



United States  
Department of  
Agriculture

Natural  
Resources  
Conservation  
Service

In cooperation with  
Illinois Agricultural  
Experiment Station

# Soil Survey of McDonough County, Illinois





# How To Use This Soil Survey

## General Soil Map

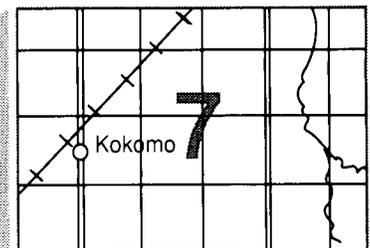
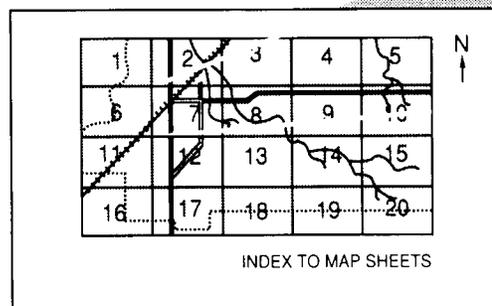
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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.

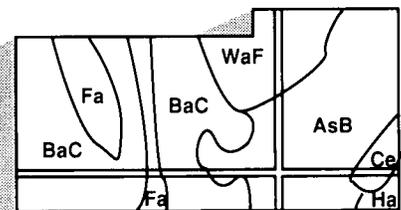
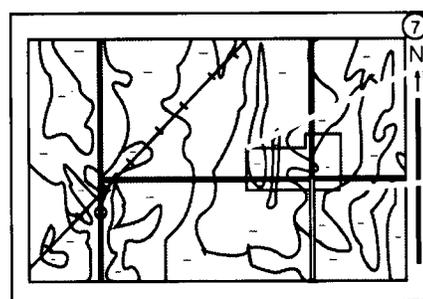
## Detailed Soil Maps

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.

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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 1989. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1989. 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 McDonough County Soil and Water Conservation District. Financial support was provided by the McDonough County Board and the Illinois Department of Agriculture.

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 151.

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**Cover: Hay being harvested from an area of Downs silt loam, 1 to 5 percent slopes, on part of the Western Illinois University farm and agricultural experiment station. (Photo courtesy of Duane Mansir and Tim Howe)**

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# Foreword

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

Thomas W. Christensen  
State Conservationist  
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# Soil Survey of McDonough County, Illinois

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By M.B. Walker, Natural Resources Conservation Service

Soils surveyed by L.L. Merkel, L.R. Staley, M.J. Walczynski, and M.B. Walker, Natural Resources Conservation Service, and C.L. Balek, R.J. Bednarek, J.S. Eversoll, and K.D. Smail, McDonough County

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

McDONOUGH COUNTY is in the west-central part of Illinois (fig. 1). It has an area of 377,750 acres, or about 590 square miles. In 1990, the county had a population of 35,244. Macomb, the county seat, had a population of 19,952.

This soil survey updates a survey of McDonough County published in 1913 (Hopkins and others, 1913). It provides more information and has larger maps, which show the soils in greater detail.

## General Nature of the County

This section provides some general information about McDonough County. It describes history and development, natural resources, physiography and drainage, and climate.

## History and Development

The Illinois State Legislature organized the boundaries of McDonough County in 1826. The administration of the county was left to Schuyler County until the population of McDonough County grew to 350 (Clarke, 1878; Hallwas, 1985). Much of the land between the Illinois and Mississippi Rivers had been set aside in 160-acre tracts for veterans of the War of 1812. These tracts were referred to as "military tracts."

The first settlers in the county were William Carter and Riggs Pennington. They established a settlement in

1826 at a location 1 mile southeast of the present town of Industry.

In late 1830, the county seat was established in present-day Macomb. By this time, there were also small settlements at other locations along the creeks in McDonough County.

Industries in the county produce ceramics, machinery parts, plastics, porcelain products for electrical uses, farm machinery, and metal fabrications.

The transportation facilities in McDonough County include Federal highways, State highways, county and township roads, and airports. The railroads provide freight and passenger service.

## Natural Resources

Soil is a dominant natural resource in McDonough County. In 1987, the number of farms was 1,018 and the acreage of farmland was approximately 92 percent of the total land area (U.S. Department of Commerce, 1989). Corn and soybeans are the primary cultivated crops. Secondary farm products include wheat, oats, hay, vegetables, cattle, hogs, dairy products, sheep and wool, and poultry and poultry products.

Of the acreage used for farming, about 24,485 acres is woodland (U.S. Department of Commerce, 1989). Most of the woodland has been pastured and is along major drainageways.

Subsurface natural resources in the county include water, coal, sand and gravel, clay, and limestone

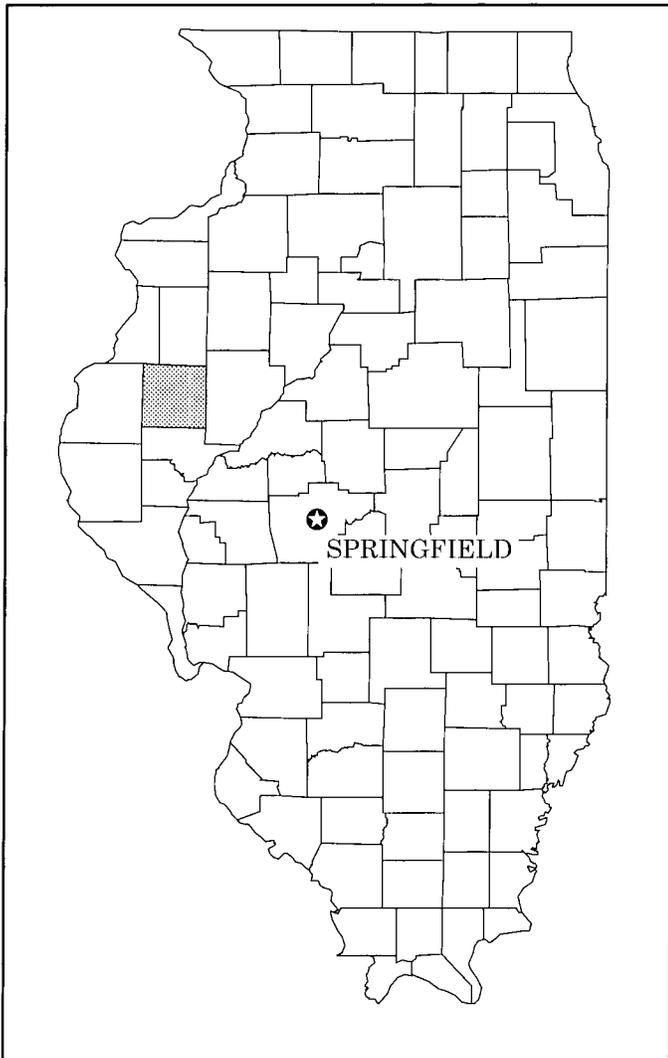


Figure 1.—Location of McDonough County in Illinois.

bedrock. Coal was mined in the Colchester area in the mid to late 1800's. Clay was excavated to supply local brickyards. Currently, one surface coal mining operation is active in McDonough County. There are also two operating limestone quarries in the county.

### Physiography and Drainage

Prepared by Cynthia L. Balek, county soil scientist, and Dr. Richard L. Rieck, geography department, Western Illinois University.

McDonough County lies in the Galesburg Plain of the Central Lowland physiographic province (Leighton and others, 1948). The Galesburg Plain is part of the relatively flat, loess-covered Illinoian glacial till plain. Although many landforms in the county are the direct

result of glaciation, the present relief is largely a result of fluvial erosion.

Dissection is greatest in the west and southwest. Because the drift is generally less than 50 feet thick in this area (Piskin and Bergstrom, 1975), many of the streams have cut down through the glacial sediments to the underlying Mississippian and Pennsylvanian bedrock. Valleys with exposed bedrock are generally narrower and steeper than valleys cut entirely in drift and create an irregular pattern of topography in the southwestern part of the county.

Mississippian rock, primarily limestone, forms the bedrock surface in large, buried bedrock valleys where preglacial streams removed overlying Pennsylvanian rocks (Horberg, 1950). The Mississippian rock is locally exposed along the La Moine River where Quaternary erosion exhumed the walls of a buried bedrock valley. Pennsylvanian strata consisting of sandstone, limestone, shale, and coal make up most of the bedrock surface. Some of these younger units, such as the Colchester (No. 2) Coal and various clays and shales, have been extensively mined.

The highest elevations in the county are situated on the crests of linear hills in the northwest and average about 800 feet above sea level. A minimum elevation of about 470 feet above sea level occurs along the La Moine Valley where the river leaves the county in the southwest (Hinds, 1917).

In the north and east, where much of the upland surface is undissected, glacial landforms are more apparent. Numerous subdued linear swells, thought to be glacially streamlined (Wickham, 1979), stand above the otherwise low-relief glacial till plain surface. Along the East Fork La Moine River are remnants of Pleistocene terraces that formed in association with Illinoian and Wisconsinan glaciation (Eldridge, unpublished thesis). Near the county's eastern border, the middle Illinoian Table Grove Moraine is a discontinuous north-south trending ridge that separates Spoon River drainage from the La Moine (Willman and Frye, 1970).

McDonough County lies entirely within the Illinois River watershed. About 90 percent of the county drains to the southwest into the La Moine River. The rest of the county drains eastward via the Spoon River (Dawes and Terstriep, 1966). An unusual, distinct rectangular drainage pattern, possibly related to glaciation (Caspall, unpublished thesis) or bedrock joints (Crowell, unpublished thesis), exists throughout most of the county. Troublesome Creek, the East Fork La Moine River, and Camp Creek are examples of linear streams exhibiting right-angle course changes characteristic of rectangular drainage. In the northeast, Drowning Fork and Farmers Fork display dendritic patterns that are

more characteristic of drainage on a glacial till plain.

## Climate

Table 1 gives data on temperature and precipitation for the survey area as recorded at La Harpe 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 25.8 degrees F and the average daily minimum temperature is 16.1 degrees. The lowest temperature on record, which occurred at La Harpe on January 17, 1977, is -22 degrees. In summer, the average temperature is 73.3 degrees and the average daily maximum temperature is 85.5 degrees. The highest recorded temperature, which occurred at La Harpe on July 12, 1966, is 104 degrees.

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

The total annual precipitation is 38.46 inches. Of this, 24.81 inches, or 65 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 19.72 inches. The heaviest 1-day rainfall during the period of record was 4.52 inches.

The average seasonal snowfall is 24.6 inches. The greatest snow depth at any one time during the period of record was 22 inches. On the average, 41 days of the year have at least 1 inch of snow on the ground. The number of such days varies greatly from year to year.

The average relative humidity in midafternoon is about 64 percent. Humidity is higher at night, and the average at dawn is about 83 percent. The sun shines 70 percent of the time possible in summer and 47 percent in winter. The prevailing wind is from the south-southwest. Average windspeed is highest, 13.8 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. 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.

In some areas, the soil names in this survey do not fully agree with those in the soil survey of Warren County, Illinois. Differences are the result of variations in the extent of the major soils in the survey areas.

## 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. Thus, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. These latter soils are called inclusions or included soils.

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

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

# General Soil Map Units

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

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

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

## Soil Descriptions

### 1. Sable-Ipava Association

*Nearly level, poorly drained and somewhat poorly drained, moderately permeable and moderately slowly permeable, silty soils that formed in loess; on uplands*

This association consists of soils on summits and in low-lying areas on loess-covered glacial till plains. Slopes range from 0 to 2 percent.

This association makes up about 14 percent of the county. It is about 58 percent Sable soils, 37 percent Ipava soils, and 5 percent soils of minor extent (fig. 2).

Sable soils are in low-lying areas. They are poorly drained and moderately permeable. Typically, the surface layer is black, friable silty clay loam about 7 inches thick. The subsurface layer is black and very dark gray, mottled, friable silty clay loam about 11 inches thick. The subsoil is about 33 inches thick. It is mottled, firm silty clay loam. The upper part is olive gray, and the lower part is light gray. The substratum to a depth of 60 inches or more is light olive gray, mottled, firm silty clay loam.

Ipava soils are on summits. They are somewhat poorly drained and moderately slowly permeable.

Typically, the surface layer is black, friable silt loam about 9 inches thick. The subsurface layer also is black, friable silt loam. It is about 8 inches thick. The subsoil is about 36 inches thick. It is mottled, friable silty clay loam. The upper part is dark grayish brown, and the lower part is light brownish gray. The substratum to a depth of 60 inches or more is light brownish gray, mottled, friable silty clay loam.

Of minor extent in this association are the poorly drained Denny soils and the moderately well drained Tama soils. Denny soils have a grayish subsurface layer. They are in shallow depressions. Tama soils are on summits and shoulders.

This association is used mainly for cultivated crops or for pasture and hay. The soils are well suited to these uses. Ponding is a hazard, and the seasonal high water table is a limitation. Management needs include measures that maintain or improve the drainage system and till. Rotation grazing or deferred grazing helps to keep pastures in good condition.

The Ipava soils are poorly suited to use as sites for dwellings or for septic tank absorption fields because of the seasonal high water table, the shrink-swell potential, and the restricted permeability. The Sable soils are generally unsuited to these uses because of the ponding.

### 2. Sable-Muscatine Association

*Nearly level, poorly drained and somewhat poorly drained, moderately permeable, silty soils that formed in loess; on uplands*

This association consists of soils on summits and in low-lying areas on loess-covered glacial till plains. Slopes range from 0 to 2 percent.

This association makes up about 3 percent of the county. It is about 75 percent Sable soils, 21 percent Muscatine soils, and 4 percent soils of minor extent.

Sable soils are in low-lying areas. They are poorly drained. Typically, the surface layer is black, friable silty clay loam about 7 inches thick. The subsurface layer is black and very dark gray, mottled, friable silty clay loam about 11 inches thick. The subsoil is about 33 inches thick. It is mottled, firm silty clay loam. The upper part is

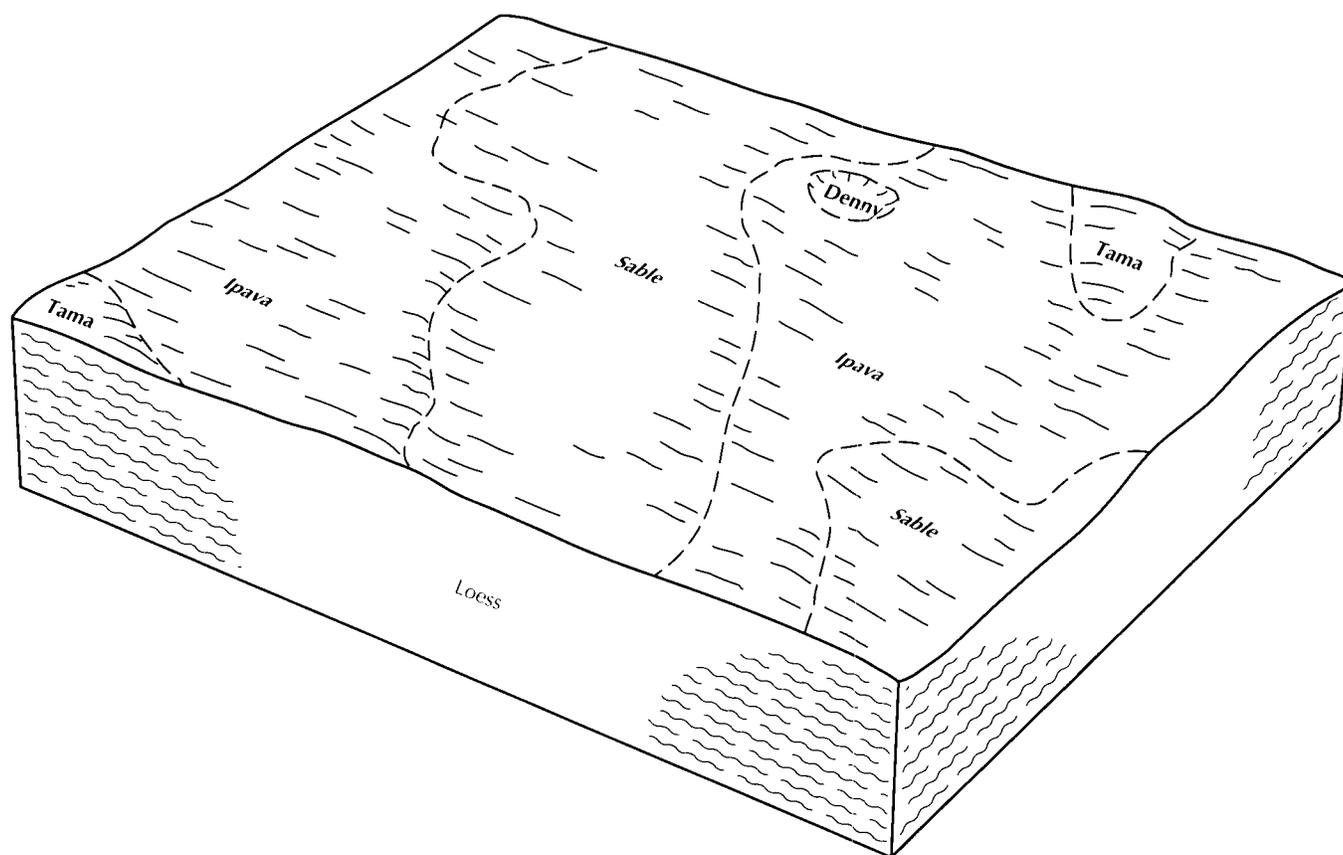


Figure 2.—Typical pattern of soils and parent material in the Sable-Ipava association.

olive gray, and the lower part is light gray. The substratum to a depth of 60 inches or more is light olive gray, mottled, firm silty clay loam.

Muscatine soils are on summits. They are somewhat poorly drained. Typically, the surface layer is very dark gray, friable silt loam about 9 inches thick. The subsurface layer also is very dark gray, friable silty clay loam. It is about 7 inches thick. The subsoil is about 44 inches thick. It is mottled. The upper part is dark grayish brown and grayish brown, friable silty clay loam. The next part is light brownish gray, friable silty clay loam. The lower part is light brownish gray, friable silt loam.

Of minor extent in this association are the poorly drained Denny soils and the moderately well drained Tama soils. Denny soils have a grayish subsurface layer. They are in shallow depressions. Tama soils are on summits and shoulders.

This association is used mainly for cultivated crops or for pasture and hay. The soils are well suited to these uses. Ponding is a hazard, and the seasonal high water table is a limitation. Management needs include measures that maintain or improve the drainage system

and tilth. Rotation grazing or deferred grazing helps to keep pastures in good condition.

The Muscatine soils are poorly suited to use as sites for septic tank absorption fields and are only moderately suited to dwellings. The seasonal high water table and the shrink-swell potential are limitations. The Sable soils are generally unsuited to these uses because of the ponding.

### 3. Ipava-Tama Association

*Nearly level to moderately sloping, somewhat poorly drained and moderately well drained, moderately slowly permeable and moderately permeable, silty soils that formed in loess; on uplands*

This association consists of soils on summits, shoulders, and back slopes on loess-covered glacial till plains. Slopes range from 0 to 10 percent.

This association makes up about 41 percent of the county. It is about 46 percent Ipava soils, 22 percent Tama soils, and 32 percent soils of minor extent (fig. 3).

Ipava soils are nearly level and gently sloping. They are lower on the landscape than the Tama soils. They

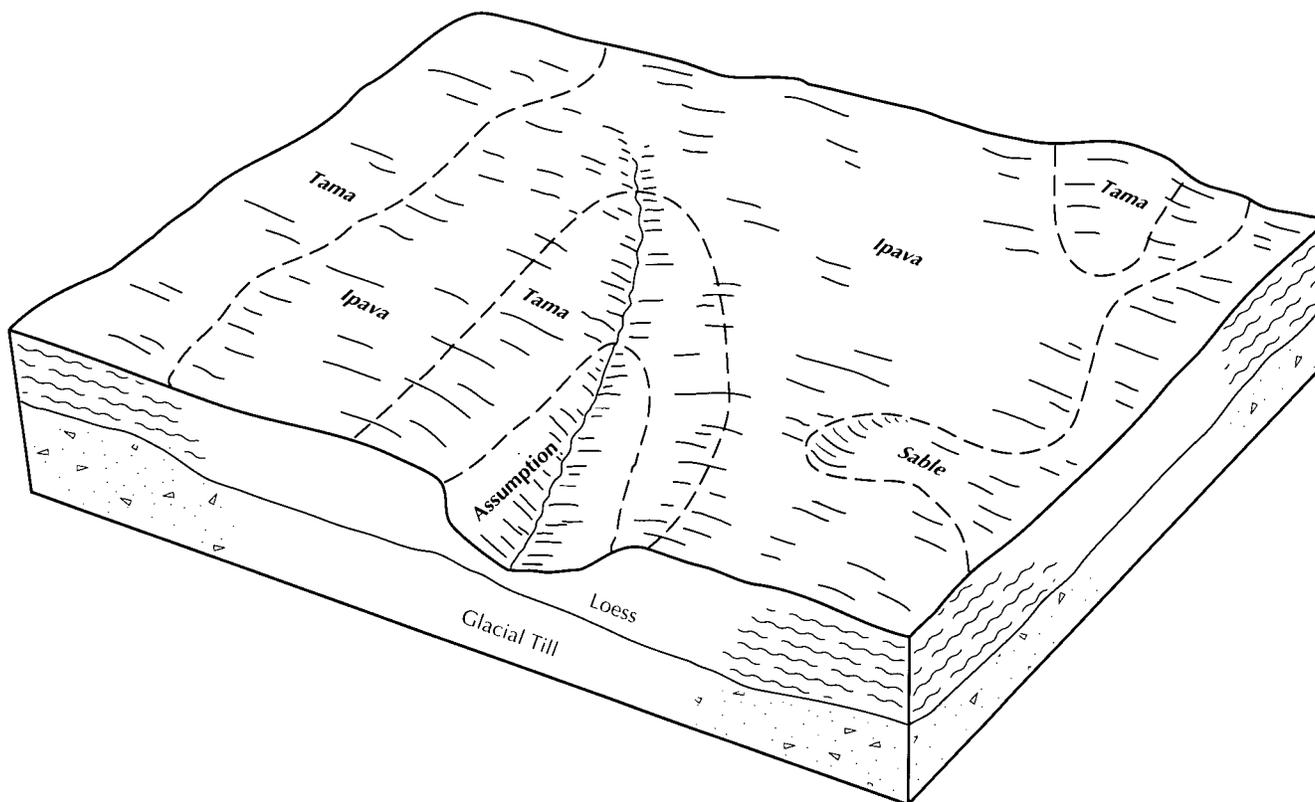


Figure 3.—Typical pattern of soils and parent material in the Ipava-Tama association.

are somewhat poorly drained and moderately slowly permeable. Typically, the surface layer is black, friable silt loam about 9 inches thick. The subsurface layer also is black, friable silt loam. It is about 8 inches thick. The subsoil is about 36 inches thick. It is mottled, friable silty clay loam. The upper part is dark grayish brown, and the lower part is light brownish gray. The substratum to a depth of 60 inches or more is light brownish gray, mottled, friable silty clay loam.

Tama soils are gently sloping and moderately sloping. They are moderately well drained and moderately permeable. Typically, the surface layer is very dark grayish brown, very friable silt loam about 6 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 5 inches thick. The subsoil is friable silty clay loam about 49 inches thick. The upper part is brown and dark yellowish brown, the next part is dark yellowish brown and mottled, and the lower part is yellowish brown and mottled.

Of minor extent in this association are the moderately well drained Assumption and Rozetta soils and the poorly drained Denny and Sable soils. Assumption soils formed in loess and in the underlying glacial till, which has a paleosol. They are lower on the shoulders and

back slopes than the major soils. Rozetta soils have a light colored surface layer. They are in landscape positions similar to those of the major soils and are closer to wooded areas. Denny soils are in shallow depressions. Sable soils are in low-lying areas.

This association is used mainly for cultivated crops or for pasture and hay. The soils are well suited to crops in the nearly level and gently sloping areas and are moderately suited to crops in the moderately sloping areas. The soils are well suited to pasture and hay. Erosion is a hazard in the sloping areas, and wetness is a limitation in the low-lying areas. Measures that control erosion and maintain drainage systems are needed. Conservation tillage and terraces are appropriate erosion-control measures in sloping areas. Rotation grazing or deferred grazing helps to keep pastures in good condition.

The Ipava soils are poorly suited to use as sites for dwellings or for septic tank absorption fields, and the Tama soils are moderately suited to this use. The seasonal high water table and the shrink-swell potential are limitations. The restricted permeability is an additional limitation in areas of the Ipava soils.

#### 4. Muscatine-Tama Association

*Nearly level to moderately sloping, somewhat poorly drained and moderately well drained, moderately permeable, silty soils that formed in loess; on uplands*

This association consists of soils on summits, shoulders, and back slopes. Slopes range from 0 to 10 percent.

This association makes up about 4 percent of the county. It is about 36 percent Muscatine soils, 30 percent Tama soils, and 34 percent soils of minor extent.

Muscatine soils are nearly level and gently sloping. They are somewhat poorly drained. They are lower on the landscape than the Tama soils. Typically, the surface layer is very dark gray, friable silt loam about 9 inches thick. The subsurface layer is very dark gray, friable silty clay loam about 7 inches thick. The subsoil is about 44 inches thick. It is mottled. The upper part is dark grayish brown and grayish brown, friable silty clay loam. The next part is light brownish gray, friable silty clay loam. The lower part is light brownish gray, friable silt loam.

Tama soils are gently sloping and moderately sloping. They are moderately well drained. Typically, the surface layer is very dark grayish brown, very friable silt loam about 6 inches thick. The subsurface layer is very dark grayish brown, friable silt loam about 5 inches thick. The subsoil is friable silty clay loam about 49 inches thick. The upper part is brown and dark yellowish brown, the next part is dark yellowish brown and mottled, and the lower part is yellowish brown and mottled.

Of minor extent in this association are the moderately well drained Assumption and Rozetta soils and the poorly drained Denny and Sable soils. Assumption soils formed in loess and in the underlying glacial till, which has a paleosol. They are in the lower positions on back slopes. Rozetta soils have a light colored surface layer. They are in landscape positions similar to those of the major soils and are closer to wooded areas. Denny soils are in shallow depressions. Sable soils are in low-lying areas.

This association is used mainly for cultivated crops or for pasture and hay. The soils are well suited to crops in the nearly level and gently sloping areas and moderately suited in the moderately sloping areas. The soils are well suited to pasture and hay. Erosion is a hazard in the sloping areas, and wetness is a limitation in the low-lying areas. Measures that control erosion and maintain or improve the drainage system are needed. Conservation tillage and terraces are appropriate erosion-control measures in sloping areas.

Rotation grazing or deferred grazing helps to keep pastures in good condition.

The Muscatine soils are moderately suited to use as sites for dwellings and poorly suited to use as sites for septic tank absorption fields. The Tama soils are moderately suited to these uses. The main limitations are the seasonal high water table and the shrink-swell potential.

#### 5. Ipava-Virden Association

*Nearly level, somewhat poorly drained and poorly drained, moderately slowly permeable, silty soils that formed in loess; on uplands*

This association consists of soils on summits and in low-lying areas on loess-covered glacial till plains. Slopes range from 0 to 2 percent.

This association makes up about 10 percent of the county. It is about 61 percent Ipava soils, 18 percent Virden soils, and 21 percent soils of minor extent.

Ipava soils are on summits. They are somewhat poorly drained. Typically, the surface layer is black, friable silt loam about 9 inches thick. The subsurface layer also is black, friable silt loam. It is about 8 inches thick. The subsoil is about 36 inches thick. It is mottled, friable silty clay loam. The upper part is dark grayish brown, and the lower part is light brownish gray. The substratum to a depth of 60 inches or more is light brownish gray, mottled, friable silty clay loam.

Virden soils are in low-lying areas. They are poorly drained. Typically, the surface layer is black, friable silty clay loam about 8 inches thick. The subsurface layer is very dark gray, mottled, friable silty clay loam about 5 inches thick. The subsoil is about 40 inches thick. It is mottled. The upper part is grayish brown and light brownish gray, firm silty clay. The lower part is light brownish gray, firm and friable silty clay loam. The substratum to a depth of 60 inches or more is light brownish gray, mottled, friable silt loam.

Of minor extent in this association are the Edinburg, Herrick, and Tama soils. The poorly drained Edinburg soils are in small, shallow depressions. The somewhat poorly drained Herrick soils are on summits and are generally closer to woodland than the major soils. The moderately well drained Tama soils are on summits and shoulders.

This association is used mainly for cultivated crops or for pasture and hay. The soils are well suited to cultivated crops and to pasture and hay. The seasonal high water table is a limitation, and ponding is a hazard. Management needs include measures that maintain or improve the drainage system and tillage. Rotation grazing or deferred grazing helps to keep pastures in good condition.

The Ipava soils are poorly suited to use as sites for dwellings or for septic tank absorption fields because of the seasonal high water table, the shrink-swell potential, and the restricted permeability. The Virden soils are generally unsuited to these uses. The ponding is an additional concern in areas of these soils.

## 6. Hickory-Rozetta-Elco Association

*Moderately sloping to very steep, well drained and moderately well drained, moderately permeable and moderately permeable over slowly permeable, loamy and silty soils that formed in glacial till or loess or in loess and in the underlying glacial till; on uplands*

This association consists of soils on shoulders and back slopes on loess-covered glacial till plains. Slopes range from 5 to 60 percent.

This association makes up about 24.5 percent of the county. It is about 36 percent Hickory soils, 26 percent Rozetta soils, 17 percent Elco soils, and 21 percent soils of minor extent (fig. 4).

Hickory soils formed in glacial till or in a thin mantle of loess and in the underlying glacial till. They are strongly sloping to very steep and are below the Rozetta and Elco soils on the landscape. They are well drained. Typically, the surface layer is dark grayish brown, very friable silt loam about 3 inches thick. The subsurface layer is brown, very friable silt loam about 6 inches thick. The subsoil to a depth of more than 60 inches is clay loam. The upper part is yellowish brown and friable. The next part is yellowish brown and firm. The lower part is yellowish brown, mottled, and firm.

Rozetta soils formed in loess. They are moderately sloping and strongly sloping and are above the Elco and Hickory soils on the landscape. They are moderately well drained and moderately permeable. Typically, the surface layer is mixed dark grayish brown and dark brown, friable silt loam about 5 inches thick. The subsurface layer is yellowish brown, friable silt loam about 6 inches thick. The subsoil is yellowish brown, friable silty clay loam about 47 inches thick. It is mottled in the lower part. The substratum to a depth of 60 inches or more is yellowish brown, mottled, friable silt loam.

Elco soils formed in loess and in the underlying glacial till, which has a paleosol. They are moderately sloping to moderately steep and are moderately well drained. Permeability is moderate in the upper part of the subsoil and moderately slow or slow in the lower part. Typically, the surface layer is mixed dark grayish brown and yellowish brown, friable silt loam about 6 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown, friable silty clay loam. The next part is yellowish brown,

mottled, firm silty clay loam. The lower part is grayish brown and light gray, mottled, firm clay.

Of minor extent in this association are Clarksdale, Keomah, Marseilles, and Wakeland soils. The somewhat poorly drained Clarksdale and Keomah soils are on summits, shoulders, and back slopes. The well drained Marseilles soils formed in loess and in the underlying residuum derived from shale. They are in lower positions on back slopes than the major soils. The somewhat poorly drained Wakeland soils are on narrow bottoms of drainageways.

This association is used for cropland, pasture, hay, or woodland. The moderately sloping and strongly sloping areas are moderately suited to cultivated crops. The moderately steep areas are poorly suited to cultivated crops, and the steep and very steep areas are generally unsuited. The moderately sloping areas are well suited to pasture and hay. The strongly sloping and moderately steep areas are moderately suited to pasture and hay, the steep areas are poorly suited, and the very steep areas are generally unsuited. The slope is the main limitation, and the hazard of erosion is also a concern. Measures that control erosion and maintain or improve tilth and productivity are needed. Conservation tillage, crop rotations, contour farming, or terraces are appropriate erosion-control measures in sloping areas. Rotation grazing or deferred grazing helps to keep pastures in good condition. The soils are well suited to woodland.

The Hickory soils are generally unsuited to use as sites for septic tank absorption fields or for dwellings because of the slope, but they are moderately suited to this use in the strongly sloping areas. The shrink-swell potential, the restricted permeability, and the slope are limitations. The Rozetta soils are moderately suited to use as sites for septic tank absorption fields or for dwellings because of the seasonal high water table and the shrink-swell potential. The Elco soils are poorly suited to this use because of the slow permeability in the subsoil, the shrink-swell potential, a seasonal high water table, and the slope.

## 7. Sawmill-Wakeland-Tice Association

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

This association consists of soils on meanderbelts and in backswamps on flood plains. They are frequently flooded for brief periods. These soils are along the La Moine River and other major streams. Slopes range from 0 to 2 percent.

This association makes up about 3 percent of the county. It is about 40 percent Sawmill soils, 30 percent

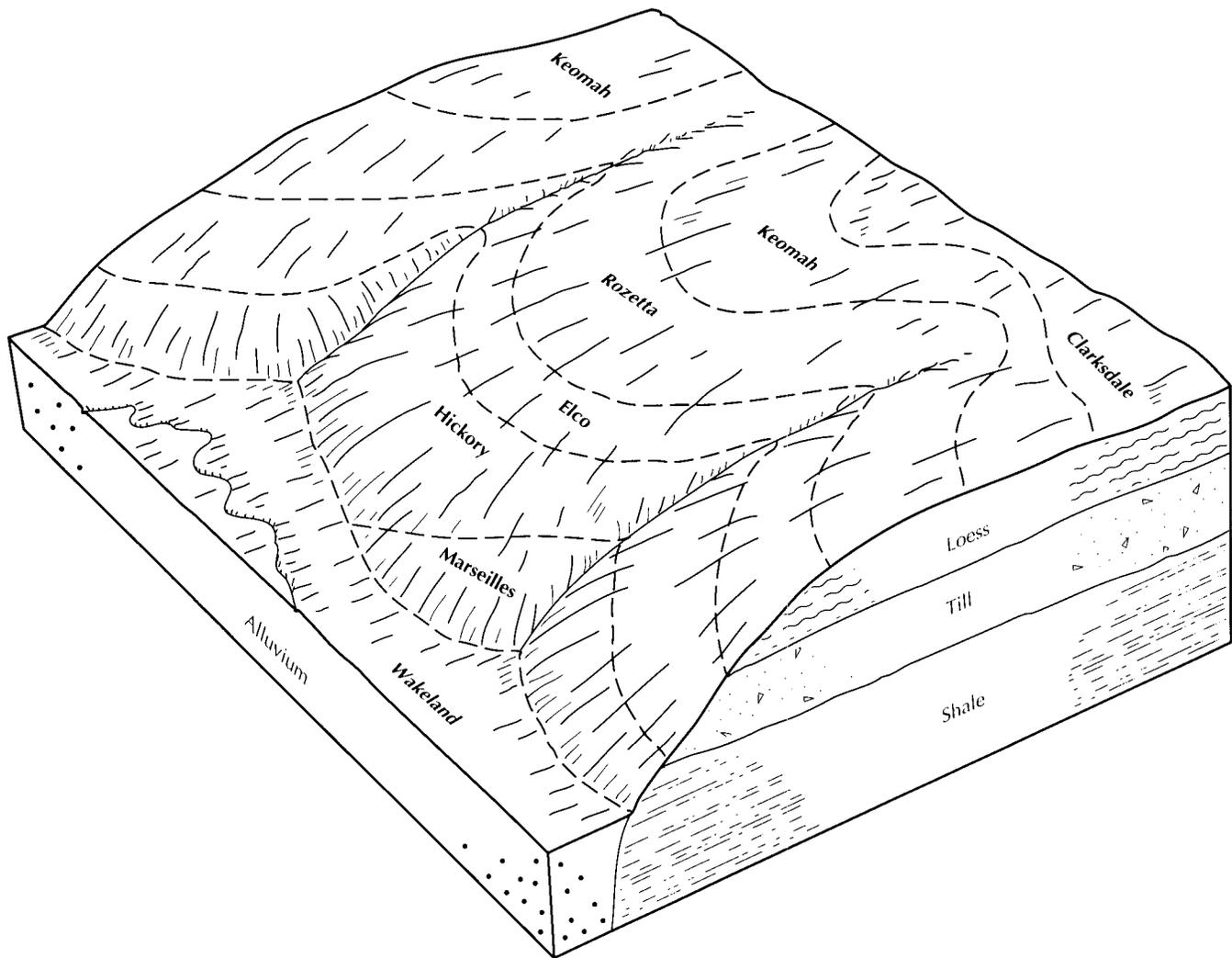


Figure 4.—Typical pattern of soils and parent material in the Hickory-Rozetta-Elco association.

Wakeland soils, 28 percent Tice soils, and 2 percent soils of minor extent (fig. 5).

Sawmill soils are on meanderbelts and in backswamps. They are lower on the landscape than the Tice and Wakeland soils and are poorly drained. Typically, the surface layer is very dark gray, friable silty clay loam about 8 inches thick. The subsurface layer also is very dark gray, friable silty clay loam. It is about 20 inches thick. It is mottled in the lower part. The subsoil is friable silty clay loam about 29 inches thick. It is mottled. The upper part is dark gray, and the lower part is light brownish gray. The substratum to a depth of 60 inches or more is light brownish gray, mottled, friable silty clay loam.

Wakeland soils are on meanderbelts. They are slightly higher on the landscape than the Sawmill soils.

They are in landscape positions similar to those of the Tice soil but generally are closer to the streams. They are somewhat poorly drained. Typically, the surface layer is mixed dark grayish brown and very dark grayish brown, mottled, friable silt loam about 9 inches thick. The substratum to a depth of 60 inches or more is mottled, friable silt loam. The upper part is dark grayish brown and has thin strata of brown material. The lower part is gray.

Tice soils are on meanderbelts. They are somewhat poorly drained. Typically, the surface layer is very dark grayish brown, friable silty clay loam about 9 inches thick. The subsurface layer also is very dark grayish brown, friable silty clay loam. It is about 6 inches thick. The subsoil is about 36 inches thick. It is mottled. The upper part is dark grayish brown, friable and firm silty

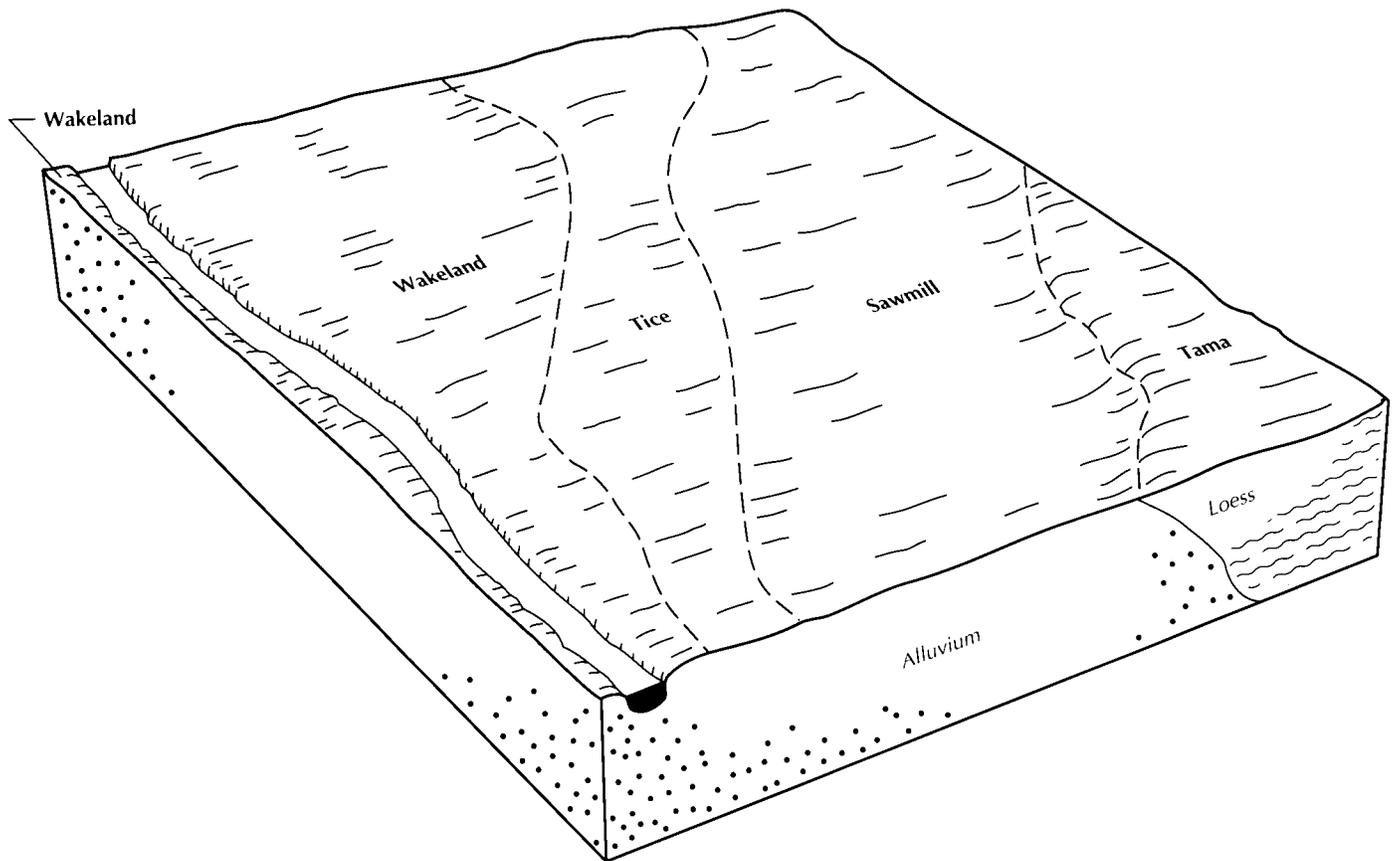


Figure 5.—Typical pattern of soils and parent material in the Sawmill-Wakeland-Tice association.

clay loam. The lower part is dark grayish brown, friable silt loam that has strata of loam. The substratum to a depth of 60 inches or more is dark grayish brown, mottled, friable silt loam that has strata of loam.

Of minor extent in this association are the moderately well drained Tama soils. These soils are on back slopes of adjacent sloping uplands.

This association is used mainly for cultivated crops or for pasture and hay. The soils are moderately suited or well suited to cultivated crops, depending on the frequency of flooding. Flooding delays harvesting in some years or may cause crop damage.

These soils are generally unsuited to use as sites for dwellings and septic tank absorption fields because of the flooding.

### 8. Rapatee-Swanwick Association

*Gently sloping, well drained and moderately well drained, slowly permeable or moderately slowly permeable, silty soils that formed in reclaimed mine spoil; on uplands*

This association consists of soils on summits,

shoulders, and back slopes of reclaimed surface mines. These soils consist of premixed soil material that has been replaced in an effort to reflect preexisting soil surface conditions. The association includes areas of water as much as 15 acres in size. Slopes range from 1 to 5 percent.

This association makes up about 0.5 percent of the county. It is about 47 percent Rapatee soils, 34 percent Swanwick soils, and 19 percent soils of minor extent (fig. 6).

Rapatee soils are on summits, shoulders, and back slopes. They are generally in areas where the premixed soils had a darker surface layer. They are well drained. Typically, the surface layer is black and very dark gray mixed with brown and yellowish brown. It is firm silty clay loam about 10 inches thick. The substratum to a depth of 60 inches or more is very firm silty clay loam. The upper part is mixed dark grayish brown, brown, and yellowish brown and has very dark gray and light brownish gray streaks. The next part is brown and yellowish brown and has very dark gray, gray, and light olive brown streaks. The lower part is mixed brown,

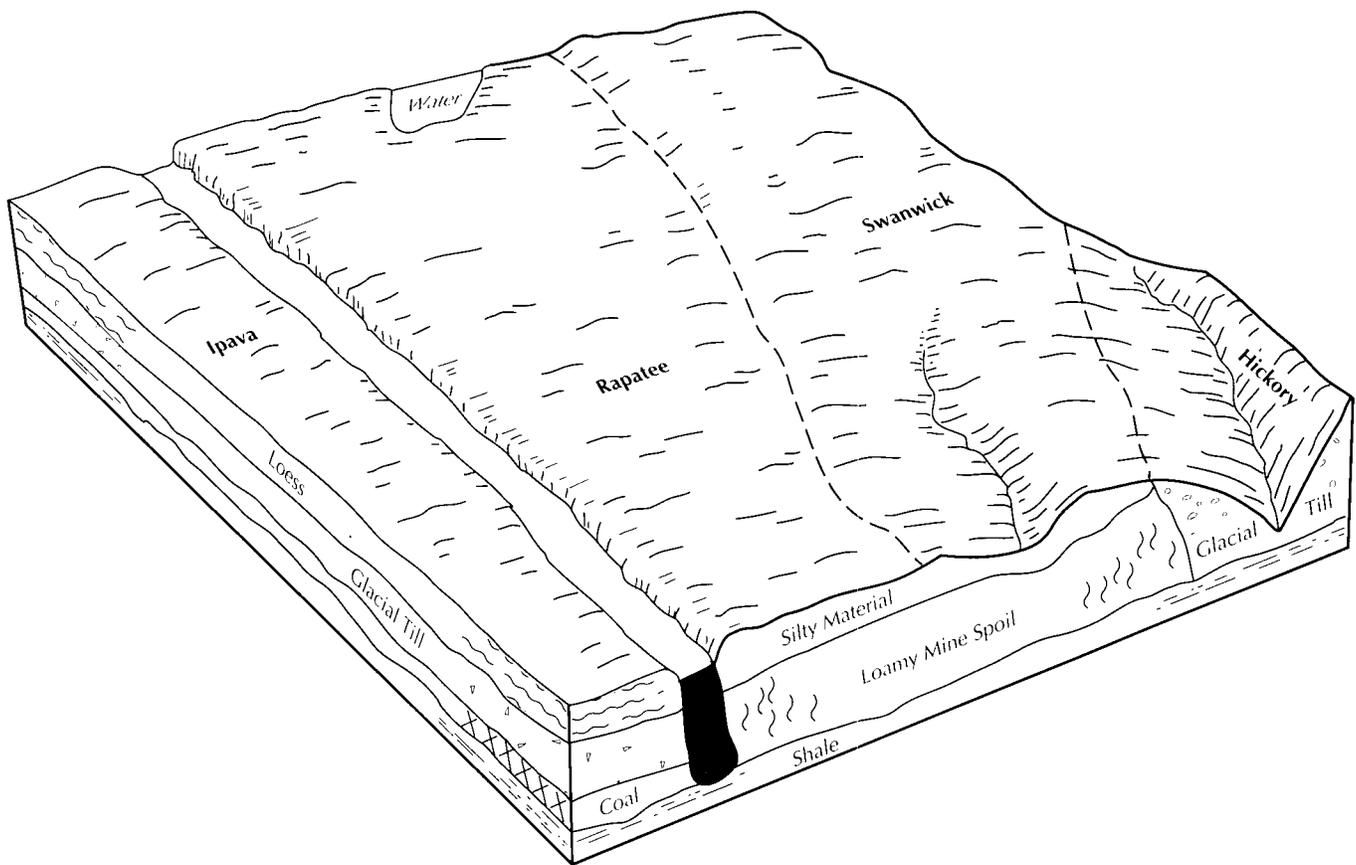


Figure 6.—Typical pattern of soils and parent material in the Rapatee-Swanwick association.

yellowish brown, gray, light olive brown, light gray, and light brownish gray. The soils have a few coarse fragments of sandstone, shale, siltstone, and limestone.

Swanwick soils are generally in areas where the premined soils had a lighter colored surface layer. They are closer to the timbered areas than the Rapatee soils. They are moderately well drained. Typically, the surface layer is brown, friable silt loam about 7 inches thick. The substratum to a depth of 60 inches or more is silty clay loam. The upper part is brown, dark grayish brown, and yellowish brown mixed with very dark grayish brown, light brownish gray, and dark brown. It is firm and very firm. The lower part is brown, dark gray, and dark yellowish brown mixed with yellowish brown, gray, light brownish gray, olive gray, dark grayish brown, and very dark gray. It is firm. The soils have a few coarse fragments of sandstone, shale, siltstone, and limestone.

Of minor extent in this association are the well drained Hickory soils, the moderately well drained Elco and Rozetta soils, and the somewhat poorly drained Ipava soils. The minor soils have not been disturbed by surface mining. Hickory and Elco soils are along

drainageways. Rozetta and Ipava soils are adjacent to the final cut or the highwall.

This association is used mainly for cultivated crops or for pasture and hay. The soils are well suited to cultivated crops and to pasture and hay. Erosion is the major hazard, and the limited available water capacity is the main limitation. Erosion-control and water-management measures are needed to maintain or improve the productivity of these soils. Conservation tillage and terraces are appropriate erosion-control measures in sloping areas. Returning crop residue to the soil or adding other organic material improves tilth, increases the rate of water infiltration, and conserves moisture. Rotation grazing or deferred grazing helps to keep pastures in good condition.

These soils are moderately suited to use as sites for dwellings. The main limitations are the shrink-swell potential of the Rapatee soils and the seasonal high water table in the Swanwick soils. The soils are poorly suited to use as sites for septic tank absorption fields because of the restricted permeability.

## Broad Land Use Considerations

The soils of McDonough County vary widely in their suitability for major land uses. Of the acreage that was farmed during 1987, about 63 percent was used for cultivated crops, principally corn and soybeans; 13 percent was used for pasture and hay; and 6 percent was woodland (U.S. Department of Commerce, 1989). Less than 1 percent of the county is surface mined for coal. The rest of the county is used for urban development, as recreational areas, or for wildlife habitat.

The major soils in associations 1, 2, 3, 4, 5, 7, and 8 are generally well suited to cultivated crops. The major limitation in associations 1, 2, and 5 is wetness, and the major hazard is ponding. The major hazard in associations 3, 4, and 8 is erosion. Also, the available water capacity is a limitation in association 8. Most areas in association 7 are frequently flooded for brief periods. The flooding can delay planting or harvesting and may cause crop damage.

Most of the pasture or hayland is in associations 5 and 6. The soils in these associations are generally suited to grasses and legumes. In association 6, the slope is a limitation and erosion is a hazard. Wetness and ponding are concerns in association 5.

Most of the woodland is in associations 6 and 7. The soils in these associations are generally well suited to woodland. Major management concerns are plant competition and equipment limitations. Erosion is a

hazard in association 6 during periods when seedlings are becoming established and during logging seasons.

The surface-mined area is in association 8. The soils in this area are reclaimed and can be used for cultivated crops or for pasture and hay. Restricted permeability and surface compaction are limitations. Erosion is a hazard in the more sloping areas.

Most of the urban land is in associations 1 and 3. The soils in these associations range from moderately suited to unsuited to urban uses. They are limited by a seasonal high water table, the shrink-swell potential, restricted permeability, and ponding. In general, the soils that are best suited to urban uses are moderately well drained or well drained and are gently sloping or sloping. Tama and Rozetta soils are examples. These soils are in associations 3, 4, and 6. Soils on flood plains, such as those in association 7, are unsuited to dwellings and septic tank absorption fields because of the flooding.

The potential for recreational uses depends on the intensity of the intended use and the properties of the soil. The soils in association 6 have the best potential for recreational development. The main limitation is the slope.

The potential for wildlife habitat varies throughout the county. All of the soils are well suited to habitat for openland wildlife. The soils best suited to habitat for woodland wildlife are in association 6. Some of the soils in associations 1, 2, and 7 are best suited to habitat for wetland wildlife.



# Detailed Soil Map Units

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The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under 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, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Tama silt loam, 1 to 5 percent slopes, is a phase of the Tama 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

### 6C2—Fishhook silt loam, 5 to 10 percent slopes, eroded

#### *Composition*

Fishhook soil and similar soils: 85 to 95 percent  
Contrasting inclusions: 5 to 15 percent

#### *Setting*

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 200 acres

*Major use:* Cropland or pasture and hay

#### *Soil Properties and Qualities*

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate in the upper part and slow in the lower part

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* Perched at a depth of 1 to 3 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* High

#### *Typical Profile*

*Surface layer:*

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

*Subsoil:*

8 to 14 inches—yellowish brown, friable silty clay loam

14 to 31 inches—brown, mottled, friable silty clay loam

31 to 38 inches—very dark gray, mottled, firm silty clay loam

38 to 60 inches—very dark grayish brown, mottled, friable silty clay

### **Inclusions**

*Contrasting inclusions:*

- The well drained Hickory soils, which have more sand in the subsoil than the Fishhook soil and are lower on the back slopes
- The well drained Ursa soils, which have a thinner mantle of loess overlying the glacial till and are lower on the back slopes

*Similar soils:*

- Soils that have a seasonal high water table at a depth of more than 3 feet
- Soils that have a thinner mantle of loess overlying the paleosol

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited

*Management measures:*

- Contour farming and a system of conservation tillage that leaves crop residue on the surface after planting help to control erosion.
- The existing drainage system should be maintained.

#### **Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor tilth.
- Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the pasture in good condition.

#### **Woodland**

*Suitability:* Moderately suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling on sites for dwellings with basements.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains higher on the back slope than the absorption field helps to lower the seasonal high water table.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### **Interpretive Groups**

*Land capability classification:* IIIe

*Woodland ordination symbol:* 4C

*Windbreak suitability group:* 4

### **6D2—Fishhook silt loam, 10 to 18 percent slopes, eroded**

#### **Composition**

Fishhook soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

#### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 60 acres

*Major use:* Cropland or pasture and hay

#### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate in the upper part and slow in the lower part

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Rapid

*Available water capacity:* High

*Seasonal high water table:* Perched at a depth of 1 to 3 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* High

#### **Typical Profile**

*Surface layer:*

0 to 8 inches—mixed dark grayish brown and yellowish brown, friable silt loam

*Subsoil:*

8 to 10 inches—yellowish brown, friable silt loam

10 to 16 inches—yellowish brown, mottled, friable silty clay loam

16 to 26 inches—brown, mottled, friable silty clay loam

26 to 56 inches—light gray and gray, mottled, firm silty clay

56 to 60 inches—gray, mottled, firm clay loam

### ***Inclusions***

#### *Contrasting inclusions:*

- The well drained Hickory soils in the lower positions on back slopes

#### *Similar soils:*

- Soils that have a seasonal high water table at a depth of more than 3 feet

### ***Use and Management***

#### **Cropland**

*Suitability:* Poorly suited

#### *Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting, a crop rotation that is dominated by forage crops, contour farming, and terraces help to control erosion.
- The existing subsurface drainage system should be maintained.

#### **Pasture and hay**

*Suitability:* Moderately suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

#### *Management measures:*

- Rotation grazing or deferred grazing and applications of fertilizer help to keep the pasture in good condition and help to control erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.

#### **Woodland**

*Suitability:* Moderately suited

#### *Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Poorly suited

#### *Management measures:*

- Land shaping by cutting and filling helps to overcome the slope.
- Installing subsurface tile drains near the foundations helps to remove excess water.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling on sites for dwellings with basements.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

#### *Management measures:*

- Installing subsurface tile drains higher on the back slope than the absorption field helps to intercept seepage water.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### ***Interpretive Groups***

*Land capability classification:* IVE

*Woodland ordination symbol:* 4C

*Windbreak suitability group:* 4

## **7C3—Atlas silty clay loam, 5 to 10 percent slopes, severely eroded**

### ***Composition***

Atlas soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### ***Setting***

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 40 acres

*Major use:* Cropland or pasture and hay

### ***Soil Properties and Qualities***

*Drainage class:* Somewhat poorly drained

*Permeability:* Very slow

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Rapid

*Available water capacity:* Moderate

*Seasonal high water table:* Perched at a depth of 1 to 2 feet during the spring

*Organic matter content:* Low

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* High

### ***Typical Profile***

*Surface layer:*

0 to 8 inches—brown, friable silty clay loam

*Subsoil:*

8 to 36 inches—brown, very dark grayish brown, and grayish brown, mottled, firm silty clay

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

### ***Inclusions***

*Contrasting inclusions:*

- The moderately well drained Elco soils, which are

higher on the back slopes than the Atlas soil

*Similar soils:*

- Soils that have a thicker surface horizon

### ***Use and Management***

#### **Cropland**

*Suitability:* Poorly suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting, terraces, contour farming, and a crop rotation that is dominated by forage crops help to control erosion.
- Regular additions of organic material help to maintain productivity and tilth.

#### **Pasture and hay**

*Suitability:* Moderately suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- A no-till method of seeding or pasture renovation helps to establish forage species and helps to control erosion.
- Proper stocking rates, rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition.

#### **Woodland**

*Suitability:* Moderately suited

*Management measures:*

- Harvesting methods that do not isolate the remaining trees or leave them widely spaced reduce the windthrow hazard.
- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
- Land shaping by cutting and filling helps to overcome the slope.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- A septic tank system can function satisfactorily if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed.

### ***Interpretive Groups***

*Land capability classification:* IVe

*Woodland ordination symbol:* 4C

*Windbreak suitability group:* 4

## **7D3—Atlas silty clay loam, 10 to 18 percent slopes, severely eroded**

### ***Composition***

Atlas soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

### ***Setting***

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 60 acres

*Major use:* Pasture and hay

### ***Soil Properties and Qualities***

*Drainage class:* Somewhat poorly drained

*Permeability:* Very slow

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Rapid

*Available water capacity:* Moderate

*Seasonal high water table:* Perched at a depth of 1 to 2 feet during the spring

*Organic matter content:* Low

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* High

### ***Typical Profile***

*Surface layer:*

0 to 7 inches—dark grayish brown and mixed yellowish brown and light gray, firm silty clay loam

*Subsoil:*

7 to 15 inches—dark grayish brown, mottled, firm silty clay loam

15 to 59 inches—grayish brown and light brownish gray, mottled, firm silty clay and silty clay loam

59 to 60 inches—grayish brown, mottled, firm clay loam

### ***Inclusions***

*Contrasting inclusions:*

- The moderately well drained Elco soils, which formed in a thicker mantle of loess than the Atlas soil and are higher on the back slopes
- The well drained Hickory soils, which have more sand in the subsoil than the Atlas soil and are lower on the back slopes
- The well drained Ursa soils, which are lower on the back slopes than the Atlas soil

*Similar soils:*

- Soils that have a thicker surface horizon

**Use and Management****Pasture and hay***Suitability:* Poorly suited*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa*Management measures:*

- Using a no-till method of pasture renovation and seeding on the contour help to prevent further erosion.
- Deferring grazing when the soil is wet helps to keep the pasture in good condition.

**Woodland***Suitability:* Moderately suited*Management measures:*

- The seedling mortality rate can be reduced by selecting planting stock that is older and larger than usual.
- The woodland should be protected from fire and from grazing by livestock.

**Dwellings***Suitability:* Poorly suited*Management measures:*

- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
- Installing underground drains helps to control the seasonal high water table.
- Land shaping by cutting and filling helps to overcome the slope.

**Septic tank absorption fields***Suitability:* Poorly suited*Management measures:*

- Installing subsurface tile drains higher on the back slope than the absorption field helps to intercept seepage water and helps to overcome the wetness.
- A septic tank system can function satisfactorily if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed.

**Interpretive Groups***Land capability classification:* VIe*Woodland ordination symbol:* 4C*Windbreak suitability group:* 4**8D2—Hickory loam, 10 to 18 percent slopes, eroded****Composition**

Hickory soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

**Setting***Landscape:* Upland*Position on the landform:* Back slopes and shoulders on glacial till plains*Shape of areas:* Irregular or long and narrow*Size of areas:* 3 to 90 acres*Major use:* Pasture and hay or cropland**Soil Properties and Qualities***Drainage class:* Well drained*Permeability:* Moderate*Parent material:* Glacial till*Runoff:* Rapid*Available water capacity:* High*Seasonal high water table:* At a depth of more than 6 feet*Organic matter content:* Moderately low*Erosion hazard:* Severe*Shrink-swell potential:* Moderate*Potential for frost action:* Moderate**Typical Profile***Surface layer:*

0 to 4 inches—dark brown and dark yellowish brown, friable loam

*Subsoil:*

4 to 23 inches—dark yellowish brown, friable clay loam

23 to 44 inches—yellowish brown, mottled, firm clay loam

44 to 56 inches—dark yellowish brown, mottled, firm loam

*Substratum:*

56 to 60 inches—yellowish brown, mottled, firm loam

**Inclusions***Contrasting inclusions:*

- The somewhat poorly drained Atlas soils, which have more clay in the subsoil than the Hickory soil and are higher on the back slopes
- The somewhat poorly drained Fishhook soils, which have a thicker mantle of loess than the Hickory soil and are higher on the back slopes

*Similar soils:*

- Soils that have a darker surface layer
- Soils that have a paleosol
- Soils that have less clay

**Use and Management****Cropland***Suitability:* Moderately suited*Management measures:*

- A crop rotation that includes 1 or more years of forage crops, a system of conservation tillage that leaves crop residue on the surface after planting, terraces, and

contour farming help to control erosion.

- Regular additions of organic material help to maintain productivity and tilth.

### **Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Deferred grazing helps to prevent surface compaction and excessive runoff and reduces the hazard of erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
- Applications of fertilizer are needed.
- The plants should not be grazed or clipped until they are sufficiently established.

### **Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

### **Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Land shaping by cutting and filling helps to overcome the slope.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

### **Septic tank absorption fields**

*Suitability:* Moderately suited

*Management measures:*

- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
- Installing the filter lines on the contour or land shaping by cutting and filling helps to overcome the slope.

### **Interpretive Groups**

*Land capability classification:* IIIe

*Woodland ordination symbol:* 5A

*Windbreak suitability group:* 3

## **8F—Hickory silt loam, 18 to 30 percent slopes**

### **Composition**

Hickory soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 3 to 340 acres

*Major use:* Pasture and hay or woodland

### **Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Moderate

*Parent material:* Loess and the underlying glacial till

*Runoff:* Rapid

*Available water capacity:* High

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

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* Moderate

*Potential for frost action:* Moderate

### **Typical Profile**

*Surface layer:*

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

*Subsurface layer:*

3 to 9 inches—brown, very friable silt loam

*Subsoil:*

9 to 19 inches—yellowish brown, friable clay loam

19 to 31 inches—yellowish brown, firm clay loam

31 to 60 inches—yellowish brown, mottled, firm clay loam

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Atlas soils, which have more clay in the subsoil than the Hickory soil and are higher on the back slopes
- The somewhat poorly drained Fishhook soils, which have a thicker mantle of loess than the Hickory soil and are higher on the back slopes
- The somewhat poorly drained Wakeland soils at the bottom of drainageways

*Similar soils:*

- Soils that formed in a thicker mantle of loess
- Soils that have a paleosol
- Soils that have less clay and more sand, particularly along Spring Creek or Troublesome Creek

### **Use and Management**

#### **Pasture and hay**

*Suitability:* Poorly suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

**Management measures:**

- A no-till method of seeding or pasture renovation helps to establish forage species and helps to control erosion.
- Proper stocking rates, rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition.

**Woodland**

*Suitability:* Well suited

**Management measures:**

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- Establishing logging roads and skid trails on the contour and seeding bare logging areas to grass or to a grass-legume mixture help to control erosion.
- The woodland should be protected from fire and from grazing by livestock.

**Wildlife habitat**

*Suitability:* Well suited

**Management measures:**

- This soil is suitable for grain and seed crops, wild herbaceous plants, and hardwood trees.
- The habitat should be protected from fire and from grazing by livestock.

**Dwellings**

*Suitability:* Generally unsuited

**Septic tank absorption fields**

*Suitability:* Generally unsuited

**Interpretive Groups**

*Land capability classification:* VIe

*Woodland ordination symbol:* 5R

*Windbreak suitability group:* 3

**8G—Hickory silt loam, 30 to 60 percent slopes****Composition**

Hickory soil and similar soils: 85 to 95 percent

Contrasting inclusions: 5 to 15 percent

**Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains and escarpments

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 5 to 50 acres

*Major use:* Woodland

**Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Moderate

*Parent material:* Loess and the underlying glacial till

*Runoff:* Very rapid

*Available water capacity:* High

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

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* Moderate

*Potential for frost action:* Moderate

**Typical Profile**

*Surface layer:*

0 to 4 inches—dark grayish brown, friable silt loam

*Subsoil:*

4 to 8 inches—yellowish brown, friable loam

8 to 39 inches—yellowish brown, friable clay loam

39 to 60 inches—yellowish brown, friable loam

**Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Atlas soils, which are higher on the back slopes than the Hickory soil
- The moderately deep Marseilles soils, which have shale in the lower part of the profile and are lower on the back slopes than the Hickory soil
- Ursa soils, which contain more clay than the Hickory soil and are higher on the back slopes
- The somewhat poorly drained Wakeland soils at the bottom of drainageways

*Similar soils:*

- Soils that have more than 20 inches of loess
- Soils that have less clay

**Use and Management****Woodland**

*Suitability:* Well suited

**Management measures:**

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- Establishing logging roads and skid trails on the contour and seeding bare logging areas to grass or to a grass-legume mixture help to control erosion.
- Machinery should be used only when the soil is firm enough to support the equipment.
- The woodland should be protected from fire and from grazing by livestock.

**Wildlife habitat**

*Suitability:* Well suited

**Management measures:**

- This soil is suitable for grain and seed crops, wild herbaceous plants, and hardwood trees.

- The habitat should be protected from fire and from grazing by livestock.

### **Dwellings**

*Suitability:* Generally unsuited

### **Septic tank absorption fields**

*Suitability:* Generally unsuited

### **Interpretive Groups**

*Land capability classification:* VIIe

*Woodland ordination symbol:* 5R

*Windbreak suitability group:* 3

## **16—Rushville silt loam**

### **Composition**

Rushville soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Shallow depressions on loess-covered glacial till plains

*Shape of areas:* Irregular

*Ponding:* Subject to ponding for brief periods during the spring

*Size of areas:* 3 to 30 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Poorly drained

*Permeability:* Slow

*Parent material:* Loess

*Runoff:* Slow to ponded

*Available water capacity:* High

*Seasonal high water table:* Perched at 1 foot above to 1 foot below the surface during the spring

*Organic matter content:* Moderate

*Erosion hazard:* None or slight

*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 15 inches—gray, friable silt

15 to 19 inches—gray, mottled, friable silt loam

*Subsoil:*

19 to 37 inches—grayish brown, mottled, firm silty clay

37 to 60 inches—light olive gray and olive gray, mottled, firm silty clay loam

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Clarksdale and Keomah soils on nearly level summits

*Similar soils:*

- Soils that have a darker surface horizon

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited

*Management measures:*

- The existing subsurface drainage system should be maintained.
- Tilling when the soil is wet causes surface cloddiness and compaction.
- Returning crop residue to the soil and minimizing tillage improve tilth and increase the rate of water infiltration.

#### **Wildlife habitat**

*Suitability:* Well suited

*Management measures:*

- The wetland plants used as food and cover by wetland wildlife grow well on this soil.
- The habitat should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Generally unsuited

#### **Septic tank absorption fields**

*Suitability:* Generally unsuited

### **Interpretive Groups**

*Land capability classification:* IIIw

*Windbreak suitability group:* 2

## **17A—Keomah silt loam, 0 to 2 percent slopes**

### **Composition**

Keomah soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Summits on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 200 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow or slow

*Parent material:* Loess

*Runoff:* Slow

*Available water capacity:* High

*Seasonal high water table:* At a depth of 2 to 4 feet from late fall through early summer

*Organic matter content:* Moderately low

*Erosion hazard:* None or slight

*Shrink-swell potential:* High

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 7 inches—dark grayish brown, friable silt loam

*Subsurface layer:*

7 to 12 inches—dark grayish brown, mottled, friable silt loam

*Subsoil:*

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

28 to 52 inches—grayish brown, mottled, firm silty clay loam

*Substratum:*

52 to 60 inches—yellowish brown, mottled, friable silt loam

### **Inclusions**

*Contrasting inclusions:*

- The poorly drained Sable soils in low areas
- The poorly drained Denny and Rushville soils in depressions

*Similar soils:*

- Soils that are better drained
- Soils that have less clay in the subsoil
- Soils that have slopes of more than 2 percent
- Soils that have a darker surface layer

### **Use and Management**

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- The existing subsurface drainage system should be maintained.
- A system of conservation tillage that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### **Interpretive Groups**

*Land capability classification:* IIw

*Woodland ordination symbol:* 3A

*Windbreak suitability group:* 1

## **17B—Keomah silt loam, 2 to 5 percent slopes**

### **Composition**

Keomah soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands and terraces

*Position on the landform:* Shoulders and back slopes on loess-covered glacial till plains and terrace treads on stream terraces

*Shape of areas:* Irregular

*Size of areas:* 3 to 150 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow or slow

*Parent material:* Loess

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* At a depth of 2 to 4 feet from late fall through early summer

*Organic matter content:* Moderately low

*Erosion hazard:* Moderate

*Shrink-swell potential:* High

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

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

*Subsoil:*

8 to 10 inches—grayish brown, mottled, friable silty clay loam

10 to 45 inches—brown and grayish brown, mottled, firm silty clay loam

*Substratum:*

45 to 60 inches—light brownish gray, mottled, firm silty clay loam

**Inclusions***Contrasting inclusions:*

- The poorly drained Sable soils in low areas
- The poorly drained Denny and Rushville soils in depressions

*Similar soils:*

- Soils that have a seasonal high water table at a depth of more than 4 feet
- Soils that have less clay in the subsoil
- Soils that have slopes of more than 5 percent
- Soils that have slopes of less than 2 percent
- Soils that have a darker surface layer

**Use and Management****Cropland**

*Suitability:* Well suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion and maintain tilth and fertility.
- The existing subsurface drainage system should be maintained.

**Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from grazing by livestock and from fire.

**Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

**Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.
- Increasing the size of the filter field or replacing the

soil with more permeable material helps to overcome the restricted permeability.

**Interpretive Groups**

*Land capability classification:* IIe

*Woodland ordination symbol:* 3A

*Windbreak suitability group:* 1

**36B—Tama silt loam, 1 to 5 percent slopes****Composition**

Tama soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

**Setting**

*Landscape:* Uplands and terraces

*Position on the landform:* Summits, shoulders, and back slopes on loess-covered glacial till plains and terrace treads on stream terraces

*Shape of areas:* Irregular

*Size of areas:* 3 to 260 acres

*Major use:* Cropland

**Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* At a depth of 4 to 6 feet from late fall through spring

*Organic matter content:* Moderate

*Erosion hazard:* Moderate

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

**Typical Profile***Surface layer:*

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

*Subsurface layer:*

6 to 11 inches—very dark grayish brown, friable silt loam

*Subsoil:*

11 to 24 inches—brown and dark yellowish brown, friable silty clay loam

24 to 33 inches—dark yellowish brown, mottled, friable silty clay loam

33 to 60 inches—yellowish brown, mottled, friable silty clay loam

**Inclusions***Contrasting inclusions:*

- The poorly drained Sable soils in low areas

- The somewhat poorly drained Ipava soils on nearly level summits
- The poorly drained Denny soils, which have more clay in the subsoil than the Tama soil and are in depressions

*Similar soils:*

- Soils that have a thinner surface horizon
- Soils that have a paleosol within a depth of 60 inches

### **Use and Management**

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting (fig. 7), terraces, and contour farming help to control erosion.
- Returning crop residue to the soil and adding other organic material help to maintain tilth and fertility.

#### **Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness on sites for dwellings with basements.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.

### **Interpretive Groups**

*Land capability classification:* IIe

*Windbreak suitability group:* 3

## **36B2—Tama silt loam, 2 to 5 percent slopes, eroded**

### **Composition**

Tama and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 5 to 80 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* At a depth of 4 to 6 feet from late fall through spring

*Organic matter content:* Moderate

*Erosion hazard:* Moderate

*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 15 inches—dark yellowish brown, friable silty clay loam

15 to 40 inches—dark yellowish brown, mottled, friable silty clay loam

40 to 49 inches—dark yellowish brown, mottled, friable silt loam

*Substratum:*

49 to 60 inches—yellowish brown, mottled, friable silt loam

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Herrick and Ipava soils, which have more clay in the subsoil than the Tama soil and are on nearly level summits
- The poorly drained Sable soils in low areas

*Similar soils:*

- Soils that have a thinner surface layer
- Soils that have a paleosol within a depth of 60 inches

### **Use and Management**

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting, terraces, and contour farming helps to control erosion.
- Regular additions of organic material help to maintain productivity and tilth.

#### **Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness on sites for dwellings with basements.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.



Figure 7.—No-till corn planted in soybean residue in an area of Tama silt loam, 1 to 5 percent slopes.

#### **Septic tank absorption fields**

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.

#### ***Interpretive Groups***

*Land capability classification:* IIe

*Windbreak suitability group:* 3

#### **36C2—Tama silt loam, 5 to 10 percent slopes, eroded**

##### ***Composition***

Tama soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

#### ***Setting***

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 80 acres

*Major use:* Cropland

#### ***Soil Properties and Qualities***

*Drainage class:* Moderately well drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* At a depth of 4 to 6 feet from late fall through spring

*Organic matter content:* Moderate

*Erosion hazard:* Severe

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

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

*Subsoil:*

9 to 13 inches—brown, friable silty clay loam

13 to 18 inches—dark yellowish brown, firm silty clay loam

18 to 36 inches—yellowish brown, mottled, firm silty clay loam

36 to 52 inches—yellowish brown, mottled, friable silt loam

*Stratum:*

52 to 60 inches—brown, mottled, friable silt loam

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Radford soils, which are in drainageways and are subject to flooding

*Similar soils:*

- Soils that have a lighter colored surface layer
- Soils that have a paleosol within a depth of 60 inches

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited

*Management measures:*

- A crop rotation that includes 1 or more years of forage crops, a system of conservation tillage that leaves crop residue on the surface after planting, terraces, and contour farming help to control erosion.
- Regular additions of organic material help to maintain productivity and tilth.

#### **Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Deferred grazing helps to prevent surface compaction and excessive runoff and reduces the hazard of erosion.
- Applications of fertilizer are needed.
- The plants should not be grazed or clipped until they are sufficiently established.

#### **Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
- Land shaping by cutting and filling helps to overcome the slope.
- On sites for dwellings with basements, installing subsurface tile drains near the foundations helps to overcome the wetness.

#### **Septic tank absorption fields**

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.

### **Interpretive Groups**

*Land capability classification:* IIIe

*Windbreak suitability group:* 3

## **41A—Muscatine silt loam, 0 to 2 percent slopes**

### **Composition**

Muscatine soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Summits on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 100 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Slow

*Available water capacity:* High

*Seasonal high water table:* At a depth of 2 to 4 feet from late fall through early spring

*Organic matter content:* High

*Erosion hazard:* None or slight

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 9 inches—very dark gray, friable silt loam

*Subsurface layer:*

9 to 16 inches—very dark gray, friable silty clay loam

*Subsoil:*

16 to 33 inches—dark grayish brown and grayish brown, mottled, friable silty clay loam

33 to 43 inches—light brownish gray, mottled, friable silty clay loam

43 to 60 inches—light brownish gray, mottled, friable silt loam

**Inclusions***Contrasting inclusions:*

- The poorly drained Denny soils, which are more slowly permeable than the Muscatine soil and are in depressions
- The poorly drained Sable soils in low areas
- The moderately well drained Tama soils on gently sloping summits

*Similar soils:*

- Soils that have a thinner surface layer
- Soils that have a lighter colored subsurface layer
- Soils that have more clay in the subsoil

**Use and Management****Cropland**

*Suitability:* Well suited

*Management measures:*

- No major limitations affect the use of this soil for cultivated crops.
- A system of conservation tillage that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

**Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

**Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

**Interpretive Groups**

*Land capability classification:* 1

*Windbreak suitability group:* 1

**41B—Muscatine silt loam, 2 to 5 percent slopes****Composition**

Muscatine soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

**Setting**

*Landscape:* Uplands

*Position on the landform:* Shoulders and back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 60 acres

*Major use:* Cropland

**Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Slow

*Available water capacity:* High

*Seasonal high water table:* At a depth of 2 to 4 feet from late fall through early summer

*Organic matter content:* High

*Erosion hazard:* Moderate

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

**Typical Profile***Surface layer:*

0 to 9 inches—black, friable silt loam

*Subsurface layer:*

9 to 14 inches—black, friable silt loam

*Subsoil:*

14 to 18 inches—dark grayish brown, friable silty clay loam

18 to 26 inches—dark grayish brown, mottled, friable silty clay loam

26 to 47 inches—grayish brown, mottled, friable silty clay loam

47 to 55 inches—light brownish gray, mottled, friable silty clay loam

*Substratum:*

55 to 60 inches—light brownish gray, mottled, friable silt loam

**Inclusions***Contrasting inclusions:*

- The poorly drained Sable soils in low areas
- The moderately well drained Tama soils, which are slightly higher on the shoulders and back slopes than the Muscatine soil

*Similar soils:*

- Soils that have a thinner surface layer

### **Use and Management**

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- No major limitations affect the use of this soil for cultivated crops.
- A system of conservation tillage that leaves crop residue on the surface after planting helps to maintain productivity and tilth and helps to control erosion.

#### **Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to remove excess water.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### **Interpretive Groups**

*Land capability classification:* IIe

*Windbreak suitability group:* 1

## **43A—Ipava silt loam, 0 to 2 percent slopes**

### **Composition**

Ipava soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Summits on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 2,700 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Parent material:* Loess

*Runoff:* Slow

*Available water capacity:* High

*Seasonal high water table:* At a depth of 1 to 3 feet during the spring

*Organic matter content:* High

*Erosion hazard:* None or slight

*Shrink-swell potential:* High

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 9 inches—black, friable silt loam

*Subsurface layer:*

9 to 17 inches—black, friable silt loam

*Subsoil:*

17 to 29 inches—dark grayish brown, mottled, friable silty clay loam

29 to 53 inches—light brownish gray, mottled, friable silty clay loam

*Substratum:*

53 to 60 inches—light brownish gray, mottled, friable silty clay loam

### **Inclusions**

*Contrasting inclusions:*

- The poorly drained Sable and Virden soils in low areas
- The poorly drained Denny and Edinburg soils in depressions
- The moderately well drained Tama soils, which are higher on the summits than the Ipava soil

*Similar soils:*

- Soils that have less clay in the subsoil
- Soils that have a grayish subsurface layer
- Soils that have a thinner surface layer

### **Use and Management**

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- No major limitations affect the use of this soil for cultivated crops.
- A system of conservation tillage that leaves crop residue on the surface helps to maintain tilth and fertility.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to remove excess water.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.

- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### **Interpretive Groups**

*Land capability classification:* 1

*Windbreak suitability group:* 1

## **43B—Ipava silt loam, 2 to 5 percent slopes**

### **Composition**

Ipava soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Shoulders and back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 100 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Parent material:* Loess

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* At a depth of 1 to 3 feet during the spring

*Organic matter content:* High

*Erosion hazard:* Moderate

*Shrink-swell potential:* High

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

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

*Subsurface layer:*

8 to 15 inches—very dark gray, friable silt loam

*Subsoil:*

15 to 20 inches—brown, mottled, friable silty clay loam

20 to 28 inches—dark grayish brown, mottled, friable silty clay loam

28 to 50 inches—grayish brown, mottled, friable silty clay loam

*Substratum:*

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

### **Inclusions**

*Contrasting inclusions:*

- Keller soils, which have a paleosol within a depth of

60 inches and are lower on the back slopes than the Ipava soil

*Similar soils:*

- Soils that do not have a subsurface layer

### **Use and Management**

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- Erosion can be controlled by a system of conservation tillage that leaves crop residue on the surface after planting, by contour farming, or by terraces.
- Returning crop residue to the soil and adding other organic material help to maintain tilth and fertility.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
- Installing subsurface tile drains near the foundations helps to overcome the wetness.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### **Interpretive Groups**

*Land capability classification:* 1Ie

*Windbreak suitability group:* 1

## **45—Denny silt loam**

### **Composition**

Denny soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Shallow depressions on loess-covered glacial till plains

*Shape of areas:* Irregular

*Ponding:* Subject to ponding for brief periods during the spring

*Size of areas:* 3 to 10 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Poorly drained

*Permeability:* Slow  
*Parent material:* Loess  
*Runoff:* Pondered  
*Available water capacity:* High  
*Seasonal high water table:* 1 foot above to 2 feet below the surface during the spring  
*Organic matter content:* Moderate  
*Erosion hazard:* None or slight  
*Shrink-swell potential:* High  
*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*  
 0 to 9 inches—very dark grayish brown, very friable silt loam  
*Subsurface layer:*  
 9 to 21 inches—dark grayish brown and grayish brown, mottled, friable silt loam  
*Subsoil:*  
 21 to 38 inches—grayish brown, mottled, firm silty clay and silty clay loam  
 38 to 46 inches—light brownish gray, mottled, firm silty clay loam  
*Substratum:*  
 46 to 60 inches—light brownish gray, mottled, firm silty clay loam

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Clarksdale, Ipava, Keomah, and Muscatine soils on nearly level summits
- Sable soils, which have a thicker surface layer than the Denny soil, do not have a grayish subsurface horizon, have less clay in the subsoil, and are in the slightly higher positions on the landscape

*Similar soils:*

- Soils that have a thicker surface horizon
- Soils that do not have a subsurface layer

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited  
*Management measures:*

- The existing subsurface tile drainage system should be maintained.
- Using a system of conservation tillage that leaves crop residue on the surface after planting and returning crop residue to the soil help to prevent surface compaction and crusting and increase the rate of water infiltration.

#### **Wildlife habitat**

*Suitability:* Well suited  
*Management measures:*

- The grain and seed crops, grasses and legumes, and

wild herbaceous plants used as food and cover by openland wildlife grow well on this soil.

- The habitat should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Generally unsuited

#### **Septic tank absorption fields**

*Suitability:* Generally unsuited

### **Interpretive Groups**

*Land capability classification:* IIIw

*Windbreak suitability group:* 2

## **46A—Herrick silt loam, 0 to 2 percent slopes**

### **Composition**

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

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Summits on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 5 to 210 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Parent material:* Loess

*Runoff:* Slow

*Available water capacity:* High

*Seasonal high water table:* At a depth of 1 to 3 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* None or slight

*Shrink-swell potential:* High

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 10 inches—very dark gray, friable silt loam

*Subsurface layer:*

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

*Subsoil:*

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

17 to 49 inches—grayish brown, mottled, firm and friable silty clay loam

*Substratum:*

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

### ***Inclusions***

#### *Contrasting inclusions:*

- The moderately well drained Tama soils, which are higher on the summits than the Herrick soil

#### *Similar soils:*

- Soils that have a lighter colored subsurface layer
- Soils that are poorly drained
- Soils that are ponded

### ***Use and Management***

#### **Cropland**

*Suitability:* Well suited

#### *Management measures:*

- The existing subsurface tile drainage system should be maintained.
- A system of conservation tillage that leaves crop residue on the surface after planting helps to maintain tilth and productivity and increases the rate of water infiltration.

#### **Dwellings**

*Suitability:* Poorly suited

#### *Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling on sites for dwellings without basements.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

#### *Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### ***Interpretive Groups***

*Land capability classification:* IIw

*Windbreak suitability group:* 1

## **50—Virden silty clay loam**

### ***Composition***

Virden soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### ***Setting***

*Landscape:* Uplands

*Position on the landform:* Low areas on loess-covered glacial till plains

*Shape of areas:* Irregular

*Ponding:* Subject to ponding during the spring (fig. 8)

*Size of areas:* 3 to 480 acres

*Major use:* Cropland

### ***Soil Properties and Qualities***

*Drainage class:* Poorly drained

*Permeability:* Moderately slow

*Parent material:* Loess

*Runoff:* Slow to ponded

*Available water capacity:* High

*Seasonal high water table:* 0.5 foot above to 2.0 feet below the surface during the spring

*Organic matter content:* High

*Erosion hazard:* None or slight

*Shrink-swell potential:* High

*Potential for frost action:* High

### ***Typical Profile***

#### *Surface layer:*

0 to 8 inches—black, friable silty clay loam

#### *Subsurface layer:*

8 to 13 inches—very dark gray, mottled, friable silty clay loam

#### *Subsoil:*

13 to 31 inches—grayish brown and light brownish gray, mottled, firm silty clay

31 to 53 inches—light brownish gray, mottled, firm and friable silty clay loam

#### *Substratum:*

53 to 60 inches—light brownish gray, mottled, friable silt loam

### ***Inclusions***

#### *Contrasting inclusions:*

- The somewhat poorly drained Clarksdale and Ipava soils, which are slightly higher on the summits than the Virden soil

#### *Similar soils:*

- Soils that have a thinner surface layer
- Soils that have less clay in the surface layer

### ***Use and Management***

#### **Cropland**

*Suitability:* Well suited

#### *Management measures:*

- The existing subsurface drainage system should be maintained.
- Using a system of conservation tillage that leaves crop residue on the surface after planting and returning crop residue to the soil improve tilth, help to prevent surface compaction, and increase the rate of water infiltration.

#### **Wildlife habitat**

*Suitability:* Moderately suited

#### *Management measures:*

- Wetland plants, which enhance wetland wildlife



Figure 8.—Ponding in an area of Virden silty clay loam.

habitat, can be easily established in low areas.

- The grain and seed crops, grasses and legumes, and wild herbaceous plants used as food and cover by openland wildlife grow well on this soil.
- The habitat should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Generally unsuited

#### **Septic tank absorption fields**

*Suitability:* Generally unsuited

#### **Interpretive Groups**

*Land capability classification:* 1lw

*Windbreak suitability group:* 2

#### **61A—Atterberry silt loam, 0 to 2 percent slopes**

##### **Composition**

Atterberry soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

##### **Setting**

*Landscape:* Uplands

*Position on the landform:* Summits on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 140 acres

*Major use:* Cropland

##### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Slow

*Available water capacity:* Very high

*Seasonal high water table:* At a depth of 1 to 3 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* None or slight

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### Typical Profile

*Surface layer:*

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

*Subsurface layer:*

7 to 12 inches—dark grayish brown, friable silt loam

*Subsoil:*

12 to 18 inches—brown, mottled, friable silty clay loam

18 to 27 inches—light brownish gray, mottled, firm silty clay loam

27 to 51 inches—light brownish gray, mottled, friable silty clay loam

*Substratum:*

51 to 60 inches—light brownish gray, mottled, friable silt loam

### Inclusions

*Contrasting inclusions:*

- The poorly drained Denny soils in slight depressions
- The moderately well drained Downs soils in the slightly higher positions on summits

*Similar soils:*

- Soils that have a thicker surface layer and subsurface layer
- Soils that have a lighter colored surface layer

### Use and Management

#### Cropland

*Suitability:* Well suited

*Management measures:*

- No major limitations affect the use of this soil for cultivated crops.
- A system of conservation tillage that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

#### Woodland

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### Wildlife habitat

*Suitability:* Well suited

*Management measures:*

- The grain and seed crops, grasses and legumes, and wild herbaceous plants used as food and cover by openland wildlife grow well on this soil.
- The habitat should be protected from fire and from grazing by livestock.

#### Dwellings

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.

#### Septic tank absorption fields

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.

### Interpretive Groups

*Land capability classification:* I

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 1

## 68—Sable silty clay loam

### Composition

Sable soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

### Setting

*Landscape:* Uplands

*Position on the landform:* Low areas on loess-covered glacial till plains

*Shape of areas:* Irregular

*Ponding:* Subject to ponding during the spring

*Size of areas:* 3 to 4,200 acres

*Major use:* Cropland

### Soil Properties and Qualities

*Drainage class:* Poorly drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Slow to ponded

*Available water capacity:* Very high

*Seasonal high water table:* 0.5 foot above to 2.0 feet below the surface during the spring

*Organic matter content:* High

*Erosion hazard:* None or slight

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### Typical Profile

*Surface layer:*

0 to 7 inches—black, friable silty clay loam

*Subsurface layer:*

7 to 18 inches—black or very dark gray, mottled, friable and firm silty clay loam

*Subsoil:*

18 to 23 inches—olive gray, mottled, firm silty clay loam

23 to 51 inches—light gray, mottled, firm silty clay loam

*Substratum:*

51 to 60 inches—light olive gray, mottled, firm silty clay loam

**Inclusions***Contrasting inclusions:*

- Denny soils, which are more slowly permeable than the Sable soil, have a grayish subsurface layer, and are in depressions
- The moderately well drained Tama soils in the higher positions on summits

*Similar soils:*

- Soils that have a seasonal high water table at a depth of more than 2 feet
- Soils that contain more clay in the subsoil

**Use and Management****Cropland**

*Suitability:* Well suited

*Management measures:*

- The existing subsurface drainage system should be maintained.
- Using a system of conservation tillage that leaves crop residue on the surface after planting and returning crop residue to the soil improve tilth, help to prevent surface compaction, and increase the rate of water infiltration.

**Wildlife habitat**

*Suitability:* Well suited

*Management measures:*

- The grain and seed crops, grasses and legumes, and wild herbaceous plants used as food and cover by openland wildlife grow well on this soil.
- The habitat should be protected from fire and from grazing by livestock.

**Dwellings**

*Suitability:* Generally unsuited

**Septic tank absorption fields**

*Suitability:* Generally unsuited

**Interpretive Groups**

*Land capability classification:* IIw

*Windbreak suitability group:* 2

**119C2—Elco silt loam, 5 to 10 percent slopes, eroded****Composition**

Elco soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

**Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Shape of areas:* Irregular or linear

*Size of areas:* 3 to 125 acres

*Major use:* Cropland

**Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Moderate in the upper part and moderately slow in the lower part

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* Perched at a depth of 2.5 to 4.5 feet during the spring

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* High

**Typical Profile**

*Surface layer:*

0 to 4 inches—mixed dark brown and yellowish brown, friable silt loam

*Subsoil:*

4 to 23 inches—yellowish brown, friable silty clay loam

23 to 28 inches—yellowish brown, mottled, friable silty clay loam

28 to 60 inches—light gray, mottled, firm silty clay loam and clay loam

**Inclusions***Contrasting inclusions:*

- The somewhat poorly drained Atlas soils, which have a very firm subsoil within a depth of 20 inches and are lower on the back slopes than the Elco soil

*Similar soils:*

- Soils that have a thinner surface layer
- Soils that have a thicker mantle of loess

**Use and Management****Cropland**

*Suitability:* Moderately suited

*Management measures:*

- A crop rotation that includes 1 or more years of forage crops, a system of conservation tillage that leaves crop residue on the surface after planting, terraces, and contour farming help to control erosion.
- Regular additions of organic material help to maintain productivity and tilth.

**Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Deferred grazing helps to prevent surface compaction and excessive runoff and reduces the hazard of erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.

### **Woodland**

*Suitability:* Well suited

*Management measures:*

- Establishing logging roads and skid trails on the contour and seeding bare logging areas to grass or to a grass-legume mixture help to control erosion.
- The seedling mortality rate can be reduced by eliminating competing vegetation and by selecting older and larger seedlings for planting.
- The woodland should be protected from fire and from grazing by livestock.

### **Dwellings**

*Suitability:* Moderately suited to dwellings without basements, poorly suited to dwellings with basements

*Management measures:*

- Land shaping by cutting and filling helps to overcome the slope.
- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- A septic tank system can function satisfactorily if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed.

### **Interpretive Groups**

*Land capability classification:* IIIe

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 3

## **119D2—Elco silt loam, 10 to 15 percent slopes, eroded**

### **Composition**

Elco soil and similar soils: 85 to 95 percent

Contrasting inclusions: 5 to 15 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 100 acres

*Major use:* Pasture

### **Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Moderate in the upper part and moderately slow or slow in the lower part

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Rapid

*Available water capacity:* High

*Seasonal high water table:* Perched at a depth of 2.5 to 4.5 feet during the spring

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 6 inches—mixed dark grayish brown and yellowish brown, friable silt loam

*Subsoil:*

6 to 22 inches—yellowish brown, friable silty clay loam

22 to 30 inches—yellowish brown, mottled, firm silty clay loam

30 to 60 inches—grayish brown and light gray, mottled, firm clay

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Atlas soils, which have a very firm subsoil within a depth of 20 inches and are lower on the back slopes than the Elco soil
- The somewhat poorly drained Lawson soils, which formed in alluvium and are at the bottom of drainageways.

*Similar soils:*

- Soils that have a darker surface horizon
- Soils that have a surface layer of silty clay loam

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited

*Management measures:*

- A crop rotation dominated by forage crops and a combination of contour farming, stripcropping, and a system of conservation tillage that leaves crop residue on the surface after planting help to control erosion.
- Regular additions of organic material help to maintain tilth and productivity.

**Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Deferred grazing helps to prevent surface compaction and excessive runoff and reduces the hazard of erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.

**Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

**Dwellings**

*Suitability:* Moderately suited to dwellings without basements, poorly suited to dwellings with basements

*Management measures:*

- Land shaping by cutting and filling helps to overcome the slope.
- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

**Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- A septic tank system can function satisfactorily if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed.

**Interpretive Groups**

*Land capability classification:* IIIe

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 3

**119E—Elco silt loam, 15 to 20 percent slopes****Composition**

Elco soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

**Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains

*Shape of areas:* Long and narrow

*Size of areas:* 3 to 35 acres

*Major use:* Pasture

**Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Moderate in the upper part and moderately slow or slow in the lower part

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Rapid

*Available water capacity:* High

*Seasonal high water table:* Perched at a depth of 2.5 to 4.5 feet during the spring

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* High

**Typical Profile**

*Surface layer:*

0 to 4 inches—dark grayish brown, friable silt loam

*Subsurface layer:*

4 to 9 inches—brown, friable silt loam

*Subsoil:*

9 to 12 inches—yellowish brown, friable silt loam

12 to 24 inches—dark yellowish brown and yellowish brown, firm silty clay loam

24 to 60 inches—yellowish brown and brown, mottled, firm silty clay loam

**Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Radford soils, which formed in alluvium and are at the bottom of drainageways

*Similar soils:*

- Soils that have a darker and thicker surface horizon
- Soils that have slopes of as much as 25 percent

**Use and Management****Cropland**

*Suitability:* Poorly suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting, terraces, contour farming, or a crop rotation that is dominated by forage crops helps to control erosion.
- Regular additions of organic material improve tilth, help to prevent crusting, and increase the rate of water infiltration.

**Pasture and hay**

*Suitability:* Moderately suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- A permanent cover of pasture plants helps to control erosion and maintain tilth.
- Interseeding legumes on the contour with a no-till seeder improves forage quality.
- Proper stocking rates, rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition.

**Woodland**

*Suitability:* Well suited

*Management measures:*

- Establishing logging roads and skid trails on the contour and seeding bare logging areas to grass or to a grass-legume mixture help to control erosion.
- Machinery should be used only when the soil is firm enough to support the equipment.
- The seedling mortality rate can be reduced by eliminating competing vegetation and by selecting older and larger seedlings for planting.
- The woodland should be protected from fire and from grazing by livestock.

**Wildlife habitat**

*Suitability:* Well suited

*Management measures:*

- Food plots of grain or seed crops should be established only in the less steep areas and should be planted on the contour.
- The habitat should be protected from fire and from grazing by livestock.

**Dwellings**

*Suitability:* Generally unsuited

**Septic tank absorption fields**

*Suitability:* Generally unsuited

**Interpretive Groups**

*Land capability classification:* IVe

*Woodland ordination symbol:* 4R

*Windbreak suitability group:* 3

**249—Edinburg silty clay loam****Composition**

Edinburg soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

**Setting**

*Landscape:* Uplands

*Position on the landform:* Shallow depressions on loess-covered glacial till plains

*Shape of areas:* Round or oblong

*Ponding:* Subject to ponding for brief periods during the spring

*Size of areas:* 1 to 150 acres

*Major use:* Cropland

**Soil Properties and Qualities**

*Drainage class:* Poorly drained

*Permeability:* Slow in the upper part and moderately slow or moderate in the lower part

*Parent material:* Loess

*Runoff:* Ponded

*Available water capacity:* High

*Seasonal high water table:* 1 foot above to 2 feet below the surface during the spring

*Organic matter content:* Moderate

*Erosion hazard:* None or slight

*Shrink-swell potential:* High

*Potential for frost action:* High

**Typical Profile**

*Surface layer:*

0 to 9 inches—very dark gray, friable silty clay loam

*Subsurface layer:*

9 to 12 inches—very dark gray, mottled, friable silty clay loam

*Subsoil:*

12 to 18 inches—dark gray, mottled, friable silty clay loam

18 to 33 inches—dark gray and dark grayish brown, mottled, firm silty clay

33 to 60 inches—light brownish gray, mottled, firm and friable silty clay loam

**Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Ipava soils in the slightly higher positions on summits

*Similar soils:*

- Soils that have a thinner surface layer and a lighter colored subsurface layer
- Soils that have less clay in the subsoil

**Use and Management****Cropland**

*Suitability:* Moderately suited

*Management measures:*

- The existing subsurface drainage system should be maintained.
- Land grading helps to control ponding.
- Applying a system of conservation tillage that leaves crop residue on the surface after planting and returning

crop residue to the soil improve tilth, help to prevent surface compaction and crusting, and increase the rate of water infiltration.

#### **Wildlife habitat**

*Suitability:* Well suited

*Management measures:*

- Wetland plants, which enhance the habitat for wetland wildlife, can be easily established in the depressions.
- The habitat should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Generally unsuited

#### **Septic tank absorption fields**

*Suitability:* Generally unsuited

### ***Interpretive Groups***

*Land capability classification:* IIIw

*Windbreak suitability group:* 2

## **257A—Clarksdale silt loam, 0 to 2 percent slopes**

### ***Composition***

Clarksdale soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### ***Setting***

*Landscape:* Uplands

*Position on the landform:* Summits on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 140 acres

*Major use:* Cropland

### ***Soil Properties and Qualities***

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Parent material:* Loess

*Runoff:* Slow

*Available water capacity:* High

*Seasonal high water table:* At a depth of 1 to 3 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* None or slight

*Shrink-swell potential:* High

*Potential for frost action:* High

### ***Typical Profile***

*Surface layer:*

0 to 7 inches—very dark grayish brown, friable silt loam

*Subsurface layer:*

7 to 11 inches—dark gray, mottled, friable silt loam

*Subsoil:*

11 to 14 inches—dark grayish brown, mottled, friable silty clay loam

14 to 25 inches—dark grayish brown, mottled, firm silty clay

25 to 43 inches—grayish brown, mottled, firm silty clay loam

*Substratum:*

43 to 60 inches—pale olive, mottled, friable silt loam

### ***Inclusions***

*Contrasting inclusions:*

- The poorly drained Denny soils in slight depressions
- The somewhat poorly drained Keomah soils, which have a lighter colored surface layer than the Clarksdale soil
- The moderately well drained Downs soils in the slightly higher positions on summits

*Similar soils:*

- Soils that have a thicker and darker surface layer
- Soils that have a thicker and darker subsurface layer
- Soils that have a lighter colored surface layer

### ***Use and Management***

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- No major limitations affect the use of this soil for cultivated crops.
- A system of conservation tillage that leaves crop residue on the surface after planting helps to maintain tilth and fertility.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to remove excess water.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.

- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### ***Interpretive Groups***

*Land capability classification:* 1

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 1

## **257B—Clarksdale silt loam, 2 to 5 percent slopes**

### ***Composition***

Clarksdale soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### ***Setting***

*Landscape:* Uplands

*Position on the landform:* Shoulders and back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 65 acres

*Major use:* Cropland

### ***Soil Properties and Qualities***

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Parent material:* Loess

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* At a depth of 1 to 3 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* Moderate

*Shrink-swell potential:* High

*Potential for frost action:* High

### ***Typical Profile***

*Surface layer:*

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

*Subsoil:*

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

13 to 27 inches—brown and grayish brown, mottled, friable silty clay loam

27 to 45 inches—light brownish gray, mottled, friable silty clay loam and silt loam

*Substratum:*

45 to 60 inches—light brownish gray, mottled friable silt loam

### ***Inclusions***

*Contrasting inclusions:*

- The poorly drained Sable soils in low areas

- The poorly drained Denny and Rushville soils in depressions
- The moderately well drained Downs soils in the slightly higher positions on shoulders and back slopes

*Similar soils:*

- Soils that have some subsoil material mixed in the surface layer
- Soils that have a lighter colored surface layer

### ***Use and Management***

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion and maintain tilth and fertility.
- Subsurface tile drains help to lower the seasonal high water table if suitable outlets are available.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to remove excess water.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### ***Interpretive Groups***

*Land capability classification:* 1Ie

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 1

## **259C2—Assumption silt loam, 5 to 10 percent slopes, eroded**

### ***Composition***

Assumption soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 3 to 30 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Moderate in the upper part and moderately slow or slow in the lower part

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* Perched at a depth of 2.5 to 4.5 feet from late winter through spring

*Organic matter content:* Moderate

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 9 inches—very dark gray, friable silt loam

*Subsoil:*

9 to 15 inches—brown, friable silt loam

15 to 36 inches—brown and yellowish brown, friable silty clay loam

36 to 49 inches—brown, firm clay loam

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

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Herrick and Ipava soils, which formed entirely in loess and are in the higher, less sloping positions

*Similar soils:*

- Soils that have a thinner and lighter colored surface layer
- Soils that have less sand in the subsoil

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited

*Management measures:*

- A crop rotation that includes 1 or more years of forage crops, a system of conservation tillage that leaves crop residue on the surface after planting, terraces, or contour farming helps to control erosion.

- Regularly adding organic material to the soil helps to maintain productivity and tilth.

#### **Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Deferred grazing helps to prevent surface compaction and excessive runoff and reduces the hazard of erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
- The plants should not be grazed or clipped until they are sufficiently established.

#### **Dwellings**

*Suitability:* Moderately suited to dwellings without basements, poorly suited to dwellings with basements

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- A septic tank system can function satisfactorily if a sealed sand filter and a disinfection tank or an evapotranspiration bed is installed.

### **Interpretive Groups**

*Land capability classification:* IIIe

*Windbreak suitability group:* 3

## **259D2—Assumption silt loam, 10 to 15 percent slopes, eroded**

### **Composition**

Assumption soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 3 to 60 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Moderate in the upper part and moderately

slow or slow in the lower part

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Rapid

*Available water capacity:* High

*Seasonal high water table:* Perched at a depth of 2.5 to 4.5 feet from late winter through spring

*Organic matter content:* Moderate

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 7 inches—very dark grayish brown, friable silt loam

*Subsoil:*

7 to 11 inches—brown, friable silt loam

11 to 23 inches—dark yellowish brown and yellowish brown, firm silty clay loam

23 to 28 inches—dark grayish brown, mottled, firm silty clay loam

28 to 60 inches—grayish brown, mottled, firm silty clay

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Radford soils, which formed in alluvium and are at the bottom of drainageways

*Similar soils:*

- Soils that have a lighter colored surface layer
- Soils that have less clay in the subsoil

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited

*Management measures:*

- A crop rotation dominated by forage crops and a combination of contour farming, stripcropping, and a system of conservation tillage that leaves crop residue on the surface after planting help to control erosion.
- Regularly adding organic material to the soil helps to maintain tilth and productivity.

#### **Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Deferred grazing helps to prevent surface compaction and excessive runoff and reduces the hazard of erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.

- The plants should not be grazed or clipped until they are sufficiently established.

#### **Dwellings**

*Suitability:* Moderately suited to dwellings without basements, poorly suited to dwellings with basements

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Land shaping by cutting and filling helps to overcome the slope.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- A septic tank system can function satisfactorily if a sealed sand filter and a disinfection tank or an evapotranspiration bed are installed and the site is leveled.

### **Interpretive Groups**

*Land capability classification:* IIIe

*Windbreak suitability group:* 3

## **278A—Stronghurst silt loam, 0 to 2 percent slopes**

### **Composition**

Stronghurst soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Summits on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 35 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Slow

*Available water capacity:* Very high

*Seasonal high water table:* At a depth of 1 to 3 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* None or slight

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### Typical Profile

*Surface layer:*

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

*Subsurface layer:*

6 to 12 inches—dark grayish brown, mottled, friable silt loam

*Subsoil:*

12 to 27 inches—brown, mottled, friable silt loam and silty clay loam

27 to 37 inches—grayish brown, mottled, firm silty clay loam

37 to 60 inches—light brownish gray, mottled, friable silty clay loam and silt loam

### Inclusions

*Contrasting inclusions:*

- The moderately well drained Rozetta soils in the more sloping positions

*Similar soils:*

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

### Use and Management

#### Cropland

*Suitability:* Well suited

*Management measures:*

- The existing subsurface drainage system should be maintained.
- Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and minimize crusting.

#### Woodland

*Suitability:* Well suited

*Management measures:*

- The woodland should be protected from fire and from grazing by livestock.

#### Dwellings

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.

#### Septic tank absorption fields

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to remove excess water.

### Interpretive Groups

*Land capability classification:* 11w

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 1

## 278B—Stronghurst silt loam, 2 to 5 percent slopes

### Composition

Stronghurst soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### Setting

*Landscape:* Uplands

*Position on the landform:* Shoulders and back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 20 acres

*Major use:* Cropland

### Soil Properties and Qualities

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Medium

*Available water capacity:* Very high

*Seasonal high water table:* At a depth of 1 to 3 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* Moderate

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### Typical Profile

*Surface layer:*

0 to 8 inches—dark gray, friable silt loam

*Subsurface layer:*

8 to 12 inches—dark grayish brown, friable silt loam

*Subsoil:*

12 to 19 inches—brown, friable silt loam

19 to 30 inches—grayish brown, mottled, friable silty clay loam

30 to 49 inches—light brownish gray, mottled, friable silty clay loam

*Substratum:*

49 to 60 inches—light brownish gray, mottled, friable silty clay loam

### Inclusions

*Contrasting inclusions:*

- The moderately well drained Rozetta soils, which are in landscape positions similar to those of the Stronghurst soil
- The somewhat poorly drained Wakeland soils at the bottom of narrow drainageways.

*Similar soils:*

- Soils that have a darker surface layer
- Soils that have steeper slopes

### **Use and Management**

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting helps to maintain productivity and tilth and helps to control erosion.
- The existing subsurface drainage system should be maintained.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.

### **Interpretive Groups**

*Land capability classification:* IIe

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 1

### **279B—Rozetta silt loam, 1 to 5 percent slopes**

#### **Composition**

Rozetta soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

#### **Setting**

*Landscape:* Uplands and terraces

*Position on the landform:* Summits, shoulders, and back slopes on loess-covered glacial till plains and on terrace treads on stream terraces

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 3 to 140 acres

*Major use:* Cropland

#### **Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Medium

*Available water capacity:* Very high

*Seasonal high water table:* At a depth of 4 to 6 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* Moderate

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 5 inches—mixed dark grayish brown and dark brown, friable silt loam

*Subsurface layer:*

5 to 11 inches—yellowish brown, friable silt loam

*Subsoil:*

11 to 26 inches—yellowish brown, friable silty clay loam

26 to 58 inches—yellowish brown, mottled, friable silty clay loam

*Substratum:*

58 to 60 inches—yellowish brown, mottled, friable silt loam

### **Inclusions**

*Contrasting inclusions:*

- The poorly drained Sable soils in low areas
- The somewhat poorly drained Clarksdale and Keomah soils, which are in landscape positions similar to those of the Rozetta soil and have more clay in the subsoil

*Similar soils:*

- Soils that have a darker surface layer
- Soils that have a thicker surface layer
- Soils that have a seasonal high water table below a depth of 6 feet

### **Use and Management**

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting, terraces, and contour farming help to control erosion.
- Returning crop residue to the soil and adding other organic material help to maintain tilth and fertility.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness on sites for dwellings with basements.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

**Septic tank absorption fields***Suitability:* Moderately suited*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

**Interpretive Groups***Land capability classification:* IIe*Woodland ordination symbol:* 4A*Windbreak suitability group:* 3**279C2—Rozetta silt loam, 5 to 10 percent slopes, eroded****Composition**

Rozetta soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

**Setting***Landscape:* Uplands*Position on the landform:* Back slopes, foot slopes, and toe slopes on loess-covered glacial till plains*Shape of areas:* Irregular*Size of areas:* 3 to 60 acres*Major use:* Cropland and pasture**Soil Properties and Qualities***Drainage class:* Moderately well drained*Permeability:* Moderate*Parent material:* Loess*Runoff:* Medium*Available water capacity:* Very high*Seasonal high water table:* At a depth of 4 to 6 feet in the spring*Organic matter content:* Moderately low*Erosion hazard:* Severe*Shrink-swell potential:* Moderate*Potential for frost action:* High**Typical Profile***Surface layer:*

0 to 7 inches—mixed brown and yellowish brown, friable silt loam

*Subsoil:*

7 to 10 inches—yellowish brown, friable silt loam

10 to 20 inches—yellowish brown, friable silty clay loam

20 to 53 inches—yellowish brown, mottled, firm silty clay loam

*Substratum:*

53 to 60 inches—yellowish brown, mottled, friable silt loam

**Inclusions***Contrasting inclusions:*

- The well drained Hickory soils, which formed in glacial till and are in the more sloping, lower positions on back slopes
- The somewhat poorly drained Keomah soils in the less sloping positions

*Similar soils:*

- Soils that have a darker surface layer
- Soils that have a paleosol within a depth of 60 inches
- Soils that have a seasonal high water table below a depth of 6 feet

**Use and Management****Cropland***Suitability:* Moderately suited*Management measures:*

- A crop rotation that includes 1 or more years of forage crops, a system of conservation tillage that leaves crop residue on the surface after planting, terraces, and contour farming help to control erosion.
- Returning crop residue to the soil and incorporating animal manure or green manure crops minimize crusting and improve fertility and tilth.

**Pasture and hay***Suitability:* Well suited*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa*Management measures:*

- Deferred grazing helps to prevent surface compaction and excessive runoff and reduces the hazard of erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
- Applications of fertilizer help to keep the pasture in good condition.
- The plants should not be grazed or clipped until they are sufficiently established.

**Woodland***Suitability:* Well suited*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.

- The woodland should be protected from fire and from grazing by livestock.

### Dwellings

*Suitability:* Moderately suited

*Management measures:*

- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
- Installing subsurface tile drains near the foundations helps to overcome the wetness on sites for dwellings with basements.

### Septic tank absorption fields

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains helps to remove excess water.

### Interpretive Groups

*Land capability classification:* IIIe

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 3

## 279D2—Rozetta silt loam, 10 to 18 percent slopes, eroded

### Composition

Rozetta soil and similar soils: 85 to 95 percent

Contrasting inclusions: 5 to 15 percent

### Setting

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 95 acres

*Major use:* Pasture and hay or cropland

### Soil Properties and Qualities

*Drainage class:* Moderately well drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Rapid

*Available water capacity:* Very high

*Seasonal high water table:* At a depth of 4 to 6 feet during the spring

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### Typical Profile

*Surface layer:*

0 to 6 inches—mixed dark grayish brown and yellowish brown, friable silt loam

*Subsoil:*

6 to 17 inches—yellowish brown, friable silty clay loam  
17 to 49 inches—yellowish brown, mottled, friable silty clay loam

49 to 58 inches—yellowish brown, mottled, friable silt loam

*Substratum:*

58 to 60 inches—yellowish brown, mottled, friable silt loam

### Inclusions

*Contrasting inclusions:*

- The well drained Ursa soils, which formed in glacial till, have more clay in the subsoil than the Rozetta soil, and are lower on the back slopes
- The well drained Hickory soils, which formed in glacial till and are lower on the back slopes than the Rozetta soil

*Similar soils:*

- Soils that have a seasonal high water table at a depth of more than 6 feet

### Use and Management

#### Cropland

*Suitability:* Moderately suited

*Management measures:*

- Contour farming, terraces, a system of conservation tillage that leaves crop residue on the surface after planting, and a crop rotation that is dominated by forage crops help to control erosion.
- Regular additions of organic material improve tilth, maintain fertility, and increase the rate of water infiltration.

#### Pasture and hay

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- A cover of grasses and legumes improves tilth and helps to control erosion.
- A no-till method of seeding or pasture renovation helps to establish forage species and helps to control erosion.
- Proper stocking rates, rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition.

#### Woodland

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species 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 woodland should be protected from fire and from grazing by livestock.

### Dwellings

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains near the foundations helps to overcome the wetness on sites for dwellings with basements.
- Land shaping by cutting and filling helps to overcome the slope.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

### Septic tank absorption fields

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains higher on the back slopes than the absorption field helps to intercept seepage water.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
- Installing the filter lines on the contour or land shaping by cutting and filling helps to overcome the slope.

### Interpretive Groups

*Land capability classification:* IIIe

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 3

## 280D2—Fayette silt loam, 10 to 18 percent slopes, eroded

### Composition

Fayette soil and similar soils: 90 to 100 percent

Contrasting inclusions: 0 to 10 percent

### Setting

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Shape of areas:* Irregular or long and narrow

*Size of areas:* 5 to 50 acres

*Major use:* Pasture or hay

### Soil Properties and Qualities

*Drainage class:* Well drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Rapid

*Available water capacity:* Very high

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

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### Typical Profile

*Surface layer:*

0 to 4 inches—dark brown, friable silt loam

*Subsoil:*

4 to 7 inches—brown, friable silt loam

7 to 40 inches—yellowish brown, mottled, friable silty clay loam

40 to 60 inches—brown, mottled, friable silt loam

### Inclusions

*Contrasting inclusions:*

- The somewhat poorly drained Fishhook and Atlas soils, which have more clay in the subsoil than the Fayette soil and are lower on the back slopes

*Similar soils:*

- Soils that have more clay in the subsoil
- Soils that have more gray colors in the subsoil
- Soils that have more sand in the subsoil

### Use and Management

#### Cropland

*Suitability:* Poorly suited

*Management measures:*

- Contour farming, stripcropping, terraces, a system of conservation tillage that leaves crop residue on the surface after planting, a crop rotation that is dominated by forage crops, or a combination of these can help to keep soil losses within tolerable limits.

#### Pasture and hay

*Suitability:* Moderately suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa; suitable warm-season grasses—indiangrass, switchgrass, and little bluestem

*Management measures:*

- Deferred grazing helps to prevent surface compaction and excessive runoff and reduces the hazard of erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
- The plants should not be grazed or clipped until they are sufficiently established.

#### Woodland

*Suitability:* Well suited

*Management measures:*

- Applying chemicals or plowing contoured furrows,

which removes the competing vegetation before the trees are planted, helps to control initial plant competition.

- 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 woodland from fire prevents injury to trees and maintains the leaf mulch.

### **Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Land shaping by cutting and filling helps to overcome the slope.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

### **Septic tank absorption fields**

*Suitability:* Moderately suited

*Management measures:*

- Installing filter lines on the contour helps to overcome the slope.

### **Interpretive Groups**

*Land capability classification:* IVe

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 3

## **280F—Fayette silt loam, 18 to 30 percent slopes**

### **Composition**

Fayette soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains

*Shape of areas:* Long and narrow

*Size of areas:* 3 to 40 acres

*Major use:* Pasture

### **Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Rapid

*Available water capacity:* High

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

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 5 inches—dark gray, friable silt loam

*Subsurface layer:*

5 to 8 inches—grayish brown, friable silt loam

*Subsoil:*

8 to 11 inches—mixed brown and yellowish brown, friable silt loam

11 to 25 inches—yellowish brown, friable silty clay loam

25 to 60 inches—yellowish brown, mottled, friable silty clay loam

### **Inclusions**

*Contrasting inclusions:*

- Hickory soils, which formed in glacial till and are lower on the back slopes than the Fayette soil
- The frequently flooded Wakeland soils at the bottom of drainageways
- Marseilles soils, which formed in loess and residuum derived from shale and are lower on the back slopes than the Fayette soil

*Similar soils:*

- Soils that contain more sand in the subsoil

### **Use and Management**

#### **Pasture and hay**

*Suitability:* Poorly suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- A no-till method of seeding or pasture renovation helps to establish forage species and helps to control erosion.
- The plants should not be grazed or clipped until they are sufficiently established.
- Proper stocking rates, rotation grazing, deferred grazing, and applications of fertilizer help to keep the pasture in good condition.
- Operating machinery is difficult on the steeper slopes.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- Establishing logging roads and skid trails on the contour and seeding bare logging areas to grass or to a grass-legume mixture help to control erosion.
- Machinery should be used only when the soil is firm enough to support the equipment.
- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- Firebreaks should be the grass type.

- The woodland should be protected from fire and from grazing by livestock.

#### **Wildlife habitat**

*Suitability:* Well suited

*Management measures:*

- This soil is suitable for grain and seed crops, wild herbaceous plants, and hardwood trees.
- The habitat should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Generally unsuited

#### **Septic tank absorption fields**

*Suitability:* Generally unsuited

### ***Interpretive Groups***

*Land capability classification:* V1e

*Woodland ordination symbol:* 4R

*Windbreak suitability group:* 3

## **386B—Downs silt loam, 1 to 5 percent slopes**

### ***Composition***

Downs soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### ***Setting***

*Landscape:* Uplands

*Position on the landform:* Summits, shoulders, and back slopes on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 140 acres

*Major use:* Cropland

### ***Soil Properties and Qualities***

*Drainage class:* Moderately well drained

*Permeability:* Moderate

*Parent material:* Loess

*Runoff:* Medium

*Available water capacity:* High

*Seasonal high water table:* At a depth of 4 to 6 feet during the spring

*Organic matter content:* Moderate

*Erosion hazard:* Moderate

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### ***Typical Profile***

*Surface layer:*

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

*Subsurface layer:*

8 to 13 inches—brown, friable silt loam

*Subsoil:*

13 to 28 inches—yellowish brown, friable silty clay loam

28 to 56 inches—yellowish brown, mottled, friable silty clay loam

*Substratum:*

56 to 60 inches—yellowish brown, mottled, friable silty clay loam

### ***Inclusions***

*Contrasting inclusions:*

- The poorly drained Sable soils in low areas
- The somewhat poorly drained Atterberry and Clarksdale soils in the higher positions and on the broader summits

*Similar soils:*

- Soils that have slopes of more than 5 percent
- Soils that have slopes of less than 1 percent
- Soils that have a lighter colored surface layer

### ***Use and Management***

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting, terraces, and contour farming help to control erosion.
- Regularly adding organic material to the soil helps to maintain tilth and fertility.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
- Installing subsurface tile drains near the foundations helps to overcome the wetness on sites for dwellings with basements.

#### **Septic tank absorption fields**

*Suitability:* Moderately suited

*Management measures:*

- Installing subsurface tile drains helps to lower the seasonal high water table.

### ***Interpretive Groups***

*Land capability classification:* 1Ie

Woodland ordination symbol: 4A  
Windbreak suitability group: 3

## 470C2—Keller silt loam, 5 to 10 percent slopes, eroded

### Composition

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

### Setting

*Landscape:* Uplands  
*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains  
*Shape of areas:* Irregular  
*Size of areas:* 3 to 40 acres  
*Major use:* Cropland

### Soil Properties and Qualities

*Drainage class:* Somewhat poorly drained  
*Permeability:* Moderate in the upper part and slow in the lower part  
*Parent material:* Loess and the underlying glacial till, which has a paleosol  
*Runoff:* Medium  
*Available water capacity:* High  
*Seasonal high water table:* Perched at a depth of 1 to 3 feet during the spring  
*Organic matter content:* Moderate  
*Erosion hazard:* Severe  
*Shrink-swell potential:* High  
*Potential for frost action:* High

### Typical Profile

*Surface layer:*  
0 to 9 inches—mixed very dark grayish brown and brown, friable silt loam  
*Subsoil:*  
9 to 12 inches—brown, mottled, friable silty clay loam  
12 to 31 inches—gray, mottled, friable and firm silty clay loam  
31 to 60 inches—gray, mottled, firm silty clay loam

### Inclusions

*Contrasting inclusions:*

- The well drained Ursa soils, which have a lighter colored surface layer than the Keller soil and are lower on the back slopes

*Similar soils:*

- Soils that have a seasonal high water table at a depth of more than 3 feet
- Soils that have less clay in the subsoil and have slopes of less than 5 percent

## Use and Management

### Cropland

*Suitability:* Moderately suited  
*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting, terraces, and contour farming help to control erosion.
- The existing subsurface drainage system should be maintained.

### Pasture and hay

*Suitability:* Well suited  
*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa  
*Management measures:*

- Overgrazing or grazing when the soil is too wet reduces forage production and causes surface compaction, excessive runoff, and poor tilth.
- Proper stocking rates, rotation grazing, and deferred grazing when the soil is wet help to keep the pasture in good condition.

### Dwellings

*Suitability:* Poorly suited  
*Management measures:*

- Reinforcing foundations helps to prevent the structural damage caused by shrinking and swelling on sites for dwellings with basements.
- Installing subsurface tile drains near the foundations helps to overcome the wetness.
- Curtain drains help to remove excess water.

### Septic tank absorption fields

*Suitability:* Poorly suited  
*Management measures:*

- Installing subsurface tile drains higher on the back slope than the absorption field helps to intercept seepage water.
- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### Interpretive Groups

*Land capability classification:* IIIe  
*Windbreak suitability group:* 4L

## 549F—Marseilles silt loam, 18 to 30 percent slopes

### Composition

Marseilles soil and similar soils: 85 to 90 percent  
Contrasting inclusions: 10 to 15 percent

### Setting

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains and on escarpments

*Shape of areas:* Long and irregular

*Size of areas:* 3 to 35 acres

*Major use:* Woodland and woodland wildlife habitat

### **Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Slow or very slow

*Parent material:* Loess and the underlying residuum derived from shale

*Runoff:* Rapid

*Available water capacity:* Moderate

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

*Organic matter content:* Moderate

*Erosion hazard:* Severe

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 5 inches—mixed dark grayish brown and brown, friable silt loam

*Subsoil:*

5 to 17 inches—brown, friable silty clay loam and silt loam

17 to 35 inches—brown, mottled, friable silty clay loam and clay loam

*Substratum:*

35 to 60 inches—mixed grayish brown, yellowish brown, and gray shale fragments

### **Inclusions**

*Contrasting inclusions:*

- Hickory soils, which formed in glacial till and are higher on the back slopes than the Marseilles soil
- The somewhat poorly drained Wakeland soils at the bottom of drainageways

*Similar soils:*

- Soils that have more sand and sandstone in the lower part of the subsoil and in the substratum
- Soils that have more clay in the surface layer and subsoil

### **Use and Management**

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable plants can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Wildlife habitat**

*Suitability:* Well suited

*Management measures:*

- This soil is suitable for wild herbaceous plants and hardwood trees.
- The habitat should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Generally unsuited

#### **Septic tank absorption fields**

*Suitability:* Generally unsuited

### **Interpretive Groups**

*Land capability classification:* VIIe

*Woodland ordination symbol:* 3R

*Windbreak suitability group:* 6

## **549G—Marseilles silt loam, 30 to 60 percent slopes**

### **Composition**

Marseilles soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains and on escarpments

*Shape of areas:* Long and irregular

*Size of areas:* 3 to 150 acres

*Major use:* Woodland and woodland wildlife habitat

### **Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Slow or very slow

*Parent material:* Loess and the underlying residuum derived from shale

*Runoff:* Rapid

*Available water capacity:* Moderate

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

*Organic matter content:* Moderate

*Erosion hazard:* Severe

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 4 inches—very dark grayish brown, friable silt loam

*Subsoil:*

4 to 13 inches—brown, friable silty clay loam

13 to 25 inches—brown, firm silty clay loam

25 to 37 inches—olive brown, firm silty clay loam

**Substratum:**

37 to 60 inches—dark grayish brown, very firm silty clay loam between shale fragments

**Inclusions****Contrasting inclusions:**

- Hickory soils, which formed in glacial till and are higher on the back slopes than the Marseilles soil
- The somewhat poorly drained Wakeland soils at the bottom of drainageways

**Similar soils:**

- Soils that have more sand and sandstone in the lower part of the subsoil and in the substratum
- Soils that have slopes of more than 60 percent
- Soils that have more clay in the surface layer and subsoil
- Soils that have outcroppings of shale and sandstone

**Use and Management****Woodland**

*Suitability:* Well suited

**Management measures:**

- Establishing logging roads and skid trails on the contour and seeding bare logging areas to grass or to a grass-legume mixture help to control erosion.
- Machinery should be used only when the soil is firm enough to support the equipment.
- The woodland should be protected from fire and from grazing by livestock.

**Wildlife habitat**

*Suitability:* Well suited

**Management measures:**

- The existing stands of trees provide good habitat for woodland wildlife.
- The habitat should be protected from fire and from grazing by livestock.

**Dwellings**

*Suitability:* Generally unsuited

**Septic tank absorption fields**

*Suitability:* Generally unsuited

**Interpretive Groups**

*Land capability classification:* VIIe

*Woodland ordination symbol:* 3R

*Windbreak suitability group:* 6

**605C2—Ursa silt loam, 5 to 10 percent slopes, eroded****Composition**

Ursa soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

**Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 60 acres

*Major use:* Cropland

**Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Slow

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Rapid

*Available water capacity:* Moderate

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

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* Moderate

**Typical Profile****Surface layer:**

0 to 7 inches—mixed brown and yellowish brown, friable silt loam

**Subsoil:**

7 to 13 inches—yellowish brown, mottled, friable clay loam

13 to 60 inches—yellowish brown, mottled, firm clay loam

**Inclusions****Contrasting inclusions:**

- The somewhat poorly drained Fishhook and Keller soils, which have less clay in the subsoil than the Ursa soil and are higher on back slopes and shoulders

**Similar soils:**

- Soils that have less clay in the subsoil
- Soils that have a seasonal high water table at a depth of less than 6 feet

**Use and Management****Cropland**

*Suitability:* Moderately suited

**Management measures:**

- A crop rotation dominated by forage crops and a combination of contour farming, stripcropping, and a system of conservation tillage that leaves crop residue on the surface after planting help to control erosion.
- Regular additions of organic material help to maintain tilth and productivity.

**Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, reduces the runoff rate, and helps to control erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
- Applications of fertilizer are needed.
- The plants should not be grazed or clipped until they are sufficiently established.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### **Interpretive Groups**

*Land capability classification:* IIIe

*Woodland ordination symbol:* 4A

*Windbreak suitability group:* 4L

## **605D2—Ursa loam, 10 to 18 percent slopes, eroded**

### **Composition**

Ursa soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Shape of areas:* Irregular

*Size of areas:* 3 to 360 acres

*Major use:* Pasture

### **Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Slow

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Runoff:* Rapid

*Available water capacity:* Moderate

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

*Organic matter content:* Moderately low

*Erosion hazard:* Severe

*Shrink-swell potential:* High

*Potential for frost action:* Moderate

### **Typical Profile**

*Surface layer:*

0 to 7 inches—mixed dark grayish brown and yellowish brown, friable loam

*Subsoil:*

7 to 16 inches—yellowish brown, mottled, friable clay loam

16 to 38 inches—brown and yellowish brown, mottled, firm clay loam

38 to 60 inches—light brownish gray and grayish brown, mottled, firm clay loam

### **Inclusions**

*Contrasting inclusions:*

- Marseilles soils, which are moderately deep to shale bedrock and are along steep and very steep drainageways
- The somewhat poorly drained Wakeland soils on flood plains and at the bottom of drainageways

*Similar soils:*

- Soils that have less clay
- Soils that have a seasonal high water table at a depth of less than 6 feet

### **Use and Management**

#### **Cropland**

*Suitability:* Poorly suited

*Management measures:*

- Contour farming, a system of conservation tillage that leaves crop residue on the surface after planting, and a crop rotation that is dominated by forage crops help to control erosion.
- Regularly adding organic material improves tilth and increases the rate of water infiltration.

#### **Pasture and hay**

*Suitability:* Moderately suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Deferred grazing helps to prevent surface compaction and excessive runoff and reduces the hazard of erosion.
- Tilling on the contour when a seedbed is prepared or

the pasture is renovated helps to control erosion.

- Applications of fertilizer are needed.
- The plants should not be grazed or clipped until they are sufficiently established.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- The woodland should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Poorly suited

*Management measures:*

- Land shaping by cutting and filling helps to overcome the slope.
- Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
- Installing the filter 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:* 4A

*Windbreak suitability group:* 4L

### **802B—Orthents, loamy, gently sloping**

#### **Composition**

Orthents and similar soils: 85 to 95 percent

Contrasting inclusions: 5 to 15 percent

#### **Setting**

*Landscape:* Uplands, terraces, and flood plains

*Slope:* 1 to 5 percent

*Shape of areas:* Irregular or rectangular

*Size of areas:* 3 to 160 acres

*Major use:* Most areas are used as sites for roadways, landfills, or recreational development; some areas are idle land. Onsite investigation is needed to determine the suitability and limitations of these soils for a specific use.

#### **Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Parent material:* Soil material that has been drastically altered or manipulated by human activities

*Runoff:* Slow or medium

*Available water capacity:* Variable

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

*Organic matter content:* Low

*Erosion hazard:* Moderate

*Shrink-swell potential:* Moderate

*Potential for frost action:* Moderate

#### **Typical Profile**

*Surface layer:*

0 to 3 inches—yellowish brown, friable silty clay loam

*Underlying material:*

3 to 60 inches—mixed yellowish brown and gray, friable and firm silty clay loam and silt loam

#### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Ipava, poorly drained Sable, and moderately well drained Tama soils, which have not been drastically altered; in nearby areas
- The well drained Hickory and Marseilles soils on the steeper slopes and escarpments along berms, borders, or drainageways
- Some level areas that have depressions in which water ponds after periods of significant rainfall

*Similar soils:*

- Soils that have gravel and stones
- Soils that contain less than 15 percent sand

#### **Interpretive Groups**

*Land capability classification:* Not assigned

### **802E—Orthents, loamy, moderately steep**

#### **Setting**

*Landscape:* Uplands

*Slope:* 12 to 30 percent

*Shape of areas:* Irregular

*Size of areas:* 3 to 200 acres

*Major use:* Most areas are idle sand and gravel pits, stone quarries, or clay pits. Part of the excavation is used for fishing and swimming. Reclaiming these areas by grading, shaping, and covering barren areas with soil material increases the number of potential uses. The feasibility and extent of reclamation should be based on the desired alternative use and individual site conditions.

#### **Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Moderately slow

*Parent material:* Soil material that has been drastically altered or manipulated by human activities

*Runoff:* Rapid  
*Erosion hazard:* Severe

### **Typical Profile**

*Surface layer:*

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

*Underlying material:*

6 to 11 inches—mixed yellowish brown, light gray, brown, and strong brown, friable and firm silty clay loam and clay loam

11 to 40 inches—mixed yellowish brown, gray, and brown, friable and firm silty clay loam and clay loam

40 to 60 inches—mixed brown, yellowish brown, and light gray, firm silt loam and silty clay loam

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Ipava, poorly drained Sable, and moderately well drained Tama soils in nearby areas that have not been drastically altered
- The moderately well drained Hickory and Marseilles soils on the steeper slopes and escarpments along berms, borders, or drainageways
- Some level areas that have depressions in which water ponds after periods of significant rainfall

*Similar soils:*

- Soils that have gravel, cobbles, and stones or have channers, flagstones, and stones
- Soils that contain less than 15 percent sand

### **Interpretive Groups**

*Land capability classification:* Not assigned

## **824B—Swanwick silt loam, 1 to 5 percent slopes**

### **Composition**

Swanwick soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Back slopes on reclaimed surface-mine spoil

*Shape of areas:* Irregular

*Size of areas:* 3 to 400 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Moderately well drained

*Permeability:* Slow in the upper part and moderately slow in the lower part

*Parent material:* Reclaimed mine spoil

*Runoff:* Slow

*Available water capacity:* High

*Seasonal high water table:* At a depth of 4 to 6 feet during late winter and spring

*Organic matter content:* Very low

*Erosion hazard:* Moderate

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 7 inches—brown, friable silt loam

*Substratum:*

7 to 29 inches—brown, yellowish brown, and dark grayish brown, firm and very firm silty clay loam that has few fragments of sandstone, shale, siltstone, and limestone

29 to 60 inches—brown, dark gray, and dark yellowish brown, firm silty clay loam that has few fragments of sandstone, shale, siltstone, and limestone

### **Inclusions**

*Contrasting inclusions:*

- The well drained Hickory and Marseilles soils and the moderately well drained Rozetta soils along the borders of the map unit in areas that have not been mined
- Steep areas adjacent to pits and the final cut
- Some areas that have shallow depressions in which water ponds after periods of significant rainfall
- Some areas that contain perennial bodies of water

*Similar soils:*

- Soils that have a surface layer that is darker and contains more clay
- Soils that have a higher percentage of rock fragments in the substratum
- Soils that have a seasonal high water table at a depth of more than 6 feet

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting, terraces, and contour farming help to control erosion.
- Regularly adding organic material to the soil improves tilth and fertility.

#### **Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Overgrazing causes surface compaction and excessive runoff and reduces the hazard of erosion.

- Proper stocking rates, rotation grazing, deferred grazing, and applications of fertilizer keep the pasture in good condition and help to control erosion.
- Using a no-till method of pasture renovation and seeding on the contour reduce the hazard of erosion.
- The plants should not be grazed or clipped until they are sufficiently established.

### **Dwellings**

*Suitability:* Moderately suited to dwellings with basements, well suited to dwellings without basements

*Management measures:*

- Installing subsurface tile drains near the foundations helps to remove excess water.
- Reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### **Interpretive Groups**

*Land capability classification:* IIIe

*Windbreak suitability group:* 8

## **872B—Rapatee silty clay loam, 1 to 5 percent slopes**

### **Composition**

Rapatee soil and similar soils: 85 to 90 percent

Contrasting inclusions: 10 to 15 percent

### **Setting**

*Landscape:* Uplands

*Position on the landform:* Summits, shoulders, and back slopes on reclaimed surface-mine spoil

*Shape of areas:* Irregular

*Size of areas:* 3 to 200 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Well drained

*Permeability:* Moderately slow or slow

*Parent material:* Reclaimed mine spoil

*Runoff:* Slow

*Available water capacity:* Moderate

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

*Organic matter content:* Moderate

*Erosion hazard:* Moderate

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 10 inches—black and very dark gray mixed with brown and yellowish brown, firm silty clay loam

*Underlying material:*

10 to 21 inches—brown, dark grayish brown, and yellowish brown, very firm silty clay loam that has few coarse fragments of sandstone, shale, siltstone, and limestone

21 to 44 inches—brown and yellowish brown, very firm silty clay loam that has few coarse fragments of sandstone, shale, siltstone, and limestone

44 to 60 inches—mixed brown, yellowish brown, light brownish gray, light olive brown, and light gray, very firm silty clay loam that has few coarse fragments of sandstone, shale, siltstone, and limestone

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Ipava, poorly drained Virden, and moderately well drained Tama soils along the borders of the map unit in areas that have not been mined
- Some areas that have shallow depressions in which water ponds after periods of significant rainfall
- Some areas that contain perennial bodies of water
- Active mine areas, including areas being prepared to be mined or reclaimed, stockpiles, and steep areas adjacent to pits and the final cut

*Similar soils:*

- Soils that have a lighter colored surface layer

### **Use and Management**

#### **Cropland**

*Suitability:* Well suited

*Management measures:*

- A system of conservation tillage that leaves crop residue on the surface after planting, terraces, and contour farming help to control erosion and conserve soil moisture.
- Selecting short-season or drought-tolerant crop varieties helps to overcome the moderate available water capacity.

#### **Pasture and hay**

*Suitability:* Well suited

*Suitable species:* Bromegrass, orchardgrass, tall fescue, and alfalfa

*Management measures:*

- Overgrazing causes surface compaction and excessive runoff and reduces the hazard of erosion.
- Proper stocking rates, rotation grazing, deferred grazing, and applications of fertilizer help to keep the

pasture in good condition and help to control erosion.

- Using a no-till method of pasture renovation and seeding on the contour reduce the hazard of erosion.
- The plants should not be grazed or clipped until they are sufficiently established.

#### **Dwellings**

*Suitability:* Moderately suited

*Management measures:*

- Reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.

#### **Septic tank absorption fields**

*Suitability:* Poorly suited

*Management measures:*

- Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

### **Interpretive Groups**

*Land capability classification:* IIe

*Windbreak suitability group:* 8

## **1334—Birds silt loam, wet**

### **Composition**

Birds soil and similar soils: 85 to 95 percent

Contrasting inclusions: 5 to 15 percent

### **Setting**

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts and backswamps on flood plains

*Slope:* 0 to 2 percent

*Shape of areas:* Long and irregular

*Flooding frequency:* Frequent

*Flooding duration:* Long

*Ponding duration:* Long

*Size of areas:* 3 to 300 acres

*Major use:* Wildlife habitat

### **Soil Properties and Qualities**

*Drainage class:* Poorly drained

*Permeability:* Moderately slow

*Parent material:* Alluvium

*Runoff:* Poned

*Available water capacity:* Very high

*Seasonal high water table:* 0.5 foot above to 1.0 foot below the surface

*Organic matter content:* Moderate

*Erosion hazard:* None

*Shrink-swell potential:* Low

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

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

*Underlying material:*

8 to 23 inches—dark gray, mottled, friable silt loam that has strata of very dark grayish brown and light brownish gray

23 to 60 inches—stratified dark grayish brown, grayish brown, and very dark gray, mottled, friable silt loam

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Lawson soils, which have a darker surface layer than the Birds soil and are slightly higher on the meanderbelts
- The somewhat poorly drained Radford soils, which have a darker surface layer than the Birds soil and have a buried soil; in the slightly higher positions on meanderbelts

*Similar soils:*

- Soils that have more clay throughout
- Soils that have a seasonal high water table at a depth of more than 1 foot
- Soils that have more sand in the surface layer
- Soils that have a darker surface layer

### **Use and Management**

#### **Woodland**

*Suitability:* Poorly suited

*Management measures:*

- The use of equipment is limited to periods when the soil is firm and dry.
- In openings where timber has been harvested, competition from undesirable vegetation can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Wildlife habitat**

*Suitability:* Well suited

*Management measures:*

- Wetland plants and shallow water areas, which enhance habitat for wetland wildlife, can be easily established in the oxbows and depressions.

#### **Dwellings**

*Suitability:* Generally unsuited

#### **Septic tank absorption fields**

*Suitability:* Generally unsuited

### **Interpretive Groups**

*Land capability classification:* Vw

*Woodland ordination symbol:* 5W

*Windbreak suitability group:* 2

**3074—Radford silt loam, frequently flooded****Composition**

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

**Setting**

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts on flood plains  
 and on alluvial fans

*Slope:* 0 to 2 percent

*Shape of areas:* Long and narrow

*Flooding frequency:* Frequent

*Flooding duration:* Brief

*Size of areas:* 3 to 160 acres

*Major use:* Cropland

**Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Parent material:* Alluvium

*Runoff:* Slow

*Available water capacity:* Very high

*Seasonal high water table:* At a depth of 1 to 3 feet  
 during the spring

*Organic matter content:* Moderate

*Erosion hazard:* None

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

**Typical Profile**

*Surface layer:*

0 to 7 inches—very dark grayish brown, friable silt loam

*Subsurface layer:*

7 to 15 inches—very dark grayish brown, friable silt loam

*Substratum:*

15 to 24 inches—very dark grayish brown, friable silt loam that has thin strata of grayish brown and brown sandy loam

*Buried soil:*

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

**Inclusions**

*Contrasting inclusions:*

- The poorly drained Birds soils, which do not have a buried soil, have a lighter colored surface layer than the Radford soil, and are in the slightly lower positions on meanderbelts
- The poorly drained Sawmill soils, which do not have a buried soil, have more clay in the surface layer than the Radford soil, and are in the slightly lower positions on meanderbelts

*Similar soils:*

- Soils that have a lighter colored surface layer and subsurface layer
- Soils that do not have a stratified subsurface layer

**Use and Management****Cropland**

*Suitability:* Moderately suited

*Management measures:*

- Flooding can delay planting or harvesting and may cause crop damage in some years.
- The existing subsurface tile drainage system should be maintained.
- Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity.

**Wildlife habitat**

*Suitability:* Moderately suited

*Management measures:*

- Wetland plants and shallow water areas, which enhance habitat for wetland wildlife, can be easily established in the oxbows.
- The habitat should be protected from fire and from grazing by livestock.

**Dwellings**

*Suitability:* Generally unsuited

**Septic tank absorption fields**

*Suitability:* Generally unsuited

**Interpretive Groups**

*Land capability classification:* IIIw

*Windbreak suitability group:* 1

**3107—Sawmill silty clay loam, frequently flooded****Composition**

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

**Setting**

*Landscape:* Flood plains

*Position on the landform:* Backswamps and meanderbelts on flood plains

*Slope:* 0 to 2 percent

*Shape of areas:* Long and narrow

*Flooding frequency:* Frequent

*Flooding duration:* Brief

*Size of areas:* 3 to 200 acres

*Major use:* Cropland

**Soil Properties and Qualities**

*Drainage class:* Poorly drained

*Permeability:* Moderate

*Parent material:* Alluvium

*Runoff:* Slow

*Available water capacity:* High

*Seasonal high water table:* At the surface to 2 feet below the surface during the spring

*Organic matter content:* High

*Erosion hazard:* None or slight

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

0 to 8 inches—very dark gray, friable silty clay loam

*Subsurface layer:*

8 to 28 inches—very dark gray, friable silty clay loam that is mottled in the lower part

*Subsoil:*

28 to 45 inches—dark gray, mottled, friable silty clay loam

45 to 57 inches—light brownish gray, mottled, friable silty clay loam

*Substratum:*

57 to 60 inches—light brownish gray, mottled, friable silty clay loam

### **Inclusions**

*Contrasting inclusions:*

- The somewhat poorly drained Radford soils, which have a buried soil and have less clay in the upper part of the profile than the Sawmill soil; in the slightly higher positions on meanderbelts
- The somewhat poorly drained Wakeland soils, which have less clay throughout than the Sawmill soil and have a lighter colored surface layer; in the higher positions on meanderbelts

*Similar soils:*

- Soils that have less clay
- Soils that have a seasonal high water table above the surface

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited

*Management measures:*

- Flooding can delay planting or harvesting and may cause crop damage in some years.
- The existing subsurface tile drainage system or surface ditches should be maintained.
- Minimizing tillage and returning crop residue to the soil help to maintain good tilth and increase the rate of water infiltration.

#### **Woodland**

*Suitability:* Poorly suited

*Management measures:*

- Plant competition can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Wildlife habitat**

*Suitability:* Well suited

*Management measures:*

- Wetland plants and shallow water areas, which enhance habitat for wetland wildlife, can be easily established in the oxbows and depressions.
- The habitat should be protected from fire and from grazing by livestock.
- The grain and seed crops, grasses and legumes, and wild herbaceous plants used as food and cover by openland wildlife grow well on this soil.

#### **Dwellings**

*Suitability:* Generally unsuited

#### **Septic tank absorption fields**

*Suitability:* Generally unsuited

### **Interpretive Groups**

*Land capability classification:* IIIw

*Woodland ordination symbol:* 5W

*Windbreak suitability group:* 2

## **3284—Tice silty clay loam, frequently flooded**

### **Composition**

Tice soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

### **Setting**

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts on flood plains

*Slope:* 0 to 2 percent

*Shape of areas:* Irregular

*Flooding frequency:* Frequent

*Flooding duration:* Brief

*Size of areas:* 5 to 300 acres

*Major use:* Cropland

### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Parent material:* Alluvium

*Runoff:* Slow

*Available water capacity:* High

*Seasonal high water table:* At a depth of 1.5 to 3.0 feet from mid winter through spring

*Organic matter content:* Moderate

*Erosion hazard:* None

*Shrink-swell potential:* Moderate

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

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

*Subsurface layer:*

9 to 15 inches—very dark grayish brown, friable silty clay loam

*Subsoil:*

15 to 39 inches—dark grayish brown, mottled, friable and firm silty clay loam

39 to 51 inches—dark grayish brown, mottled, friable silt loam that has strata of loam

*Substratum:*

51 to 60 inches—dark grayish brown, mottled, friable silt loam that has strata of loam

### **Inclusions**

*Contrasting inclusions:*

- The poorly drained Birds soils, which have a lighter colored surface layer than the Tice soil and are lower on the meanderbelts
- The somewhat poorly drained Wakeland soils, which have a lighter colored surface layer than the Tice soil and are in similar landscape positions

*Similar soils:*

- Soils that have less clay
- Soils that have a dark buried soil within a depth of 40 inches
- Soils that have a seasonal high water table within a depth of 1.5 feet

### **Use and Management**

#### **Cropland**

*Suitability:* Moderately suited

*Management measures:*

- Flooding can delay planting or harvesting and may cause crop damage in some years.
- The existing subsurface tile drainage system or surface ditches should be maintained.
- Keeping tillage to a minimum and leaving crop residue on the surface after planting help to maintain tilth and productivity.

#### **Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

#### **Wildlife habitat**

*Suitability:* Moderately suited

*Management measures:*

- Wetland plants and shallow water areas, which enhance habitat for wetland wildlife, can be easily established in the oxbows.
- The habitat should be protected from fire and from grazing by livestock.

#### **Dwellings**

*Suitability:* Generally unsuited

#### **Septic tank absorption fields**

*Suitability:* Generally unsuited

### **Interpretive Groups**

*Land capability classification:* IIIw

*Woodland ordination symbol:* 5A

*Windbreak suitability group:* 1

### **3333—Wakeland silt loam, frequently flooded**

#### **Composition**

Wakeland soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

#### **Setting**

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts on flood plains

*Slope:* 0 to 2 percent

*Shape of areas:* Long and narrow

*Flooding frequency:* Frequent

*Flooding duration:* Brief

*Size of areas:* 3 to 120 acres

*Major use:* Cropland

#### **Soil Properties and Qualities**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Parent material:* Alluvium

*Runoff:* Slow

*Available water capacity:* Very high

*Seasonal high water table:* At a depth of 1 to 3 feet from mid winter through spring

*Organic matter content:* Moderate

*Erosion hazard:* None

*Shrink-swell potential:* Low

*Potential for frost action:* High

### **Typical Profile**

*Surface layer:*

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

*Underlying material:*

9 to 44 inches—dark grayish brown, mottled, friable silt loam that has brown strata

44 to 60 inches—gray, mottled, friable silt loam

**Inclusions***Contrasting inclusions:*

- The poorly drained Sawmill soils, which have a dark surface layer more than 24 inches thick, contain more clay than the Wakeland soil, and are lower on the meanderbelts

*Similar soils:*

- Soils that have a buried soil within a depth of 40 inches
- Soils that have a seasonal high water table within a depth of 1 foot

**Use and Management****Cropland**

*Suitability:* Well suited

*Management measures:*

- Flooding can delay planting or harvesting and may cause crop damage in some years.
- The existing subsurface tile drainage system or surface ditches should be maintained.
- A system of conservation tillage that leaves crop residue on the surface after planting improves tilth, helps to prevent surface compaction and crusting, and increases the rate of water infiltration.

**Woodland**

*Suitability:* Well suited

*Management measures:*

- In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

**Wildlife habitat**

*Suitability:* Moderately suited

*Management measures:*

- Wetland plants and shallow water areas, which enhance habitat for wetland wildlife, can be easily established in the oxbows and depressions.
- The woodland should be protected from fire and from grazing by livestock.

**Dwellings**

*Suitability:* Generally unsuited

**Septic tank absorption fields**

*Suitability:* Generally unsuited

**Interpretive Groups**

*Land capability classification:* 1lw

*Woodland ordination symbol:* 5A

*Windbreak suitability group:* 1

**3334—Birds silt loam, frequently flooded****Composition**

Birds soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

**Setting**

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts on flood plains

*Slope:* 0 to 2 percent

*Shape of areas:* Long and irregular

*Flooding frequency:* Frequent

*Flooding duration:* Brief

*Size of areas:* 3 to 240 acres

*Major use:* Cropland

**Soil Properties and Qualities**

*Drainage class:* Poorly drained

*Permeability:* Moderately slow

*Parent material:* Alluvium

*Runoff:* Slow

*Available water capacity:* Very high

*Seasonal high water table:* 0.5 foot above to 1.0 foot below the surface during the spring

*Organic matter content:* Moderate

*Erosion hazard:* None

*Shrink-swell potential:* Low

*Potential for frost action:* High

**Typical Profile***Surface layer:*

0 to 9 inches—dark gray, mottled, friable silt loam that has thin strata of very dark gray and light yellowish brown

*Underlying material:*

9 to 22 inches—gray, mottled, friable silt loam that has strata of light gray and dark gray

22 to 37 inches—dark gray, mottled, friable, stratified silt loam and silty clay loam

37 to 60 inches—light brownish gray, mottled, friable silt loam that has strata of dark gray

**Inclusions***Contrasting inclusions:*

- The somewhat poorly drained Lawson soils, which have a darker surface layer than the Birds soil and are slightly higher on the meanderbelts
- The somewhat poorly drained Radford soils, which have a darker surface layer than the Birds soil and have a buried soil; in the slightly higher positions on meanderbelts

*Similar soils:*

- Soils that have less clay throughout
- Soils that have a seasonal high water table at a depth of more than 1 foot
- Soils that have more sand in the surface layer

**Use and Management****Cropland***Suitability:* Moderately suited*Management measures:*

- Flooding can delay planting or harvesting and may cause crop damage in some years.
- The existing subsurface tile drainage system or surface ditches should be maintained.
- Tilling when the soil is wet causes surface cloddiness and compaction.
- Minimizing tillage and returning crop residue to the soil help to maintain good tilth and increase the rate of water infiltration.

**Woodland***Suitability:* Poorly suited*Management measures:*

- The use of equipment is limited to periods when the soil is firm and dry.
- Plant competition can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

**Wildlife habitat***Suitability:* Well suited*Management measures:*

- The included areas that have shallow depressions and areas of deep water can be used as feeding and resting areas by certain species of waterfowl.

**Dwellings***Suitability:* Generally unsuited**Septic tank absorption fields***Suitability:* Generally unsuited**Interpretive Groups***Land capability classification:* IIIw*Woodland ordination symbol:* 5W*Windbreak suitability group:* 2**3451—Lawson silt loam, frequently flooded****Composition**

Lawson soil and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

**Setting***Landscape:* Flood plains*Position on the landform:* Meanderbelts on flood plains*Slope:* 0 to 2 percent*Shape of areas:* Long and narrow*Flooding frequency:* Frequent*Flooding duration:* Brief*Size of areas:* 8 to 240 acres*Major use:* Cropland**Soil Properties and Qualities***Drainage class:* Somewhat poorly drained*Permeability:* Moderate*Parent material:* Alluvium*Runoff:* Slow*Available water capacity:* Very high*Seasonal high water table:* At a depth of 1 to 3 feet from spring through fall*Organic matter content:* High*Erosion hazard:* None*Shrink-swell potential:* Moderate*Potential for frost action:* High**Typical Profile***Surface layer:*

0 to 9 inches—very dark gray, friable silt loam

*Subsurface layer:*

9 to 27 inches—very dark gray, mottled, friable silt loam

*Underlying material:*

27 to 47 inches—dark grayish brown and grayish brown, mottled, friable silt loam

47 to 60 inches—gray, mottled, firm silt loam

**Inclusions***Contrasting inclusions:*

- The poorly drained Birds soils, which have a lighter colored surface layer than the Lawson soil and are lower on the flood plain

*Similar soils:*

- Soils that have a buried soil
- Soils that contain more clay throughout

**Use and Management****Cropland***Suitability:* Moderately suited*Management measures:*

- Flooding can delay planting or harvesting and may cause crop damage in some years.
- The existing subsurface tile drainage system or surface ditches should be maintained.
- Using a system of minimum tillage and leaving crop residue on the surface after planting help to maintain tilth and productivity.

**Woodland***Suitability:* Well suited

*Management measures:*

- Plant competition can be controlled by chemical or mechanical means.
- The woodland should be protected from fire and from grazing by livestock.

**Wildlife habitat***Suitability:* Moderately suited*Management measures:*

- Wetland plants and shallow water areas can be easily established in the oxbows and depressions.
- The habitat should be protected from fire and from grazing by livestock.

**Dwellings***Suitability:* Generally unsuited**Septic tank absorption fields***Suitability:* Generally unsuited***Interpretive Groups****Land capability classification:* IIIw*Woodland ordination symbol:* 2W*Windbreak suitability group:* 1**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.

A recent trend in land use in some parts of the county has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive and cannot be easily cultivated.

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

Some soils that have a seasonal high water table and all soils that are frequently flooded during the growing season qualify 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.



# Use and Management of the Soils

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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 all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

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

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

## Crops and Pasture

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly

grown in the survey area, are identified; the system of land capability classification used by the 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.

About 302,173 acres in McDonough County was used as cropland in 1987. Of this acreage, 109,257 acres was used for corn, 113,596 acres was used for soybeans, and 2,806 acres was used for wheat. About 23,029 acres was used for pasture, and 13,544 acres was hayland (U.S. Department of Commerce, 1989).

The chief management needs in the county are measures that control water erosion and soil blowing, that maintain or improve drainage in wet areas, and that help to maintain tilth and fertility.

Water erosion is a major management concern. Loss of topsoil through sheet and rill erosion results in poor tilth and reduced productivity. As topsoil is lost, part of the subsoil, which is typically higher in clay content, is incorporated into the plow layer and tilth is affected. As tilth deteriorates, the potential for cloddiness increases and the rate of water infiltration and the ease of preparing a seedbed decrease. The reduced rate of water infiltration is accompanied by increased runoff and the potential for further water erosion. Nutrients valuable to crop production are lost as the topsoil is lost.

Another damaging effect of water erosion is the sedimentation of waterways, ditches, streams, and rivers. Controlling water erosion helps to minimize the detrimental effects of sedimentation, such as poor water quality, the flooding associated with reduced channel capacity, and the expense of removing the sediment.

Specific information about the design of conservation practices is available from the McDonough County Soil and Water Conservation District.

Most of the nearly level soils in the county are susceptible to soil blowing. Maintaining a plant cover or using cropping and tillage systems that leave the surface rough and covered with plant residue helps to control soil blowing. Windbreaks also are effective in reducing the hazard of soil blowing.

Many of the soils in the county are artificially drained. Unless a drainage system is provided, wetness can damage crops or delay planting or harvesting. About 18 percent of the soils in McDonough County are poorly drained. Birds and Sawmill soils on flood plains and Sable and Virden soils on uplands are examples. About 47 percent of the soils in McDonough County are somewhat poorly drained. Lawson and Radford soils on flood plains and Clarksdale, Ipava, and Keomah soils on uplands are examples.

The design of drainage systems differs from soil to soil. Tile drains function well in most areas on bottom land if suitable outlets are available. Upland soils that are slowly permeable or very slowly permeable, such as Rushville and Denny soils, may require a drainage system other than standard tile lines. Surface ditches or a combination of scattered tile lines and surface inlets may be needed. Information about the drainage system suitable for each kind of soil is available in the local office of the Natural Resources Conservation Service.

During periods of high water demand, an inadequate soil moisture supply is a problem in soils that have an unfavorable or root-restricting subsoil, such as Marseilles soils.

Natural fertility is high in Ipava, Sable, and Lawson soils and in other soils that have a thick, dark surface layer. Plants respond well to applications of lime and fertilizer. Natural fertility is lower in Keomah, Rozetta, and Rushville soils and in other soils that have a light colored surface layer. Generally, these soils are also more acid than the soils with high natural fertility. Applying limestone helps to raise the pH to a level that is optimum for plant growth. Additions of lime, nitrogen, phosphorus, potassium, or other elements are needed for optimum yields. The additions of these elements should be based on the results of soil tests. The Cooperative Extension Service or the Natural Resources Conservation Service can help in determining the kinds and amounts of fertilizer and lime needed.

Soil tilth is an important factor influencing the germination of seeds, the runoff rate, and the infiltration of water into the soil. Good tilth is a condition in which the surface soil is granular and porous. A low content of organic matter, a high clay content, or a combination of these results in poor tilth. Poor tilth is a common problem in areas of the severely eroded Atlas soils. A

system of conservation tillage can improve tilth in these areas.

The field crops suited to the soils and climate of the survey area include many that are not commonly grown. The main crops are corn, soybeans, and wheat. Grain sorghum is also common. Some specialty crops, such as strawberries and sweet corn, are also grown. Nursery stock is grown in a few areas. There are also several orchards in the county. The climatic conditions and the soils are particularly well suited not only to field crops but also to vegetables and specialty crops.

Suitable pasture and hay plants include several legumes, cool-season grasses, and warm-season native grasses. Alfalfa and red clover are the legumes commonly grown for hay. They are also used in mixtures with grasses for hay and pasture.

Suitable warm-season native grasses include big bluestem, little bluestem, indiagrass, and switchgrass. These grasses produce well in summer. They require different management techniques for establishment and grazing than cool-season grasses (University of Illinois, 1989).

Alfalfa is best suited to deep, moderately well drained and well drained soils, such as Elco, Fayette, Hickory, and Rozetta soils. With proper management, other legumes and grasses also grow well on these soils.

Plants that are tolerant of wetness are suited to somewhat poorly drained, poorly drained, and very poorly drained soils. Red clover, ladino clover, alsike clover, and birdsfoot trefoil are legumes that are more water tolerant than alfalfa. Cool-season grasses that are relatively water tolerant include orchardgrass, smooth brome, timothy, and reed canarygrass.

Drought tolerance is desirable in plants selected for pasture or hayland established in areas of soils that have a moderate available water capacity, such as Marseilles soils. Legumes that are suited to droughty soils include alfalfa, red clover, and ladino clover. Bromegrass, tall fescue, and orchardgrass are cool-season grasses that are relatively tolerant of droughty conditions.

Well managed stands of forage crops are effective in controlling erosion. Overgrazing and the need for adequate lime and fertilizer are common management concerns. The amount of lime and fertilizer added should be based on the results of soil tests, on the needs of plants, and on the expected level of yields.

Overgrazing reduces the vigor of pasture plants and hampers forage production. It also allows an increase in the extent of weeds and brush. Measures that maintain soil fertility, deferred grazing, rotation grazing, and proper stocking rates help to prevent overgrazing. Deferred grazing allows the plants to build up reserves of carbohydrates. Rotating grazing among several areas

of pasture allows each area a rest period. The information in table 6 can be helpful in estimating the number of animals that can be supported by pasture.

Many soils in the survey area have a high water table in spring. Deferring grazing during wet periods helps to prevent surface compaction. Pasture renovation helps to overcome surface compaction where it is a concern. Frost heave of alfalfa and red clover is a hazard on soils that have a high water table. Maintaining a cover of stubble 4 to 6 inches in height during winter and planting grass-legume mixtures can minimize the damage caused by frost heave.

### 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 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

Barrie McVey, district forester, Illinois Department of Conservation, helped prepare this section.

In the early 19th century, an estimated 38.2 percent of the land in Illinois and 30.0 percent of the land in McDonough County was forested. In 1985, about 36,500 acres in McDonough County, or about 9.7 percent of the total acreage, was woodland (Iverson and others, 1989). The majority of this woodland is privately owned. Much of it is in areas of association 6, which is described under the heading "General Soil Map Units."

Woodland was cleared for farms, pastures, homesites, and fuel. An increase in agricultural production also reduced the acreage of woodland. Much of the woodland that remains today is in areas that are unsuitable for farming because of slope, wetness, or poor accessibility. Removal of trees from steep areas results in a severe hazard of water erosion. The canopy and leaf litter help to absorb and slow the water. Tree roots stabilize the soil and reduce the runoff rate.

The most common tree species in an upland forest include white oak, northern red oak, black oak, shagbark hickory, bitternut hickory, sugar maple, black cherry, white ash, green ash, black walnut, and American elm. Bottom-land areas along major drainageways support sycamore, silver maple, boxelder, willow, river birch, and cottonwood. If the soils in wooded areas are disturbed, Osage-orange and honeylocust can invade.

Most of the woodland in the county can be greatly improved by applying management measures that exclude livestock from the wooded areas. Grazing destroys small seedlings and causes surface compaction. The stands can be improved by harvesting mature but merchantable trees. Competition from undesirable species should be controlled, and the woodland should be protected from fire, insects, and disease.

Table 7 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 7, *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 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 bedrock, a fragipan, or other limiting layers. 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.

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. 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. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and to abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To 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 8 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in table 8 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.

At the end of each description under the heading "Detailed Soil Map Units," the soil has been assigned to a windbreak suitability group. These groups are based primarily on the suitability of the soil for the locally adapted species, as is indicated by their growth and vigor. Detailed interpretations for each windbreak suitability group in the county are provided in the Technical Guide, which is available in the local office of the Natural Resources Conservation Service.

Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service or from a commercial nursery.

## Recreation

McDonough County has many areas of scenic, geologic, and historic interest. These areas are used for hiking, camping, sightseeing, picnicking, hunting, fishing, boating, and cycling. Public areas available for recreational use include Argyle Lake State Park (fig. 9), Spring Lake, museums at Western Illinois University, and many city parks.

The use of recreational areas in the county has increased in recent years. The potential for additional development of recreational facilities is good in parts of the county. Areas having the best potential for recreational uses are in associations 6 and 7, which are described under the heading "General Soil Map Units."



Figure 9.—An area of Marseilles silt loam, 30 to 60 percent slopes, in Argyle Lake State Park.

These associations are characterized by hilly terrain, wooded slopes, rock formations, and many streams, all of which provide a variety of recreational opportunities.

The soils of the survey area are rated in table 9 according to limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water

impoundment sites, and access to public 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 9, 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 9 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 12 and interpretations for dwellings without basements and for local roads and streets in table 11.

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

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

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

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

## Wildlife Habitat

The soils in McDonough County provide habitat for various species of wildlife. These species include quail, squirrel, raccoon, turkey, deer, rabbit, and many nongame species. Geese use the lakes and small ponds in the county during their migration. Lakes, ponds, and streams are inhabited by many species of fish, including largemouth bass, catfish, trout, carp and other rough fish, and various pan fish.

By providing the food, cover, and water required by wildlife, most areas in the county can be used as wildlife habitat. The survey area can be divided into four general kinds of wildlife habitat. These wildlife areas are described in the following paragraphs.

*Wildlife area 1* consists of the Sable-Ipava, Sable-Muscatine, Ipava-Tama, Muscatine-Tama, and Ipava-Virden associations. The soils are nearly level to moderately sloping and are poorly drained to moderately well drained.

This wildlife area supports few wildlife species because it is characterized by few of the elements of wildlife habitat. It is used mainly for row crops, such as corn and soybeans, and provides little cover for wildlife.

The habitat can be improved by leaving idle areas, such as roadsides, waterways, and grassed buffer strips, unmowed until the nesting season is over in August; by permitting woody vegetation to become established in fence rows and along roadways; and by planting fine stemmed grasses, such as smooth brome and timothy, along waterways. Food and cover for wildlife can be enhanced by leaving  $\frac{1}{4}$  acre unharvested for every 40 acres of grain crops, by leaving crop residue on the surface during winter, and by planting a grass buffer strip around fields.

*Wildlife area 2* consists of the Hickory-Rozetta-Elco association. The soils are moderately sloping to very steep and are well drained and moderately well drained.

This wildlife area is generally along drainageways and in areas upslope from streams. The major uses include cropland, pasture and hay, and woodland. Because of the diversity of land use, the area is favorable for many kinds of wildlife.

The habitat can be improved by leaving idle areas, such as roadsides, waterways, and grassed buffer strips, unmowed until the nesting season is over in August; by permitting woody vegetation to become established in fence rows and along roadways; and by planting fine stemmed grasses, such as smooth brome and timothy, along waterways. Establishing greenbelts or permanent vegetation along streams or drainageways also improves the habitat. Applying good

pasture management practices and protecting greenbelts and woodland from grazing are also important. Food and cover for wildlife can be enhanced by leaving  $\frac{1}{4}$  acre unharvested for every 40 acres of grain crops, by leaving crop residue on the surface during winter, and by planting a grass buffer strip around fields.

*Wildlife area 3* consists of the Sawmill-Wakeland-Tice association. The soils are nearly level and are poorly drained and somewhat poorly drained.

This wildlife area is directly adjacent to streams. The major uses include cropland, pasture and hay, and woodland.

The habitat can be improved by leaving idle areas, such as roadsides, waterways, and grassed buffer strips, unmowed until the nesting season is over in August; by permitting woody vegetation to become established in fence rows and along roadways; and by planting fine stemmed grasses, such as smooth brome and timothy, along waterways. Establishing greenbelts or permanent vegetation along streams or drainageways and establishing wetland plants in old oxbows and depressions also improve the habitat. Applying good pasture management practices and protecting greenbelts and woodland from grazing are also important. Food and cover for wildlife can be enhanced by leaving  $\frac{1}{4}$  acre unharvested for every 40 acres of grain crops, by leaving crop residue on the surface during winter, and by planting a grass buffer strip around fields.

*Wildlife area 4* consists of the Rapatee-Swanwick association. The soils are gently sloping to moderately sloping and are well drained.

This wildlife area is in reclaimed areas that have been surface mined (fig. 10). The major uses include cropland and pasture and hay.

The habitat can be improved by leaving idle areas, such as roadsides, waterways, and grassed buffer strips, unmowed until the nesting season is over in August; by permitting woody vegetation to become established in fence rows and along roadways; and by planting fine stemmed grasses, such as smooth brome and timothy, along waterways. Establishing greenbelts or permanent vegetation along streams or drainageways and establishing natural prairie grasses in the uplands and wetland plants along pond shorelines and in depressions also improve the habitat. Applying good pasture management practices and protecting greenbelts and woodland from grazing are also important. Food and cover for wildlife can be enhanced by leaving  $\frac{1}{4}$  acre unharvested for every 40 acres of grain crops, by leaving crop residue on the surface during winter, and by planting a grass buffer strip around fields.

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 10, 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, and oats.

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

*Wild herbaceous plants* are native or naturally



Figure 10.—This area, which was created as a result of surface mining for coal, provides habitat for wildlife. The slopes in the background are in an area of Orthents, loamy, moderately steep.

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. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, and wheatgrass.

*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, and blackberry. Examples of fruit-producing shrubs that are suitable for planting on

soils rated *good* are Russian-olive, autumn-olive, and crabapple.

*Coniferous plants* furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

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

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

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

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

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

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

## Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. 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, depth to bedrock, hardness of bedrock within 5 or 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the 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 11 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so

difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

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

*Dwellings and small commercial buildings* are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrinking and swelling, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, 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 bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost action potential, and depth to a high water table affect the traffic-supporting capacity.

*Lawns and landscaping* require soils on which turf and ornamental trees and shrubs can be established and maintained. The ratings are based on soil properties, site features, and observed performance of the soils. Soil reaction, a high water table, depth to bedrock or to a cemented pan, the available water capacity in the upper 40 inches, and the content of salts, sodium, and sulfidic materials affect plant growth.

Flooding, wetness, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer affect trafficability after vegetation is established.

### Sanitary Facilities

Table 12 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 12 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. Large stones and bedrock or a cemented pan interfere with installation.

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

*Sewage lagoons* are shallow ponds constructed to hold sewage while aerobic bacteria decompose the

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

Table 12 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage 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, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

*Sanitary landfills* are areas where solid waste is disposed of by burying it in soil. 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.

The landfill must be able to bear heavy vehicular traffic. The pollution of ground water is a hazard. Ease of excavation and revegetation should be considered.

The ratings in table 12 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect the ratings for landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. Onsite investigation may be 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 bedrock, a cemented pan, 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 13 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 large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, 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 13, 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 14 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 stones or boulders, organic matter, or salts

or sodium. A high water table affects the amount of usable material. It also affects trafficability.

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

*Irrigation* is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The

construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

*Terraces and diversions* are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of 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. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of soil blowing, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

# Soil Properties

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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 18.

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 15 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 18.

*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 16 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 16, 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 17 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

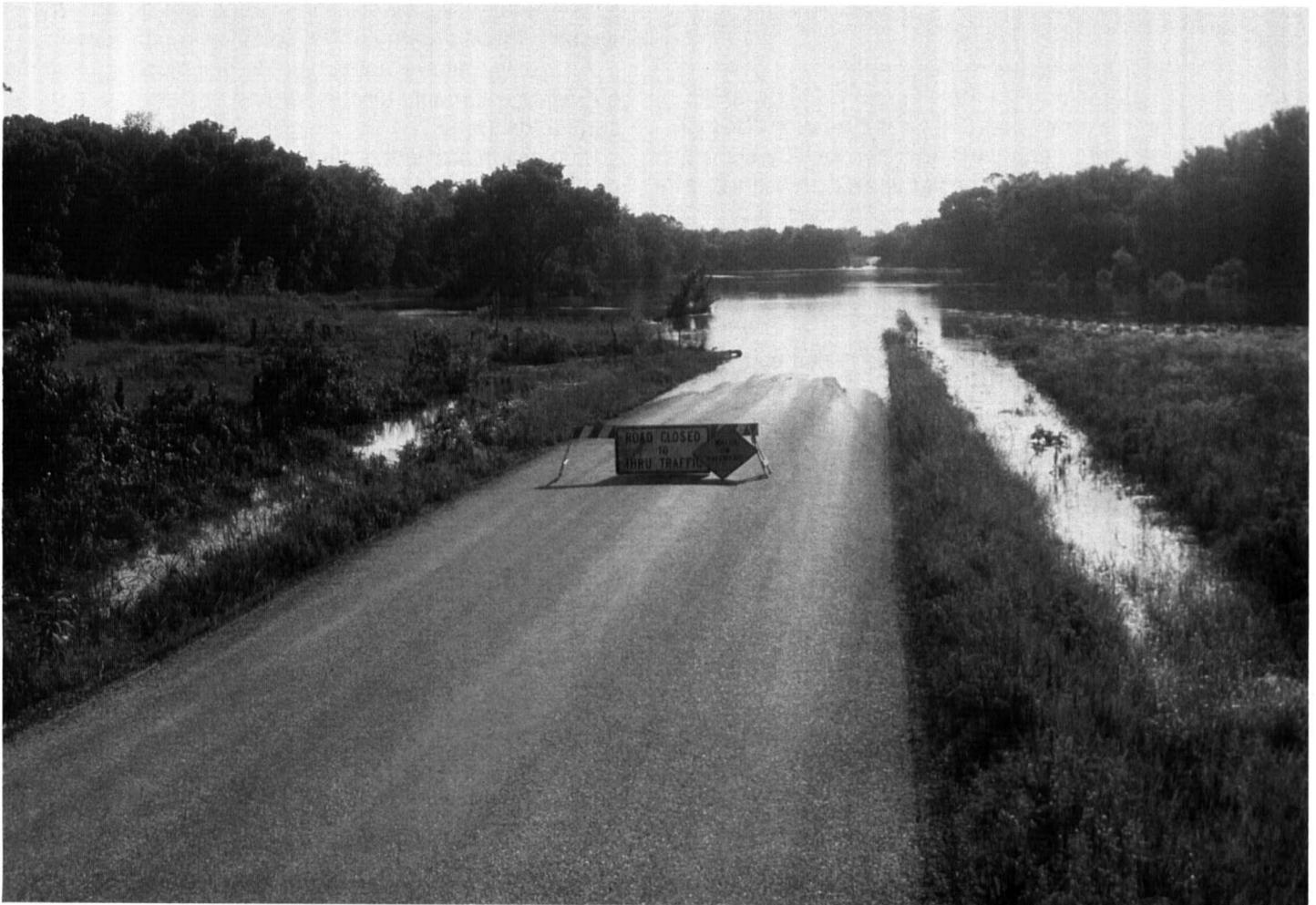


Figure 11.—Flooding in an area of Wakeland silt loam, frequently flooded.

17, 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 or by runoff from adjacent slopes (fig. 11). Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 17 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 17 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 17.

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.

*Depth to bedrock* is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

*Potential frost action* is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly structured, clayey soils that have a high water table in winter are 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 18 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

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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 19 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 horizonation, plus *aquoll*, 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."

### Assumption Series

*Drainage class:* Moderately well drained

*Permeability:* Moderate in the upper part and moderately slow or slow in the lower part

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Slope range:* 5 to 15 percent

*Taxonomic class:* Fine-silty, mixed, mesic Typic Argiudolls

*Taxadjunct features:* The Assumption soils in this survey area have a thinner dark surface layer than is defined as the range for the series. They are classified as fine-silty, mixed, mesic Mollic Hapludalfs.

### Typical Pedon

Assumption silt loam, 5 to 10 percent slopes, eroded, 2,400 feet east and 1,860 feet north of the southwest corner of sec. 15, T. 6 N., R. 4 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; mixed with some streaks and pockets of brown (10YR 4/3) silt loam subsoil material; moderate fine granular structure; friable; common very fine and fine roots; medium acid; clear smooth boundary.

BA—9 to 15 inches; brown (10YR 4/3) silt loam; weak fine subangular blocky structure; friable; common very fine and few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—15 to 29 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; friable; common very fine and few fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt2—29 to 36 inches; brown (10YR 4/3) silty clay loam; moderate fine and medium subangular blocky structure; friable; few very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; about 1 percent pebbles; medium acid; gradual smooth boundary.

2Bt3—36 to 49 inches; brown (10YR 5/3) clay loam; moderate medium subangular blocky structure; firm; few very fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; about 1 percent pebbles; slightly acid; gradual smooth boundary.

2Btg—49 to 60 inches; dark grayish brown (2.5Y 4/2) clay loam; few fine prominent light brownish gray (10YR 6/2) and common fine prominent yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; about 5 percent pebbles; slightly acid.

### Range in Characteristics

*Thickness of the loess:* 20 to 40 inches

*Ap horizon:*

Chroma—1 to 3

*Bt or 2Btg horizon:*

Value—4 or 5

Chroma—3 to 5

Texture—silt loam or silty clay loam

*2Bt horizon:*

Hue—7.5YR, 10YR, 2.5Y, or 5Y

Value—3 to 5

Chroma—1 to 6

Texture—silty clay loam, silt loam, clay loam, loam, or clay

### Atlas Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Very slow

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Slope range:* 5 to 18 percent

*Taxonomic class:* Fine, montmorillonitic, mesic, sloping Aeric Ochraqualfs

### Typical Pedon

Atlas silty clay loam, 5 to 10 percent slopes, severely eroded, 2,540 feet north and 540 feet west of the southeast corner of sec. 8, T. 4 N., R. 3 W.

Ap—0 to 8 inches; brown (10YR 5/3) silty clay loam, very pale brown (10YR 7/3) dry; mixed with some streaks and pockets of dark grayish brown (10YR 4/2) silty clay subsoil material; moderate very fine or fine subangular blocky structure parting to moderate fine granular; friable; common very fine roots; few fine soft accumulations of iron and manganese oxides; slightly acid; abrupt smooth boundary.

2Bt—8 to 16 inches; brown (10YR 5/3) silty clay; common fine faint light brownish gray (10YR 6/2) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; firm; few very fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; few fine and medium concretions of iron and manganese oxides; about 1 percent pebbles; medium acid; clear smooth boundary.

2Btg1—16 to 24 inches; dark grayish brown (2.5Y 4/2) silty clay; common fine prominent light gray (5Y 6/1) and few fine prominent yellowish brown (10YR 5/6)

mottles; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few very fine roots; many distinct gray (10YR 5/1) clay films on faces of peds; few medium and coarse concretions and few fine soft accumulations of iron and manganese oxides; about 1 percent pebbles; medium acid; gradual smooth boundary.

2Btg2—24 to 36 inches; grayish brown (2.5Y 5/2) silty clay; common medium distinct light gray (5Y 6/1), common fine prominent yellowish brown (10YR 5/6), and few fine prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; few very fine roots; many distinct gray (5Y 5/1) clay films on faces of peds; very few prominent very dark gray (10YR 3/1) organic coatings in root channels; few fine and medium concretions and many fine and medium soft accumulations of iron and manganese oxides; about 1 percent pebbles; neutral; gradual smooth boundary.

2Btg3—36 to 53 inches; light gray (5Y 6/1) clay loam; many medium prominent yellowish brown (10YR 5/6), common fine distinct light brownish gray (2.5Y 6/2), few fine prominent yellowish brown (10YR 5/8), and few fine faint light olive gray (5Y 6/2) mottles; moderate coarse subangular blocky structure; firm; common faint gray (5Y 5/1) clay films on faces of peds; very few prominent very dark gray (10YR 3/1) organic coatings in root channels; few fine and medium concretions and many fine and medium soft accumulations of iron and manganese oxides; about 1 percent pebbles; neutral; gradual smooth boundary.

2BC—53 to 60 inches; strong brown (7.5YR 5/6) clay loam; many medium prominent light gray (5Y 6/1) and common fine faint strong brown (7.5YR 5/8) mottles; weak coarse subangular blocky structure; firm; few prominent gray (5Y 5/1) clay films on faces of peds; common fine and medium soft accumulations of iron and manganese oxides; about 1 percent pebbles; neutral.

#### Range in Characteristics

*Thickness of the loess:* Less than 15 inches

*A or Ap horizon:*

Value—4 or 5

Chroma—2 to 4

Texture—silt loam or silty clay loam

*2Bt horizon:*

Hue—10YR or 2.5Y

Value—4 to 6

Chroma—2 to 4

Texture—silty clay loam or silty clay

*2BC horizon:*

Hue—10YR, 2.5Y, or 7.5YR

Chroma—2 to 6

### Atterberry Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Landscape:* Uplands

*Position on the landform:* Summits on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine-silty, mixed, mesic Udollic Ochraqualfs

#### Typical Pedon

Atterberry silt loam, 0 to 2 percent slopes, 90 feet east and 520 feet south of the northwest corner of sec. 5, T. 7 N., R. 4 W.

Ap—0 to 7 inches; very dark gray (10YR 3/1) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; common very fine roots; neutral; abrupt smooth boundary.

E—7 to 12 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak medium platy structure parting to weak fine granular; friable; common very fine roots; few fine soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Bt—12 to 18 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate very fine and fine subangular blocky structure; friable; common very fine roots; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Btg1—18 to 27 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

Btg2—27 to 35 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few fine and very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct

light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

Btg3—35 to 51 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse subangular blocky structure; friable; few fine and very fine roots; few distinct brown (7.5YR 4/2) clay films on faces of peds; common distinct dark brown (7.5YR 3/2) organic coatings lining pores; few fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

Cg—51 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; many fine and medium prominent yellowish brown (10YR 5/6) and common fine prominent yellowish brown (10YR 5/8) mottles; massive; friable; common distinct dark brown (7.5YR 3/2) organic coatings lining pores; few fine and medium soft accumulations of iron and manganese oxides; neutral.

#### Range in Characteristics

##### *Ap horizon:*

Value—2 or 3

Chroma—1 or 2

##### *E horizon:*

Value—4 or 5

##### *Bt or Btg horizon:*

Hue—10YR or 2.5Y

Value—5 or 6

Chroma—2 to 4

Texture—silty clay loam or silt loam

### **Birds Series**

*Drainage class:* Poorly drained

*Permeability:* Moderately slow

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts and backswamps on flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine-silty, mixed, nonacid, mesic  
Typic Fluvaquents

#### Typical Pedon

Birds silt loam, frequently flooded, 110 feet west and 2,050 feet north of the southeast corner of sec. 36, T. 5 N., R. 4 W.

Ap—0 to 9 inches; dark gray (10YR 4/1) silt loam that has strata of very dark gray (10YR 3/1) and light yellowish brown (10YR 6/4), pale brown (10YR 6/3)

dry; few fine prominent yellowish brown (10YR 5/8) mottles; moderate fine granular structure; friable; few very fine roots; slight effervescence; mildly alkaline; clear smooth boundary.

Cg1—9 to 22 inches; gray (10YR 5/1) silt loam that has strata of dark gray (10YR 4/1) and light gray (10YR 7/1); few fine faint light brownish gray (10YR 6/2) and few fine prominent yellowish brown (10YR 5/8) mottles; massive parting to weak platy structure; friable; few very fine roots; common clean brown (10YR 5/3) sand grains on horizontal surfaces; few fine soft accumulations of iron and manganese oxides; slight effervescence; mildly alkaline; clear smooth boundary.

Cg2—22 to 37 inches; dark gray (10YR 4/1), stratified silt loam and silty clay loam; common fine distinct light brownish gray (10YR 6/2) and common fine prominent yellowish brown (10YR 5/8) mottles; massive parting to weak platy structure; friable; few very fine roots; common clean brown (10YR 5/3) sand grains on horizontal surfaces; few fine soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Cg3—37 to 60 inches; light brownish gray (10YR 6/2) silt loam that has dark gray (10YR 4/1) strata; common fine faint gray (10YR 5/1) and common fine and medium prominent yellowish brown (10YR 5/8) mottles; massive parting to weak platy structure; friable; few very fine roots; common clean brown (10YR 5/3) sand grains on horizontal surfaces; few fine soft accumulations of iron and manganese oxides; slightly acid.

#### Range in Characteristics

##### *Ap or A horizon:*

Value—4 to 6

Chroma—1 or 2

##### *Cg horizon:*

Hue—10YR or 2.5Y

Value—4 to 7

Texture—silt loam; strata of silty clay loam, clay loam, or loam

### **Clarksdale Series**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate in the upper part and moderately slow in the lower part

*Landscape:* Uplands

*Position on the landform:* Summits, shoulders, and back slopes on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 5 percent

*Taxonomic class:* Fine, montmorillonitic, mesic Udollic  
Ochraqualfs

### Typical Pedon

Clarksdale silt loam, 0 to 2 percent slopes, 2,980 feet east and 1,740 feet south of the northwest corner of sec. 6, T. 4 N., R. 4 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common very fine and fine roots; few fine soft accumulations of iron and manganese oxides; neutral; abrupt smooth boundary.

E—7 to 11 inches; dark gray (10YR 4/1) silt loam, light gray (10YR 6/1) dry; few fine distinct brown (10YR 5/3) mottles; weak medium platy structure parting to weak very fine subangular blocky; friable; few very fine roots; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

BE—11 to 14 inches; dark grayish brown (2.5Y 4/2) silty clay loam; common fine distinct brown (10YR 5/3) mottles; weak fine subangular blocky structure; friable; common very fine roots; common distinct light gray (10YR 7/1) dry silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Btg1—14 to 19 inches; dark grayish brown (2.5Y 4/2) silty clay; many fine distinct brown (10YR 5/3) and common fine prominent yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; common very fine roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine and medium soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

Btg2—19 to 25 inches; dark grayish brown (2.5Y 4/2) silty clay; many fine and medium prominent yellowish brown (10YR 5/4 and 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; many distinct dark gray (10YR 4/1) and few distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

Btg3—25 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; firm; few very fine roots; few prominent very dark gray (10YR 3/1) and many distinct dark gray (10YR 4/1) clay films on faces of peds; few fine and medium soft accumulations of iron and manganese oxides;

medium acid; gradual smooth boundary.

Btg4—33 to 43 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine prominent yellowish brown (10YR 5/4) and common fine prominent yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; few very fine roots; few distinct very dark gray (10YR 3/1) and dark gray (10YR 4/1) clay films on faces of peds; common fine and medium soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

Cg—43 to 60 inches; pale olive (5Y 6/3) silt loam; many fine prominent yellowish brown (10YR 5/4), common fine prominent light brownish gray (10YR 6/2), and common fine prominent yellowish brown (10YR 5/8) mottles; massive; friable; few fine and medium soft accumulations of iron and manganese oxides; slightly acid.

### Range in Characteristics

*Depth to carbonates:* Greater than 40 inches

*Ap horizon:*

Value—2 or 3

Chroma—1 or 2

*E horizon:*

Value—4 to 6

Chroma—1 or 2

*Bt or Btg horizon:*

Hue—10YR or 2.5Y

Value—4 to 6

Chroma—1 to 3

*Cg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—1 to 6

### Denny Series

*Drainage class:* Poorly drained

*Permeability:* Slow

*Landscape:* Uplands

*Position on the landform:* Shallow depressions on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine, montmorillonitic, mesic Mollic  
Albaqualfs

### Typical Pedon

Denny silt loam, 1,700 feet east and 220 feet north of the southwest corner of sec. 25, T. 7 N., R. 3 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; weak fine granular

structure; very friable; few very fine roots; medium acid; abrupt smooth boundary.

Eg1—9 to 14 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; common fine distinct dark yellowish brown (10YR 3/6) mottles; weak thin platy structure parting to weak fine granular; very friable; few very fine roots; few distinct very dark gray (10YR 3/1) organic coatings in root channels; common faint grayish brown (10YR 5/2) silt coatings on faces of peds; few fine concretions of iron and manganese oxides; medium acid; abrupt smooth boundary.

Eg2—14 to 21 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/2) dry; common fine faint dark brown (10YR 3/3) mottles; weak thin platy structure parting to weak fine granular; very friable; few very fine roots; few distinct very dark gray (10YR 3/1) organic coatings in root channels; common fine concretions of iron and manganese oxides; medium acid; abrupt smooth boundary.

Btg1—21 to 29 inches; grayish brown (10YR 5/2) silty clay; many fine distinct dark yellowish brown (10YR 4/6) and common fine distinct yellowish brown (10YR 5/4) mottles; moderate fine subangular blocky structure; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings in root channels; common fine concretions of iron and manganese oxides; medium acid; gradual smooth boundary.

Btg2—29 to 38 inches; grayish brown (10YR 5/2) silty clay; many fine and medium distinct dark yellowish brown (10YR 4/6) and common fine distinct yellowish brown (10YR 5/4) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings in root channels; common fine and few medium concretions of iron and manganese oxides; medium acid; gradual smooth boundary.

Btg3—38 to 46 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine prominent dark yellowish brown (10YR 4/6) and common fine distinct yellowish brown (10YR 5/4) mottles; moderate coarse subangular blocky structure; firm; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings in root channels; common fine concretions of iron and manganese oxides; medium acid; gradual smooth boundary.

Cg—46 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine prominent dark yellowish

brown (10YR 4/6) and common fine prominent yellowish brown (10YR 5/4) mottles; massive; firm; very few distinct very dark gray (10YR 3/1) organic coatings in root channels; common fine concretions of iron and manganese oxides; slightly acid.

#### Range in Characteristics

*Ap horizon:*

Value—2 or 3

Chroma—1 or 2

*Eg horizon:*

Chroma—1 or 2

*Btg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—1 or 2

*Cg horizon:*

Hue—10YR or 2.5Y

Value—5 or 6

Chroma—1 or 2

#### Downs Series

*Drainage class:* Moderately well drained

*Permeability:* Moderate

*Landscape:* Uplands

*Position on the landform:* Summits, shoulders, and back slopes on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 1 to 5 percent

*Taxonomic class:* Fine-silty, mixed, mesic Mollic Hapludalfs

#### Typical Pedon

Downs silt loam, 1 to 5 percent slopes, 150 feet south and 1,900 feet west of the northeast corner of sec. 4, T. 7 N., R. 4 W.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; mixed with some streaks and pockets of brown (10YR 4/3) silt loam material from the subsurface layer; weak very fine and fine granular structure; friable; common very fine roots; strongly acid; abrupt smooth boundary.

E—8 to 13 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium platy structure parting to weak fine and medium granular; friable; common very fine roots; common faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few distinct white (10YR 8/2 dry) silt coatings on faces of peds; common fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

- Bt1**—13 to 18 inches; yellowish brown (10YR 5/4) silty clay loam; moderate very fine subangular blocky structure; friable; common very fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few distinct white (10YR 8/2 dry) silt coatings on faces of peds; common fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.
- Bt2**—18 to 23 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine and very fine subangular blocky structure; friable; few very fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few distinct white (10YR 8/2 dry) silt coatings on faces of peds; common fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.
- Bt3**—23 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine subangular blocky structure; friable; few very fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; few distinct white (10YR 8/2 dry) silt coatings on faces of peds; common fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.
- Bt4**—28 to 37 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; few very fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; common distinct white (10YR 8/2 dry) silt coatings on faces of peds; common fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.
- Bt5**—37 to 48 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium distinct light brownish gray (10YR 6/2), common fine and medium distinct yellowish brown (10YR 5/6), and few fine distinct yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; friable; few very fine roots; few distinct brown (10YR 4/3) clay films on faces of peds; common distinct white (10YR 8/2 dry) silt coatings on faces of peds; common fine soft accumulations of iron and manganese oxides; strongly acid; gradual smooth boundary.
- BC**—48 to 56 inches; yellowish brown (10YR 5/4) silty clay loam; many fine and medium distinct light brownish gray (10YR 6/2), common fine distinct yellowish brown (10YR 5/6), and few fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; few very fine roots; few distinct brown (7.5YR 4/2) clay films on faces of peds; common prominent dark brown

(7.5YR 3/2) organic coatings in root channels; common fine soft accumulations of iron and manganese oxides; strongly acid; gradual smooth boundary.

- C**—56 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium distinct light brownish gray (10YR 6/2), common fine distinct yellowish brown (10YR 5/6), and few fine distinct yellowish brown (10YR 5/8) mottles; massive; friable; few prominent dark brown (7.5YR 3/2) organic coatings in root channels; common fine soft accumulations of iron and manganese oxides; strongly acid.

#### Range in Characteristics

##### *Ap horizon:*

Value—2 or 3  
Chroma—1 or 2

##### *E horizon:*

Value—3 to 5  
Chroma—2 or 3

##### *Bt horizon:*

Value—4 or 5  
Chroma—3 to 6

### ***Edinburg Series***

*Drainage class:* Poorly drained

*Permeability:* Slow in the upper part and moderately slow or moderate in the lower part

*Landscape:* Uplands

*Position on the landform:* Shallow depressions on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine, montmorillonitic, mesic Typic Argiaquolls

#### Typical Pedon

Edinburg silty clay loam, 200 feet south and 235 feet east of the northwest corner of sec. 28, T. 6 N., R. 1 W.

**Ap**—0 to 9 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; weak fine granular structure; friable; common very fine roots; slightly acid; clear smooth boundary.

**A**—9 to 12 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; common fine distinct yellowish brown (10YR 5/4) and few fine prominent yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to weak fine granular; friable; few very fine roots; common distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese

oxides; medium acid; clear smooth boundary.

BEg—12 to 18 inches; dark gray (10YR 4/1) silty clay loam; common fine distinct yellowish brown (10YR 5/4) and few fine prominent yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; few very fine roots; common distinct very dark gray (10YR 3/1) clay films and few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

Btg1—18 to 25 inches; dark gray (10YR 4/1) silty clay; common fine distinct yellowish brown (10YR 5/4) and few fine prominent yellowish brown (10YR 5/6) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; few fine and medium concretions of iron and manganese oxides; medium acid; gradual smooth boundary.

Btg2—25 to 33 inches; dark grayish brown (2.5Y 4/2) silty clay; common fine prominent yellowish brown (10YR 5/4 and 5/6) and few fine prominent dark yellowish brown (10YR 4/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; many prominent dark gray (10YR 4/1) clay films on faces of peds; few fine and medium concretions of iron and manganese oxides; slightly acid; gradual smooth boundary.

Btg3—33 to 43 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6 and 5/8) and common fine distinct light olive brown (2.5Y 5/4) mottles; weak medium prismatic structure parting to moderate coarse subangular blocky; firm; few very fine roots; few distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; few fine and medium concretions of iron and manganese oxides; neutral; gradual smooth boundary.

BCg—43 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine distinct light olive brown (2.5Y 5/4) and common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak medium prismatic structure; friable; few distinct dark gray (10YR 4/1) clay films on faces of peds; few fine and medium concretions of iron and manganese oxides; neutral.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 24 inches

*A horizon:*

Value—2 or 3

Chroma—1 or 2

*Btg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—3 to 5 in the upper part, 4 to 6 in the lower part

Chroma—1 or 2

*Cg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—5 or 6

Chroma—2 to 4

### Elco Series

*Drainage class:* Moderately well drained

*Permeability:* Moderate in the upper part and moderately slow or slow in the lower part

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered plains

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Slope range:* 5 to 20 percent

*Taxonomic class:* Fine-silty, mixed, mesic Typic Hapludalfs

#### Typical Pedon

Elco silt loam, 10 to 15 percent slopes, eroded, 1,060 feet east and 2,500 feet south of the northwest corner of sec. 36, T. 7 N., R. 3 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; mixed with some streaks and pockets of yellowish brown (10YR 5/4) silty clay loam subsoil material; mostly weak fine granular structure but some moderate medium platy structure resulting from compaction; friable; many very fine roots; slightly acid; abrupt smooth boundary.

BE—6 to 8 inches; yellowish brown (10YR 5/4) silty clay loam; weak medium subangular blocky structure parting to moderate fine granular; friable; many very fine roots; few distinct dark brown (10YR 3/3) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt1—8 to 15 inches; yellowish brown (10YR 5/4) silty clay loam; moderate very fine subangular blocky structure; friable; many very 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; medium acid; clear smooth boundary.

Bt2—15 to 22 inches; yellowish brown (10YR 5/4) silty clay loam; moderate very fine and fine subangular blocky structure; friable; common very fine roots; few distinct light gray (10YR 7/2 dry) silt coatings and few distinct brown (10YR 4/3) and many distinct

dark yellowish brown (10YR 4/4) clay films on faces of peds; very few dark grayish brown (10YR 4/2) organic coatings in root channels; medium acid; clear smooth boundary.

Bt3—22 to 30 inches; yellowish brown (10YR 5/4) silty clay loam; many fine distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; firm; few very fine roots; many faint brown (10YR 4/3) and common faint dark yellowish brown (10YR 4/4) clay films and common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

2Btg1—30 to 44 inches; grayish brown (10YR 5/2) clay; many medium distinct yellowish brown (10YR 5/4) and common fine distinct dark yellowish brown (10YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common faint dark yellowish brown (10YR 4/4) and many faint grayish brown (10YR 5/2) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; about 1 percent pebbles; medium acid; gradual smooth boundary.

2Btg2—44 to 60 inches; light gray (5Y 6/1) clay; common fine prominent yellowish brown (10YR 5/4) and common medium prominent yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; firm; few very fine roots; few distinct grayish brown (2.5Y 5/2) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; about 1 percent pebbles; medium acid.

#### Range in Characteristics

*Thickness of the loess:* 20 to 40 inches

*Ap horizon:*

Value—3 or 4

Chroma—1 to 3

*Bt horizon:*

Value—4 or 5

Chroma—3 to 6

Texture—silt loam or silty clay loam

*2Bt or 2Btg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—3 to 6

Chroma—1 to 4

Texture—clay, silty clay, clay loam, or silty clay loam

### Fayette Series

*Drainage class:* Well drained

*Permeability:* Moderate

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 30 percent

*Taxonomic class:* Fine-silty, mixed, mesic Typic Hapludalfs

#### Typical Pedon

Fayette silt loam, 18 to 30 percent slopes, 1,540 feet east and 1,100 feet south of the northwest corner of sec. 19, T. 5 N., R. 4 W.

A—0 to 5 inches; dark gray (10YR 4/1) silt loam, light gray (10YR 6/1) dry; moderate fine granular structure; friable; common very fine roots; neutral; clear smooth boundary.

E—5 to 8 inches; grayish brown (10YR 5/2) silt loam; weak medium platy structure; friable; few very fine roots; few faint dark gray (10YR 4/1) organic coatings on faces of peds; neutral; clear smooth boundary.

BE—8 to 11 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/4) silt loam; weak medium platy structure parting to moderate fine subangular blocky; friable; few very fine roots; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—11 to 17 inches; yellowish brown (10YR 5/4) silty clay loam; weak fine prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; very few distinct light gray (10YR 7/2 dry) silt coatings and common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—17 to 25 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; very few distinct light gray (10YR 7/2 dry) silt coatings and many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt3—25 to 40 inches; yellowish brown (10YR 5/4) silty clay loam; few fine faint pale brown (10YR 6/3) mottles; moderate fine prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; very few distinct light gray (10YR 7/2 dry) silt coatings and common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine soft accumulations of iron and

manganese oxides; strongly acid; gradual smooth boundary.

Bt4—40 to 55 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct light brownish gray (10YR 6/2) mottles; moderate medium prismatic structure; friable; very few distinct light gray (10YR 7/2 dry) silt coatings and few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

BC—55 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct yellowish brown (10YR 5/8) and common fine distinct light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; friable; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid.

#### Range in Characteristics

##### *A or Ap horizon:*

Value—3 or 4

Chroma—1 to 3

##### *E horizon:*

Value—4 or 5

Chroma—1 to 4

##### *Bt horizon:*

Value—4 or 5

Chroma—3 to 6

### **Fishhook Series**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate in the upper part and slow in the lower part

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Slope range:* 5 to 18 percent

*Taxonomic class:* Fine-silty, mixed, mesic Aquic Hapludalfs

#### Typical Pedon

Fishhook silt loam, 10 to 18 percent slopes, eroded, 1,000 feet south and 2,240 feet east of the northwest corner of sec. 10, T. 5 N., R. 4 W.

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam mixed with pockets of yellowish brown (10YR 5/4), light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many very fine and few fine roots; medium acid; abrupt smooth boundary.

BE—8 to 10 inches; yellowish brown (10YR 5/4) silt loam; moderate medium platy structure; friable; common very fine roots; medium acid; abrupt smooth boundary.

Bt1—10 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct light brownish gray (10YR 6/2) and few fine faint yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; common very fine roots; few faint dark yellowish brown (10YR 4/4) clay films on faces of peds; few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Bt2—16 to 26 inches; brown (10YR 5/3) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and common fine faint yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; few very fine roots; common faint brown (10YR 4/3) clay films on faces of peds; common fine soft accumulations of iron and manganese oxides; very dark grayish brown (10YR 3/2) krotovina at a depth of 23 inches; medium acid; abrupt smooth boundary.

2Btg1—26 to 33 inches; light gray (5Y 6/1) silty clay; common medium distinct dark yellowish brown (10YR 4/4 and 4/6) mottles; moderate coarse subangular blocky structure; firm; common distinct grayish brown (2.5Y 5/2) clay films on faces of peds; about 20 percent sand; about 1 percent pebbles; slightly acid; gradual smooth boundary.

2Btg2—33 to 56 inches; gray (5Y 5/1) silty clay; common medium distinct dark yellowish brown (10YR 4/4 and 4/6) mottles; moderate medium subangular blocky structure; firm; many distinct grayish brown (2.5Y 5/2) clay films on faces of peds; about 1 percent pebbles; slightly acid; gradual smooth boundary.

2Btg3—56 to 60 inches; gray (5Y 5/1) clay loam; many coarse prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure; firm; few distinct dark gray (5Y 4/1) clay films in root channels and on faces of peds; about 1 percent pebbles; slightly acid.

#### Range in Characteristics

*Thickness of the loess:* 20 to 40 inches

##### *Ap or A horizon:*

Value—3 to 5

Chroma—2 or 3

Texture—silt loam or silty clay loam

##### *Bt horizon:*

Hue—10YR or 2.5Y

Value—4 or 5

Chroma—2 to 4

*2Btg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—3 to 6

Chroma—1 to 3

Texture—silty clay loam, clay loam, or silty clay

### **Herrick Series**

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Landscape:* Uplands

*Position on the landform:* Summits on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine, montmorillonitic, mesic Aquic Argiudolls

#### **Typical Pedon**

Herrick silt loam, 0 to 2 percent slopes, 1,420 feet north and 2,480 feet east of the southwest corner of sec. 23, T. 5 N., R. 4 W.

Ap—0 to 10 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak very fine and fine granular structure; friable; common very fine roots; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

E—10 to 13 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak medium platy structure parting to weak fine granular; friable; common very fine roots; many distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

Btg1—13 to 17 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct yellowish brown (10YR 5/4 and 5/6) mottles; moderate very fine subangular blocky structure; friable; few fine and common very fine roots; many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Btg2—17 to 23 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine prominent yellowish brown (10YR 5/4 and 5/6) mottles; moderate very fine and fine subangular blocky structure; firm; few fine and common very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Btg3—23 to 31 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine and medium subangular blocky structure; firm; few fine and common very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

Btg4—31 to 49 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse subangular blocky structure; friable; few very fine and fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine and medium soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

Cg—49 to 60 inches; grayish brown (2.5Y 5/2) silt loam; many fine and medium prominent yellowish brown (10YR 5/6 and 5/8) and common fine faint light brownish gray (2.5Y 6/2) mottles; massive; friable; few fine and medium soft accumulations of iron and manganese oxides; medium acid.

#### **Range in Characteristics**

*Thickness of the mollic epipedon:* 10 to 20 inches

*Ap or A horizon:*

Value—2 or 3

Chroma—1 or 2

*E horizon:*

Value—3 or 4

Chroma—1 or 2

*Btg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—2 or 3

Texture—silty clay loam, silty clay, or silt loam

*C horizon:*

Hue—2.5Y or 5Y

Value—5 or 6

Chroma—2 to 4

### **Hickory Series**

*Drainage class:* Well drained

*Permeability:* Moderate

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains and on escarpments

*Parent material:* Glacial till or loess and the underlying glacial till

*Slope range:* 10 to 60 percent

*Taxonomic class:* Fine-loamy, mixed, mesic Typic Hapludalfs

### Typical Pedon

Hickory silt loam, 18 to 30 percent slopes, 2,500 feet east and 1,000 feet south of the northwest corner of sec. 29, T. 4 N., R. 4 W.

A—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak very fine granular structure; very friable; many very fine roots; medium acid; abrupt smooth boundary.

E—3 to 9 inches; brown (10YR 5/3) silt loam, very pale brown (10YR 7/3) dry; moderate thin platy structure parting to weak very fine granular; very friable; common very fine and fine roots; about 1 percent pebbles; medium acid; abrupt smooth boundary.

Bt1—9 to 19 inches; yellowish brown (10YR 5/4) clay loam; moderate fine subangular blocky structure; friable; common very fine and few medium roots; few distinct yellowish brown (10YR 4/4) clay films on faces of peds; about 5 percent pebbles; strongly acid; clear smooth boundary.

Bt2—19 to 31 inches; yellowish brown (10YR 5/6) clay loam; moderate fine and medium subangular blocky structure; firm; few very fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; about 5 percent pebbles; strongly acid; clear smooth boundary.

Bt3—31 to 41 inches; yellowish brown (10YR 5/6) clay loam; common fine faint dark yellowish brown (10YR 4/6) and brownish yellow (10YR 6/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common medium soft accumulations of iron and manganese oxides; about 5 percent pebbles; strongly acid; gradual smooth boundary.

BC—41 to 60 inches; yellowish brown (10YR 5/6) clay loam; common fine faint dark yellowish brown (10YR 4/6) and brownish yellow (10YR 6/6) mottles; moderate coarse subangular blocky structure; firm; few very fine and fine roots; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common medium soft accumulations of iron and manganese oxides; medium acid.

### Range in Characteristics

*Depth to carbonates:* 40 to more than 60 inches

*A horizon:*

Value—2 to 4

Texture—loam or silt loam

*E horizon:*

Value—4 to 6

Chroma—2 to 4

*Bt horizon:*

Hue—7.5YR or 10YR

Value—4 or 5

Chroma—3 to 6

Texture—clay loam or silty clay loam

### Ipava Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow

*Landscape:* Uplands

*Landscape position:* Summits, shoulders, and back slopes on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 5 percent

*Taxonomic class:* Fine, montmorillonitic, mesic Aquic Argiudolls

### Typical Pedon

Ipava silt loam, 0 to 2 percent slopes, 200 feet east and 700 feet south of the northwest corner of sec. 22, T. 7 N., R. 3 W.

Ap—0 to 9 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; few very fine roots; neutral; clear smooth boundary.

A—9 to 17 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; few very fine roots; slightly acid; clear smooth boundary.

BA—17 to 23 inches; dark grayish brown (10YR 4/2) silty clay loam; few fine faint brown (10YR 5/3) mottles; weak fine subangular blocky structure parting to moderate fine granular; friable; few very fine roots; many distinct black (10YR 2/1) organic coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

Btg1—23 to 29 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct brownish yellow (10YR 6/8) and common fine faint grayish brown (10YR 5/2) mottles; moderate fine subangular blocky structure; friable; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct black (10YR 2/1) organic coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

Btg2—29 to 43 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine prominent yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; few very fine

roots; common distinct grayish brown (10YR 5/2) and common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in root channels and few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; neutral; gradual smooth boundary.

Btg3—43 to 53 inches; light brownish gray (2.5Y 6/2) silty clay loam; many medium distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; few very fine roots; common distinct grayish brown (10YR 5/2) clay films on faces of peds and common distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in root channels; few distinct very dark gray (10YR 3/1) organic coatings in root channels; few fine soft accumulations of iron and manganese oxides; neutral; gradual smooth boundary.

Cg—53 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; few fine distinct yellowish brown (10YR 5/8) mottles; massive; friable; few distinct very dark gray (10YR 3/1) organic coatings in root channels; few fine soft accumulations of iron and manganese oxides; neutral.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 14 to 19 inches

*A or Ap horizon:*

Value—2 or 3

Chroma—1 or 2

*Bt or Btg horizon:*

Hue—10YR or 2.5Y

Value—4 to 6

Chroma—2 to 4

Texture—silty clay loam or silty clay

*C or Cg horizon:*

Hue—10YR or 2.5Y

Value—5 or 6

Chroma—1 to 4

Texture—silty clay loam or silt loam

### Keller Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate in the upper part and slow in the lower part

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Slope range:* 5 to 10 percent

*Taxonomic class:* Fine-silty, mixed, mesic Aquic Argiudolls

*Taxadjunct features:* The Keller soils in this survey area have a thinner dark surface layer than is defined as the range for the series. They are classified as fine-silty, mixed, mesic Aquollic Hapludalfs.

#### Typical Pedon

Keller silt loam, 5 to 10 percent slopes, eroded, 800 feet east and 500 feet north of the southwest corner of sec. 35, T. 5 N., R. 3 W.

Ap—0 to 9 inches; mixed very dark grayish brown (10YR 3/2) and brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine and medium granular structure; friable; many very fine and common fine roots; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; abrupt smooth boundary.

Bt—9 to 12 inches; brown (10YR 5/3) silty clay loam; many fine and medium distinct light brownish gray (10YR 6/2) and common fine and medium distinct yellowish brown (10YR 5/6) mottles; weak fine subangular blocky structure; friable; few distinct grayish brown (10YR 5/2) and brown (10YR 4/3) clay films on faces of peds; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine and medium soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

Btg1—12 to 21 inches; gray (10YR 5/1) silty clay loam; common fine and medium prominent yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common very fine roots; common distinct gray (5Y 5/1) clay films on faces of peds; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; abrupt smooth boundary.

2Btg2—21 to 31 inches; gray (10YR 5/1) silty clay loam; many fine prominent brown (7.5YR 4/4) and common fine prominent yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common coarse concretions and soft accumulations of iron and manganese oxides; about 1 percent pebbles; medium acid; clear smooth boundary.

2Btg3—31 to 39 inches; gray (10YR 5/1) silty clay loam; many fine distinct dark yellowish brown (10YR 4/4) and common fine prominent yellowish brown (10YR 5/8) mottles; weak medium prismatic structure parting to moderate fine and medium subangular

blocky; firm; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common medium soft accumulations of iron and manganese oxides; about 5 percent pebbles; slightly acid; gradual smooth boundary.

2Btg4—39 to 51 inches; gray (10YR 5/1) silty clay loam; many fine distinct dark yellowish brown (10YR 4/4), common fine prominent yellowish red (5YR 5/8), and few fine prominent red (2.5YR 4/8) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common coarse concretions and soft accumulations of iron and manganese oxides; about 5 percent pebbles; slightly acid; clear smooth boundary.

2BCg—51 to 60 inches; gray (10YR 5/1) silty clay loam; many fine distinct dark yellowish brown (10YR 4/4) and few fine prominent strong brown (7.5YR 5/8) mottles; weak coarse prismatic structure; firm; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; very dark gray (10YR 3/1) krotovina; few fine soft accumulations of iron and manganese oxides; about 5 percent pebbles; slightly acid.

#### Range in Characteristics

*Thickness of the loess:* 20 to 40 inches

*Ap horizon:*

Value—2 to 5

Chroma—1 to 3

*Bt horizon:*

Value—4 to 6

Chroma—2 to 4

*2Bt or 2Btg horizon:*

Hue—10YR or 2.5Y

Value—3 to 6

Chroma—1 to 3

Texture—silty clay loam, loam, clay loam, or silty clay

#### Keomah Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderately slow or slow

*Landscape:* Uplands and terraces

*Position on the landform:* Summits, shoulders, and back slopes on loess-covered glacial till plains and on terrace treads on stream terraces

*Parent material:* Loess

*Slope range:* 0 to 5 percent

*Taxonomic class:* Fine, montmorillonitic, mesic Aeric Ochraqualfs

#### Typical Pedon

Keomah silt loam, 0 to 2 percent slopes, 140 feet south and 2,880 feet east of the northwest corner of sec. 7, T. 4 N., R. 4 W.

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak very fine granular structure; friable; common very fine roots; few fine soft accumulations of iron and manganese oxides; neutral; abrupt smooth boundary.

E—7 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very pale brown (10YR 7/3) dry; common fine distinct yellowish brown (10YR 5/4) and few fine faint grayish brown (10YR 5/2) mottles; weak thin and medium platy structure parting to weak fine granular; friable; few very fine roots; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Bt—12 to 19 inches; brown (10YR 5/3) silty clay loam; many fine distinct light brownish gray (10YR 6/2), common fine faint yellowish brown (10YR 5/4), and common fine distinct yellowish brown (10YR 5/6) mottles; moderate very fine and fine subangular blocky structure; friable; few very fine and few fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; many prominent light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

Btg1—19 to 28 inches; grayish brown (10YR 5/2) silty clay loam; common fine faint light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6 and 5/8) mottles; moderate fine subangular blocky structure; firm; few very fine and few fine roots; many distinct brown (10YR 5/3) and common distinct grayish brown (10YR 5/2) clay films on faces of peds; common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

Btg2—28 to 39 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine and medium distinct light brownish gray (10YR 6/2) and common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films and few prominent light gray (10YR 7/2 dry) silt coatings on faces of peds; few distinct dark brown (7.5YR 3/2) organic coatings in root channels; few fine soft accumulations of iron and manganese oxides; strongly acid; gradual smooth boundary.

Btg3—39 to 52 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine and medium distinct light brownish gray (10YR 6/2) and common fine prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse subangular blocky structure; firm; few prominent dark grayish brown (10YR 4/2) clay films on faces of peds and in root channels; few prominent very dark gray (N 3/0) organic coatings in root channels; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

C—52 to 60 inches; yellowish brown (10YR 5/4) silt loam; many coarse faint yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) mottles; massive; friable; few prominent very dark gray (N 3/0) organic coatings in root channels; few fine and medium soft accumulations of iron and manganese oxides; neutral.

#### Range in Characteristics

##### *Ap* horizon:

Chroma—1 or 2

##### *E* horizon:

Value—4 or 5

Chroma—1 to 3

##### *Bt* or *Btg* horizon:

Value—4 or 5

Chroma—2 to 4

Texture—silty clay loam or silty clay

##### *C* or *Cg* horizon:

Hue—2.5Y or 10YR

Value—4 or 5

Chroma—2 to 4

### Lawson Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts on high flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine-silty, mixed, mesic Cumulic  
Hapludolls

#### Typical Pedon

Lawson silt loam, frequently flooded, 165 feet south and 2,140 feet east of the northwest corner of sec. 23, T. 7 N., R. 2 W.

*Ap*—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate fine and medium

granular structure; friable; common very fine and few fine roots; slightly acid; clear smooth boundary.

*A*—9 to 27 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; few fine faint very dark grayish brown (10YR 3/2) mottles; moderate fine and medium granular structure; friable; common very fine and few fine roots; few fine soft accumulations and fine and medium concretions of iron and manganese oxides; slightly acid; clear smooth boundary.

*C1*—27 to 34 inches; dark grayish brown (10YR 4/2) silt loam; few fine faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/4) mottles; moderate very fine and fine subangular blocky structure; friable; common very fine and few fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine soft accumulations and few fine and medium concretions of iron and manganese oxides; slightly acid; clear smooth boundary.

*C2*—34 to 47 inches; grayish brown (10YR 5/2) silt loam; common fine faint brown (10YR 5/3) and common fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine and few fine roots; common distinct dark gray (10YR 4/1) coatings on faces of peds; few fine soft accumulations and concretions of iron and manganese oxides; slightly acid; gradual smooth boundary.

*C3*—47 to 60 inches; gray (5Y 5/1) silt loam; many fine prominent brown (10YR 5/3) and yellowish brown (10YR 5/4) mottles; weak medium prismatic structure; firm; few very fine roots; common distinct dark gray (10YR 4/1) coatings in root channels; few fine soft accumulations and concretions of iron and manganese oxides; neutral.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 24 to 36 inches

##### *A* horizon:

Value—2 or 3

Chroma—1 or 2

Texture—silt loam or silty clay loam

##### *C* horizon:

Hue—10YR, 2.5Y, or 5Y

Value—3 to 5

Chroma—1 to 3

Texture—silt loam or silty clay loam that has strata of clay loam, loam, or sandy loam

### Marseilles Series

*Depth class:* Moderately deep

*Drainage class:* Well drained

*Permeability:* Slow or very slow

*Landscape:* Uplands

*Position on the landform:* Back slopes on loess-covered glacial till plains and on escarpments

*Parent material:* Loess and the underlying residuum derived from shale

*Slope range:* 18 to 60 percent

*Taxonomic class:* Fine-silty, mixed, mesic Typic Hapludalfs

### Typical Pedon

Marseilles silt loam, 30 to 60 percent slopes, 600 feet west and 1,310 feet north of the southeast corner of sec. 12, T. 5 N., R. 4 W.

A—0 to 4 inches; very dark grayish brown (10YR 3/2) silt loam, light grayish brown (10YR 6/2) dry; mixed with some streaks and pockets of brown (10YR 4/3) silt loam subsurface material; moderate fine granular structure; friable; common very fine and few medium roots; about 2 percent shale channers; medium acid; clear smooth boundary.

Bt1—4 to 9 inches; brown (10YR 5/3) silty clay loam; moderate very fine and fine subangular blocky structure; friable; common very fine and few fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; about 2 percent shale channers; strongly acid; clear smooth boundary.

2Bt2—9 to 13 inches; brown (10YR 5/3) silty clay loam; moderate fine subangular blocky structure; friable; few very fine and fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; about 2 percent shale channers; strongly acid; clear smooth boundary.

2Bt3—13 to 25 inches; brown (10YR 5/3) silty clay loam; moderate fine and medium subangular blocky structure; firm; few very fine and fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; about 2 percent shale channers; strongly acid; gradual smooth boundary.

2Bt4—25 to 37 inches; olive brown (2.5Y 4/4) silty clay loam; strong medium subangular and angular blocky structure; firm; few very fine and fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; few fine soft accumulation of iron and manganese oxides; about 2 percent hard shale channers; strongly acid; clear smooth boundary.

2Cr—37 to 60 inches; dark grayish brown (2.5Y 4/2) silty clay loam; soft shale fragments with horizontal layers of hard shale; very firm; streaks of dark

brown (10YR 3/3) and olive brown (2.5Y 4/4); few fine soft accumulations of iron and manganese oxides; about 5 percent hard shale channers; medium acid.

### Range in Characteristics

*Depth to bedrock:* 20 to 40 inches

*Depth to weathered shale:* 0 to 30 inches

*Thickness of the loess:* 0 to 8 inches

*A horizon:*

Value—3 or 4

Chroma—2 or 3

Texture—silt loam or silty clay loam

*Bt horizon:*

Value—4 or 5

Chroma—3 or 4

Texture—silty clay loam or silt loam

*2Bt horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—2 to 4

Texture—silty clay loam, clay loam, or silt loam

*2Cr horizon:*

Hue—10YR, 2.5Y, 5Y, or neutral

Value—4 or 5

Chroma—0 to 4

### Muscatine Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Landscape:* Uplands

*Position on the landform:* Summits, shoulders, and back slopes on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 5 percent

*Taxonomic class:* Fine-silty, mixed, mesic Aquic Hapludolls

### Typical Pedon

Muscatine silt loam, 0 to 2 percent slopes, 1,130 feet south and 215 feet east of the northwest corner of sec. 6, T. 7 N., R. 3 W.

Ap—0 to 9 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; moderate very fine and fine granular structure; friable; common very fine roots; slightly acid; clear smooth boundary.

A—9 to 16 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; moderate fine and medium granular structure; friable; common very fine roots; slightly acid; clear smooth boundary.

BA—16 to 22 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct grayish brown

(2.5Y 5/2) mottles; moderate very fine subangular blocky structure; friable; common very fine roots; many distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

Btg1—22 to 26 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct grayish brown (2.5Y 5/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate fine subangular blocky structure; friable; common very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine concretions of iron and manganese oxides; slightly acid; clear smooth boundary.

Btg2—26 to 33 inches; grayish brown (2.5Y 5/2) silty clay loam; few fine faint light brownish gray (2.5Y 6/2) and common fine prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate medium subangular blocky structure; friable; common very fine roots; many distinct dark brown (7.5YR 4/2) clay films on faces of peds; few fine concretions of iron and manganese oxides; neutral; gradual smooth boundary.

Btg3—33 to 43 inches; light brownish gray (2.5Y 6/2) silty clay loam; few fine distinct light gray (5Y 6/1) and common fine prominent yellowish brown (10YR 5/6 and 5/8) mottles; moderate coarse subangular blocky structure; friable; common very fine roots; few distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; few fine and medium concretions of iron and manganese oxides; neutral; gradual smooth boundary.

BCg—43 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; common fine and medium prominent yellowish brown (10YR 5/6 and 5/8) mottles; weak coarse prismatic structure; friable; few very fine roots; few distinct dark grayish brown (2.5Y 4/2) clay films in pores and on faces of peds; few fine and medium soft accumulations of iron and manganese oxides; neutral.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 22 inches

*Other features:* A C or Cg horizon within a depth of 60 inches in some pedons

*Ap or A horizon:*

Value—2 or 3

Chroma—1 or 2

*AB or BA horizon:*

Value—3 or 4

*Bt, Btg, Bw, or Bg horizon:*

Chroma—2 to 4

### Radford Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts on high flood plains and on alluvial fans

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine-silty, mixed, mesic Fluvaquentic Hapludolls

#### Typical Pedon

Radford silt loam, frequently flooded, 320 feet east and 1,700 feet south of the northwest corner of sec. 35, T. 4 N., R. 4 W.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; friable; common very fine roots; few distinct light brownish gray (10YR 6/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

A—7 to 15 inches; very dark grayish brown (10YR 3/2) silt loam, brown (10YR 5/3) dry; moderate fine and medium granular structure; friable; common very fine roots; very few distinct light brownish gray (10YR 6/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

C—15 to 24 inches; very dark grayish brown (10YR 3/2) silt loam that has thin strata of grayish brown (10YR 5/2) and brown (10YR 5/3) sandy loam; common fine prominent yellowish brown (10YR 5/8) mottles; massive parting to depositional weak platy structure; friable; common very fine roots; few fine soft accumulations of iron and manganese oxides; neutral; abrupt smooth boundary.

Ab1—24 to 34 inches; very dark gray (10YR 3/1) silty clay loam; few fine prominent grayish brown (2.5Y 5/2) mottles; moderate fine subangular blocky structure parting to moderate fine granular; firm; many distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine concretions of iron and manganese oxides; neutral; about 1 percent pebbles; clear smooth boundary.

Ab2—34 to 48 inches; very dark gray (10YR 3/1) silty clay loam; few fine prominent grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) mottles; weak medium prismatic structure parting to moderate fine and medium subangular blocky; firm; few very fine roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine and medium concretions of iron and manganese oxides;

about 1 percent pebbles; neutral; clear smooth boundary.

Ab<sub>3</sub>—48 to 60 inches; very dark gray (10YR 3/1) silty clay loam; few fine prominent grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; firm; common distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine concretions of iron and manganese oxides; about 1 percent pebbles; neutral.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 24 inches

*Ap and A horizons:*

Value—2 or 3

Chroma—1 or 2

*C horizon:*

Value—2 to 6

Chroma—1 or 2; 3 or 4 in some thin strata

*Ab horizon:*

Value—2 or 3

Texture—silty clay loam, clay loam, loam, or silt loam

### Rapatee Series

*Drainage class:* Well drained

*Permeability:* Moderately slow in the upper part and slow in the lower part

*Landscape:* Uplands

*Position on the landform:* Summits, shoulders, and back slopes on reclaimed surface-mine spoil

*Parent material:* Reclaimed mine spoil

*Slope range:* 1 to 5 percent

*Taxonomic class:* Fine-silty, mixed, nonacid, mesic Typic Udorthents

#### Typical Pedon

Rapatee silty clay loam, 1 to 5 percent slopes, 2,100 feet north and 530 feet west of the southeast corner of sec. 25, T. 4 N., R. 3 W.

Ap—0 to 10 inches; mixed black (10YR 2/1) and very dark gray (10YR 3/1) silty clay loam; moderate very fine subangular blocky structure; firm; common very fine roots; some mixing of yellowish brown (10YR 5/6) and brown (10YR 5/3) material; about 4 percent sand; few fine soft accumulations of iron and manganese oxides; less than 5 percent coarse fragments (till pebbles, sandstone, and shale); slightly acid; abrupt smooth boundary.

C<sub>1</sub>—10 to 13 inches; mixed dark grayish brown (10YR 4/2) and brown (10YR 5/3) silty clay loam; moderate thin platy compression strata; very firm; few very

fine roots; about 6 percent sand; common fine and medium soft accumulations or iron oxide and concretions of manganese oxide; about 3 percent coarse fragments (till pebbles, sandstone, and shale); neutral; gradual wavy boundary.

C<sub>2</sub>—13 to 21 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/4 and 5/6) silty clay loam; massive with few clods; very firm; few very fine roots; some mixing and horizontal strata of very dark gray (10YR 3/1) and light brownish gray (2.5Y 6/2); about 6 percent sand; common fine and medium soft accumulations of iron oxide and concretions of manganese oxide; about 5 percent coarse fragments (till pebbles, shale, and sandstone); neutral; gradual wavy boundary.

Cd<sub>1</sub>—21 to 44 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/4 and 5/6) silty clay loam; massive with few clods; very firm; few very fine roots; some mixing and horizontal strata of very dark gray (10YR 3/1), gray (N 5/0), and light olive brown (2.5Y 5/4); about 10 percent sand; few fine and medium soft accumulations of iron oxide and concretions of manganese oxide; about 8 percent coarse fragments (till pebbles, sandstone, and shale); neutral; gradual wavy boundary.

Cd<sub>2</sub>—44 to 60 inches; mixed brown (10YR 4/3 and 5/3), yellowish brown (10YR 5/6), gray (N 5/0), light olive brown (2.5Y 5/4), light gray (N 6/0), and light brownish gray (2.5Y 6/2) silty clay loam; massive with few clods; very firm; about 10 percent sand; few fine and medium soft accumulations of iron oxide and concretions of manganese oxide; about 10 percent coarse fragments (till pebbles, sandstone, and shale); neutral.

#### Range in Characteristics

*Ap horizon:*

Value—2 to 6

Chroma—1 to 6

Texture—silt loam or silty clay loam

*C and Cd horizons:*

Hue—10YR, 2.5Y, 5Y, or neutral

Value—4 to 6

Chroma—0 to 8

Texture—may have layers or soil fragments of silt loam, loam, or clay loam

### Rozetta Series

*Drainage class:* Moderately well drained

*Permeability:* Moderate

*Landscape:* Uplands and terraces

*Position on the landform:* Summits, shoulders, back

slopes, foot slopes, and toe slopes on loess-covered glacial till plains and on terrace treads on stream terraces

*Parent material:* Loess

*Slope range:* 1 to 18 percent

*Taxonomic class:* Fine-silty, mixed, mesic Typic Hapludalfs

### Typical Pedon

Rozetta silt loam, 1 to 5 percent slopes, 1,160 feet east and 2,700 feet north of the southwest corner of sec. 33, T. 6 N., R. 3 W.

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; mixed with some streaks and pockets of dark brown (10YR 3/3) silt loam; moderate fine and very fine granular structure; friable; many very fine roots; slightly acid; abrupt smooth boundary.

E—5 to 11 inches; yellowish brown (10YR 5/4) silt loam, very pale brown (10YR 7/4) dry; weak medium platy structure parting to moderate fine granular; friable; common very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

BE—11 to 14 inches; yellowish brown (10YR 5/4) silty clay loam; moderate very fine subangular blocky structure; friable; common very fine roots; many distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—14 to 21 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine angular and subangular blocky structure; friable; common very fine roots; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt2—21 to 26 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; few very fine roots; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt3—26 to 45 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine and very fine roots; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few fine soft accumulations of iron and

manganese oxides; strongly acid; gradual smooth boundary.

BC—45 to 58 inches; yellowish brown (10YR 5/4) silty clay loam; common fine and medium distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; few fine and very fine roots; few distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; common fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

C—58 to 60 inches; yellowish brown (10YR 5/4) silt loam; common fine and medium distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/8) mottles; massive; friable; few fine and very fine roots; common fine soft accumulations of iron and manganese oxides; slightly acid.

### Range in Characteristics

*Ap horizon:*

Value—3 to 5

Chroma—1 to 3

*E horizon:*

Value—4 to 6

Chroma—2 to 4

*Bt horizon:*

Hue—10YR or 7.5YR

Value—4 to 6

Chroma—3 to 6

*C horizon:*

Value—4 to 6

Chroma—2 to 6

### Rushville Series

*Drainage class:* Poorly drained

*Permeability:* Slow

*Landscape:* Uplands

*Position on the landform:* Shallow depressions on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine, montmorillonitic, mesic Typic Albaqualfs

### Typical Pedon

Rushville silt loam, 1,700 feet east and 900 feet north of the southwest corner of sec. 32, T. 5 N., R. 4 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak fine granular structure parting to moderate thin platy;

friable; many very fine roots; medium acid; abrupt smooth boundary.

Eg1—9 to 15 inches; gray (10YR 5/1) silt, light gray (10YR 7/1) dry; moderate thin and medium platy structure parting to weak fine granular; friable; few fine and few very fine roots; many distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; many fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Eg2—15 to 19 inches; gray (10YR 5/1) silt loam, light gray (10YR 7/1) dry; common medium distinct brown (10YR 5/3) mottles; weak medium subangular blocky structure; friable; few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; many distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; common fine accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

Btg1—19 to 27 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent yellowish brown (10YR 5/6) mottles; moderate fine and medium prismatic structure parting to moderate fine subangular blocky; firm; few very fine roots; common distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings in root channels; many fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

Btg2—27 to 37 inches; grayish brown (2.5Y 5/2) silty clay; few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings in root channels; common fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

Btg3—37 to 52 inches; olive gray (5Y 5/2) silty clay loam; common fine faint light gray (5Y 6/1) and few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium and coarse subangular blocky structure; firm; many faint dark grayish brown (2.5Y 4/2) clay films on faces of peds; very few distinct very dark gray (10YR 3/1) organic coatings in root channels; common fine soft accumulations of iron and manganese oxides; strongly acid; gradual smooth boundary.

BCg—52 to 60 inches; light olive gray (5Y 6/2) silty clay loam; many fine faint light gray (5Y 6/1) and common fine prominent yellowish brown (10YR 5/6) mottles; moderate coarse subangular blocky structure; firm; very few distinct very dark gray (10YR 3/1) organic coatings in root channels; common fine soft accumulations of iron and

manganese oxides; medium acid.

### Range in Characteristics

#### *Ap horizon:*

Value—4 or 5

Chroma—1 or 2

#### *Eg horizon:*

Value—5 or 6

Chroma—1 or 2

#### *Btg horizon:*

Hue—10YR, 5Y, 2.5Y, or neutral

Value—4 to 6

Chroma—0 to 3

### Sable Series

*Drainage class:* Poorly drained

*Permeability:* Moderate

*Landscape:* Uplands

*Position on the landform:* Low areas on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine-silty, mixed, mesic Typic Haplaquolls

### Typical Pedon

Sable silty clay loam, 2,420 feet east and 180 feet south of the northwest corner of sec. 16, T. 7 N., R. 3 W.

Ap—0 to 7 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine and medium granular structure; friable; common very fine and few fine roots; slightly acid; clear smooth boundary.

A—7 to 14 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; few fine prominent light olive gray (5Y 6/2) mottles; moderate medium granular structure; friable; common very fine roots; medium acid; clear smooth boundary.

AB—14 to 18 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; common fine prominent dark gray (5Y 4/1) and few fine prominent light olive gray (5Y 6/2) mottles; weak fine subangular blocky structure parting to moderate medium granular; firm; common very fine roots; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Btg1—18 to 23 inches; olive gray (5Y 5/2) silty clay loam; common fine faint light olive gray (5Y 6/2) and few fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few fine and common very fine roots;

common distinct dark gray (5Y 4/1) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Btg2—23 to 36 inches; light gray (5Y 6/1) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; firm; few very fine roots; common distinct olive gray (5Y 5/2) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; gradual smooth boundary.

Btg3—36 to 51 inches; light gray (5Y 6/1) silty clay loam; common medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; few faint gray (5Y 5/1) clay films on faces of peds; common fine soft accumulations of iron and manganese oxides; slightly acid; gradual smooth boundary.

Cg—51 to 60 inches; light olive gray (5Y 6/2) silty clay loam; common medium prominent yellowish brown (10YR 5/6) and few fine prominent yellowish brown (10YR 5/8) mottles; massive; firm; few fine soft accumulations of iron and manganese oxides; slightly acid.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 13 to 24 inches

#### *A horizon:*

Hue—10YR or neutral

Value—2 or 3

Chroma—0 or 1

#### *Btg or Bg horizon:*

Hue—10YR, 2.5Y, 5Y, or neutral

Value—4 to 6

Chroma—0 to 2

Texture—silty clay loam or silt loam

#### *Cg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—5 or 6

Chroma—1 or 2

Texture—silty clay loam or silt loam

### Sawmill Series

*Drainage class:* Poorly drained

*Permeability:* Moderate

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts and backswamps on flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine-silty, mixed, mesic Cumulic Haplaquolls

#### Typical Pedon

Sawmill silty clay loam, frequently flooded, 1,400 feet north and 1,850 feet west of the southeast corner of sec. 29, T. 7 N., R. 1 W.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; common very fine and few fine roots; neutral; clear smooth boundary.

A1—8 to 19 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; weak fine subangular blocky structure parting to moderate fine granular; friable; few very fine roots; few fine concretions of iron and manganese oxides; neutral; clear smooth boundary.

A2—19 to 28 inches; very dark gray (10YR 3/1) silty clay loam, dark gray (10YR 4/1) dry; few fine prominent yellowish brown (10YR 5/8) mottles; moderate fine angular blocky structure; friable; few very fine roots; few fine concretions of iron and manganese oxides; neutral; clear smooth boundary.

Btg1—28 to 36 inches; dark gray (10YR 4/1) silty clay loam; common fine prominent gray (5Y 5/1) and strong brown (7.5YR 5/8) mottles; weak fine prismatic structure parting to moderate fine and medium subangular blocky; friable; few very fine roots; common distinct very dark gray (10YR 3/1) clay films on faces of peds; common fine and medium concretions and soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Btg2—36 to 45 inches; dark gray (10YR 4/1) silty clay loam; common fine prominent light olive gray (5Y 6/2) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; common fine and medium concretions and soft accumulations of iron and manganese oxides; neutral; abrupt smooth boundary.

BCg—45 to 57 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine prominent strong brown (7.5YR 5/8) mottles; weak medium prismatic structure; friable; few very fine roots; few faint dark gray (10YR 4/1) clay films on faces of peds; common fine concretions and soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Cg—57 to 60 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine prominent strong brown (7.5YR 5/8) mottles; massive; friable; few very fine

roots; dark gray (10YR 4/1) krotovina; common fine concretions of iron and manganese oxides; neutral.

### Range in Characteristics

*Thickness of the mollic epipedon:* 24 to 36 inches

*A horizon:*

Hue—10YR, 2.5Y, or neutral

Value—2 or 3

Chroma—0 to 2

*Bg or Btg horizon:*

Hue—10YR, 2.5Y, 5Y, or neutral

Value—3 to 6

Chroma—0 to 2

Texture—may have strata of clay loam, loam, silt loam, or sandy loam in the lower part

*Cg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—5 or 6

Chroma—1 or 2

Texture—silty clay loam or clay loam; may have strata of loam, silt loam, or sandy loam

## Stronghurst Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Landscape:* Uplands

*Position on the landform:* Summits, shoulders, and back slopes on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 5 percent

*Taxonomic class:* Fine-silty, mixed, mesic Aeric Ochraqualfs

### Typical Pedon

Stronghurst silt loam, 0 to 2 percent slopes, 1,180 feet east and 300 feet south of the northwest corner of sec. 5, T. 7 N., R. 4 W.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; many very fine and few fine roots; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.

E—6 to 12 inches; dark grayish brown (10YR 4/2) silt loam, pale brown (10YR 6/3) dry; few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium platy structure parting to moderate medium granular; friable; many very fine and few fine roots; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common fine soft accumulations

of iron and manganese oxides; neutral; clear smooth boundary.

BE—12 to 19 inches; brown (10YR 5/3) silt loam; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to moderate fine subangular blocky; friable; many very fine roots; common distinct dark grayish brown (10YR 4/2) and grayish brown (10YR 5/2) clay films on faces of peds; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common fine soft accumulations of iron and manganese oxides; strongly acid; abrupt smooth boundary.

Bt—19 to 27 inches; brown (10YR 5/3) silty clay loam; common fine faint light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to strong fine and medium angular blocky; friable; many very fine roots; many distinct dark grayish brown (10YR 4/2) and few distinct very dark gray (10YR 3/1) clay films on faces of peds; very few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; common fine soft accumulations of iron and manganese oxides; strongly acid; clear smooth boundary.

Btg1—27 to 37 inches; grayish brown (10YR 5/2) silty clay loam; common fine faint dark grayish brown (10YR 4/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to strong medium angular blocky; firm; many very fine roots; many distinct dark grayish brown (10YR 4/2) and common distinct very dark gray (10YR 3/1) clay films on faces of peds; common fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Btg2—37 to 46 inches; light brownish gray (10YR 6/2) silty clay loam; common fine faint grayish brown (10YR 5/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; friable; common very fine roots; common distinct very dark gray (10YR 3/1) clay films on faces of peds and in root channels; few distinct brown (10YR 4/3) clay films on faces of peds; common fine soft accumulations of iron and manganese oxides; slightly acid; gradual smooth boundary.

Btg3—46 to 56 inches; light brownish gray (10YR 6/2) silt loam; common medium faint brown (10YR 5/3) and common medium distinct yellowish brown (10YR 5/6) mottles; moderate medium and coarse prismatic structure; friable; few very fine roots; few distinct very dark gray (10YR 3/1) clay films on faces of peds and in root channels; common fine soft accumulations of iron and manganese oxides;

neutral; gradual smooth boundary.

BCg—56 to 60 inches; light brownish gray (10YR 6/2) silt loam; common medium faint brown (10YR 5/3) and common medium prominent yellowish brown (10YR 5/8) mottles; moderate coarse prismatic structure; friable; few distinct very dark gray (10YR 3/1) clay films on faces of peds and in root channels; few fine soft accumulations of iron and manganese oxides; neutral.

#### Range in Characteristics

*Special features:* A C or Cg horizon within a depth of 60 inches in some pedons

*Ap horizon:*

Value—4 to 6

Chroma—1 or 2

*E horizon:*

Value—4 to 6

Chroma—2 or 3

*Bt or Btg horizon:*

Hue—10YR or 2.5Y

Value—4 to 6

Chroma—1 to 4

### Swanwick Series

*Drainage class:* Moderately well drained

*Permeability:* Moderately slow

*Landscape:* Uplands

*Position on the landform:* Back slopes on reclaimed surface-mine spoil

*Parent material:* Reclaimed mine spoil

*Slope range:* 1 to 5 percent

*Taxonomic class:* Fine-silty, mixed, nonacid, mesic  
Typic Udorthents

#### Typical Pedon

Swanwick silt loam, 1 to 5 percent slopes, 2,510 feet east and 2,420 feet north of the southwest corner of sec. 26, T. 4 N., R. 3 W.

Ap—0 to 7 inches; brown (10YR 5/3) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many very fine roots; about 3 percent sand; few fine soft accumulations of iron and manganese oxides; less than 5 percent coarse fragments (till pebbles and sandstone); neutral; abrupt smooth boundary.

C—7 to 20 inches; mixed brown (10YR 5/3) and dark grayish brown (2.5Y 4/2) silty clay loam; massive with horizontal and vertical planes; firm; common very fine and few medium roots in the upper part; some mixing and horizontal strata of very dark grayish brown (2.5Y 3/2), yellowish brown (10YR

5/8), and light brownish gray (10YR 6/2); about 5 percent sand; common fine and medium soft accumulations of iron and manganese oxides; about 8 percent coarse fragments (till pebbles and sandstone); neutral; clear smooth boundary.

Cd1—20 to 29 inches; mixed brown (10YR 5/3) and yellowish brown (10YR 5/8) silty clay loam; massive with moderate coarse clods; very firm; some mixing and horizontal strata of dark grayish brown (2.5Y 4/2), very dark grayish brown (2.5Y 3/2), and light brownish gray (10YR 6/2); about 10 percent sand; many fine and medium soft accumulations of iron and manganese oxides; about 8 percent coarse fragments (till pebbles and sandstone); neutral; clear smooth boundary.

Cd2—29 to 44 inches; brown (10YR 5/3) silty clay loam; massive with weak coarse clods; firm; some mixing and horizontal strata of yellowish brown (10YR 5/8), gray (10YR 6/1), light brownish gray (10YR 6/2), and olive gray (5Y 4/2); about 15 percent sand; common fine and medium soft accumulations of iron and manganese oxides; about 8 percent coarse fragments (till pebbles and sandstone); mildly alkaline; gradual smooth boundary.

Cd3—44 to 60 inches; mixed dark gray (10YR 4/1), dark yellowish brown (10YR 4/4), and brown (10YR 5/3) silty clay loam; massive; firm; some mixing and horizontal strata of dark grayish brown (2.5 4/2), very dark gray (10YR 3/1), yellowish brown (10YR 5/8), and gray (10YR 6/1); about 18 percent sand; common fine and medium soft accumulations of iron and manganese oxides; about 12 percent coarse fragments (till pebbles, sandstone, and shale); neutral.

#### Range in Characteristics

*Ap or A horizon:*

Value—4 to 6

Chroma—2 to 6

Texture—silt loam or silty clay loam

*C or Cd horizon:*

Hue—7.5YR, 10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—1 to 8

Texture—may have layers or soil fragments of silt loam, loam, or clay loam

### Tama Series

*Drainage class:* Moderately well drained

*Permeability:* Moderate

*Landscape:* Uplands and terraces

*Position on the landform:* Summits, shoulders, and back

slopes on loess-covered glacial till plains and on terrace treads on stream terraces

*Parent material:* Loess

*Slope range:* 1 to 10 percent

*Taxonomic class:* Fine-silty, mixed, mesic Typic Argiudolls

*Taxadjunct features:* The Tama soils in map units 36B2 and 36C2 have a thinner dark surface layer than is defined as the range for the series. They are classified as fine-silty, mixed, mesic Mollic Hapludalfs.

### Typical Pedon

Tama silt loam, 1 to 5 percent slopes, 2,400 feet south and 540 feet east of the northwest corner of sec. 3, T. 7 N., R. 2 W.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine granular structure; very friable; common very fine roots; medium acid; abrupt smooth boundary.

A—6 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak very fine subangular blocky structure parting to moderate fine granular; friable; common very fine roots; medium acid; abrupt smooth boundary.

BA—11 to 16 inches; brown (10YR 4/3) silty clay loam; moderate very fine subangular blocky structure; friable; common very fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—16 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; weak medium prismatic structure parting to moderate fine subangular blocky; friable; common very fine roots; few faint brown (10YR 4/3) clay films on faces of peds; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds and in root channels; medium acid; clear smooth boundary.

Bt2—24 to 33 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; 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; few fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

Bt3—33 to 40 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct yellowish brown (10YR 5/8) and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; friable; few very fine roots; common

distinct brown (10YR 4/3) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

Bt4—40 to 50 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/8) mottles; moderate coarse subangular blocky structure; friable; few very fine roots; common distinct brown (10YR 5/3) clay films on faces of peds; few faint brown (10YR 4/3) clay films in root channels; common fine soft accumulations of iron and manganese oxides; medium acid; gradual smooth boundary.

BC—50 to 60 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/8) mottles; weak coarse subangular blocky structure; friable; few very fine roots; few faint brown (10YR 4/3) clay films in root channels; common fine soft accumulations of iron and manganese oxides; medium acid.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 20 inches

*Ap and A horizons:*

Value—2 or 3

Chroma—1 or 2

Texture—silt loam or silty clay loam

*Bt horizon:*

Value—4 or 5

Chroma—3 or 4

*C horizon (if it occurs):*

Chroma—3 to 6

### Tice Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts on flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine-silty, mixed, mesic Fluvaquentic Hapludolls

### Typical Pedon

Tice silty clay loam, frequently flooded, 1,740 feet south and 2,020 feet west of the northeast corner of sec. 34, T. 4 N., R. 4 W.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine granular structure; friable; common very fine

and few fine roots; few fine soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

- A—9 to 15 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; weak fine and medium granular structure; friable; common very fine and few fine roots; few fine soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.
- Bw1—15 to 22 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine distinct yellowish brown (10YR 5/4) mottles; moderate very fine subangular blocky structure; friable; common very fine and few fine roots; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; clear smooth boundary.
- Bw2—22 to 30 inches; dark grayish brown (10YR 4/2) silty clay loam; many fine faint grayish brown (10YR 5/2) and many fine distinct yellowish brown (10YR 5/4) mottles; moderate fine subangular blocky structure; firm; few very fine roots; few prominent very dark gray (10YR 3/1) organic coatings and white (10YR 8/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.
- Bw3—30 to 39 inches; dark grayish brown (10YR 4/2) silty clay loam; common fine faint grayish brown (10YR 5/2) and many fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to weak medium subangular blocky; firm; few very fine roots; common prominent very dark gray (10YR 3/1) organic coatings in root channels and white (10YR 8/2 dry) silt coatings on faces of peds; few fine soft accumulations of iron and manganese oxides; very strongly acid; gradual smooth boundary.
- BC—39 to 51 inches; dark grayish brown (10YR 4/2) silt loam that has strata of loam; many fine and medium faint grayish brown (10YR 5/2) and many fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to weak medium and coarse subangular blocky; friable; few very fine roots; common prominent white (10YR 8/2 dry) silt coatings on faces of peds; few fine and medium soft accumulations of iron and manganese oxides; very strongly acid; gradual smooth boundary.
- C—51 to 60 inches; dark grayish brown (10YR 4/2) silt loam that has strata of loam; many fine faint grayish brown (10YR 5/2), many fine distinct yellowish brown (10YR 5/6), and common fine distinct light brownish gray (10YR 6/2) mottles; massive; friable; few fine soft accumulations of iron and manganese oxides; very strongly acid.

### Range in Characteristics

*Thickness of the mollic epipedon:* 10 to 24 inches

*Ap or A horizon:*

Value—2 or 3

Chroma—1 or 2

Texture—silty clay loam or silt loam

*Bw horizon:*

Hue—10YR or 2.5Y

Value—4 or 5

Chroma—2 to 4

Texture—silty clay loam or silt loam; commonly has strata of silt loam, loam, or sandy loam

*C horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—4 to 6

Chroma—1 to 3

Texture—stratified silty clay loam, silt loam, loam, clay loam, or sandy loam

### Ursa Series

*Drainage class:* Well drained

*Permeability:* Slow

*Landscape:* Uplands

*Position on the landform:* Back slopes and shoulders on loess-covered glacial till plains

*Parent material:* Loess and the underlying glacial till, which has a paleosol

*Slope range:* 5 to 18 percent

*Taxonomic class:* Fine, montmorillonitic, mesic Typic Hapludalfs

### Typical Pedon

Ursa silt loam, 5 to 10 percent slopes, eroded, 1,900 feet west and 1,000 feet north of the southeast corner of sec. 28, T. 4 N., R. 4 W.

Ap—0 to 7 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; mixed with some streaks and pockets of yellowish brown (10YR 5/6) clay loam subsoil material; moderate fine granular structure; friable; few very fine roots; neutral; abrupt smooth boundary.

Bt1—7 to 13 inches; yellowish brown (10YR 5/6) clay loam; common fine faint yellowish brown (10YR 5/8) and few fine distinct brown (10YR 5/3) mottles; moderate fine subangular blocky structure; friable; few very fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few fine concretions of iron and manganese oxides; about 1 percent pebbles; medium acid; clear smooth boundary.

Bt2—13 to 31 inches; yellowish brown (10YR 5/6) clay

loam; many fine distinct yellowish brown (10YR 5/8), brownish yellow (10YR 6/8), and light brownish gray (10YR 6/2) mottles; moderate medium subangular blocky structure; firm; few very fine roots; many distinct brown (10YR 4/3) and few distinct dark grayish brown (10YR 4/2) clay films on faces of peds and few distinct dark grayish brown (10YR 4/2) clay films in root channels; common fine concretions of iron and manganese oxides; about 1 percent pebbles; medium acid; gradual smooth boundary.

Bt3—31 to 50 inches; yellowish brown (10YR 5/8) clay loam; many medium faint brownish yellow (10YR 6/8) and many medium prominent light brownish gray (10YR 6/2) 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 dark grayish brown (10YR 4/2) clay films in root channels; many fine concretions of iron and manganese oxides; about 5 percent pebbles; neutral; gradual smooth boundary.

Bt4—50 to 60 inches; yellowish brown (10YR 5/8) clay loam; many medium faint brownish yellow (10YR 6/8) and many medium prominent light brownish gray (10YR 6/2) mottles; weak coarse subangular blocky structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds and in root channels; many fine concretions of iron and manganese oxides; about 5 percent pebbles; mildly alkaline.

#### Range in Characteristics

*Thickness of the loess:* Less than 20 inches

*Ap or A horizon:*

Value—4 or 5

Chroma—2 or 3

Texture—silt loam or loam

*Bt horizon:*

Hue—7.5YR or 10YR

Value—4 to 6

Chroma—2 to 8

Texture—loam, clay loam, or silty clay loam

#### Virden Series

*Drainage class:* Poorly drained

*Permeability:* Moderately slow

*Landscape:* Uplands

*Position on the landform:* Low areas on loess-covered glacial till plains

*Parent material:* Loess

*Slope range:* 0 to 2 percent

*Taxonomic class:* Fine, montmorillonitic, mesic Typic Argiaquolls

#### Typical Pedon

Virden silty clay loam, 1,420 feet north and 1,800 feet west of the southeast corner of sec. 30, T. 4 N., R. 4 W.

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; medium acid; clear smooth boundary.

A—8 to 13 inches; very dark gray (10YR 3/1) silty clay loam, gray (10YR 5/1) dry; common fine prominent grayish brown (2.5Y 5/2) mottles; moderate fine and medium granular structure; friable; common very fine roots; medium acid; clear smooth boundary.

Btg1—13 to 21 inches; grayish brown (2.5Y 5/2) silty clay; common fine prominent yellowish brown (10YR 5/4) mottles; moderate fine subangular blocky structure; firm; few very fine roots; many distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Btg2—21 to 31 inches; light brownish gray (2.5Y 6/2) silty clay; many fine prominent yellowish brown (10YR 5/6) and common fine prominent light yellowish brown (10YR 6/4) mottles; weak fine prismatic structure parting to moderate medium subangular blocky; firm; few very fine roots; common distinct dark gray (10YR 4/1) and few distinct very dark gray (10YR 3/1) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; medium acid; clear smooth boundary.

Btg3—31 to 38 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine prominent light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to moderate coarse subangular blocky; firm; few very fine roots; few distinct dark gray (10YR 4/1) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; slightly acid; gradual smooth boundary.

BCg—38 to 53 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine prominent light yellowish brown (10YR 6/4) and yellowish brown (10YR 5/6) mottles; weak coarse subangular blocky structure; friable; few very fine roots; few distinct dark gray (10YR 4/1) clay films on faces of peds; few fine soft accumulations of iron and manganese oxides; neutral; gradual smooth boundary.

Cg—53 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; many fine prominent yellowish brown (10YR

5/6) and many fine and medium prominent light yellowish brown (10YR 6/4) mottles; massive; friable; few very fine roots; few fine soft accumulations of iron and manganese oxides; neutral.

#### Range in Characteristics

*Thickness of the mollic epipedon:* 12 to 24 inches

*Ap or A horizon:*

Chroma—1 or 2

*Btg horizon:*

Hue—10YR, 2.5Y, or 5Y

Value—3 to 6

Chroma—1 or 2

*Cg horizon:*

Hue—2.5Y or 5Y

Value—5 or 6

Chroma—1 or 2

### Wakeland Series

*Drainage class:* Somewhat poorly drained

*Permeability:* Moderate

*Landscape:* Flood plains

*Position on the landform:* Meanderbelts on flood plains

*Parent material:* Alluvium

*Slope range:* 0 to 2 percent

*Taxonomic class:* Coarse-silty, mixed, nonacid, mesic  
Aeric Fluvaquents

#### Typical Pedon

Wakeland silt loam, frequently flooded, 1,680 feet south and 2,635 feet east of the northwest corner of sec. 25, T. 4 N., R. 1 W.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; mixed with some streaks and pockets of very dark grayish brown (10YR 3/2) silt loam; few fine distinct dark yellowish brown (10YR 4/4) mottles; weak medium

granular structure; friable; common very fine roots; neutral; clear smooth boundary.

Cg1—9 to 19 inches; dark grayish brown (10YR 4/2) silt loam; many fine faint brown (10YR 5/3), common fine faint grayish brown (10YR 5/2), and few fine distinct yellowish brown (10YR 4/4) mottles; massive with weak depositional planes; friable; common very fine roots; few fine soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Cg2—19 to 44 inches; dark grayish brown (10YR 4/2) silt loam that has brown (10YR 5/3) strata; few fine faint gray (10YR 5/1), many fine and medium faint brown (10YR 5/3), and common fine distinct yellowish brown (10YR 4/4) mottles; massive with weak depositional planes; friable; few very fine roots; few fine soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Cg3—44 to 53 inches; gray (10YR 5/1) silt loam; common fine distinct yellowish brown (10YR 4/4) and dark brown (10YR 3/3) mottles; massive with weak depositional planes; friable; few very fine roots; few fine soft accumulations of iron and manganese oxides; neutral; clear smooth boundary.

Cg4—53 to 60 inches; gray (10YR 5/1) silt loam; many fine distinct brown (10YR 4/3) and common fine prominent dark yellowish brown (10YR 4/6) mottles; massive with weak depositional planes; friable; few very fine roots; few fine soft accumulations of iron and manganese oxides; neutral.

#### Range in Characteristics

*Ap or A horizon:*

Value—4 or 5

Chroma—1 to 3

*Cg horizon:*

Hue—10YR or 2.5Y

Value—4 to 6

Chroma—1 to 4

Texture—silt loam; may have thin strata of loam, fine sandy loam, loamy fine sand, or fine sand



# Formation of the Soils

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Soil forms as the result of soil-forming factors acting on material deposited or otherwise exposed during geological events (Jenny, 1941). The active factors of soil formation are the physical and mineralogical composition of the parent material; the climate under which the soil material has accumulated and existed since accumulation; the relief, commonly referred to as the lay of the land; the kind of vegetation and animal life on or in the soil; and the length of time the soil-forming factors have acted upon the soil.

The effect of any single factor is generally conditioned by the effects of the other factors. The factors of soil formation are so closely interrelated that few generalizations can be made regarding the effect of one unless conditions are specified for the others.

## Parent Material

Prepared by Cynthia L. Balek, county soil scientist, with assistance from Dr. John J. Alford, geography department, Western Illinois University.

Parent material is the consolidated or unconsolidated sediment in which a soil forms. Most of the soils in McDonough County formed in glacially derived unconsolidated sediments. Loess and till are the most geographically extensive Pleistocene deposits. Although other glacial sediments, such as outwash, lacustrine silts and clays, and organic silts, occur in the county, they are typically deeply buried beneath the loess and till.

Recent alluvium is also a common parent material in the survey area. Its distribution is generally restricted to narrow flood plains bordering major stream valleys. Even though alluvium is not directly related to glaciation, its composition is determined in part by the different glacial sediments that are eroded by the stream.

Prior to glaciation, the soils in the survey area formed in Mississippian and Pennsylvanian limestone, sandstone, shale, and coal. Today, the remaining extent of the soils that formed in weathered bedrock is minor. Shale bedrock is a common parent material in the western part of the county where the glacial sediments

have been eroded. Marseilles soils formed mainly in weathered shale.

Sometime between 302,000 and 610,000 years ago, a pre-Illinoian glacier from the northwest crossed the Mississippi River and entered the survey area (Richmond and Fullerton, 1986). Local drainage at this time was to the southwest and was controlled by the Carthage Bedrock Valley, the largest tributary to what is now the Mississippi River (Horbert, 1950). Because drainage was to the southwest, toward the ice margin, the glacier acted as a dam, causing the stream in the Carthage Bedrock Valley to pond (Balek, unpublished thesis). The resultant lake may have extended from La Moine Township in the southwest to the town of Bushnell in the northeast. Lacustrine silts and clays associated with this ancient lake are currently being exhumed along parts of Troublesome and Killjordan Creeks.

Outwash and till overlie the lacustrine sediments. These materials were deposited by the glacier that dammed the drainage as it continued to advance to the Illinois River. On some of the steeper slopes bordering Troublesome Creek, patches of outwash lie close enough to the surface to serve as parent material for soil formation.

A long period of erosion and soil formation, known as the Yarmouthian Interglacial, followed deglaciation of the pre-Illinoian ice. The Yarmouth Soil has been identified in McDonough County from deep core samples; it is not known to be exposed at the surface. The Yarmouth Soil is buried beneath till and outwash associated with the succeeding Illinoian glaciation.

About 302,000 years ago, an Illinoian glacier entered the survey area from the northeast (Johnson, 1986). A large volume of outwash was deposited in the bedrock valleys; numerous sand pits along Spring Creek reveal thick sequences of glaciofluvial deposits. Till was then deposited over the outwash as the ice overrode the county.

On parts of the bedrock upland, the glacier molded the underlying surface. This action produced the linear hills in the county. The trend of these streamlined features indicates the direction of local ice movement.

The Table Grove Moraine, just inside the county's eastern border, was also formed sometime during the Illinoian glaciation.

A long ice-free interval of weathering, called the Sangamonian Interglacial, followed the Illinoian glaciation. A well developed, clay-enriched Sangamon Soil formed in the Illinoian till and in other less extensive surface deposits. Although the Sangamon Soil is one of the most prominent and widespread units in the county, it is largely buried beneath Wisconsinan Peoria Loess.

Peoria Loess is the most geographically extensive parent material in the survey area. This loess, which was deposited locally less than 25,000 years ago (McKay, 1979), is windblown silt that originated on the flood plain along the Mississippi River (Glass and others, 1968). Streams draining late Wisconsinan glaciers filled the Mississippi valley with sediments. After the flood plain dried out, the silts were picked up by the wind and deposited on the uplands. Approximately 6 to 10 feet of Peoria Loess accumulated on the undissected uplands. The somewhat poorly drained Ipava and Keomah soils formed in more than 60 inches of loess.

On hillslopes bordering stream valleys, erosion during loess deposition resulted in a thinner loess cover. The moderately well drained Assumption and Ursa soils formed in less than 40 inches of loess and in the underlying Sangamon Soil, which formed in till. Where the slopes are extremely steep, the Sangamon Soil has been eroded and the Modern Soil has formed in a thin layer of loess and in the underlying till. Hickory soils formed in this material.

Along the larger stream valleys, the soils formed in Cahokia Alluvium, an alluvial sediment dating from Wisconsinan to Recent times. Because most of the alluvium in McDonough County was derived from the erosion of loess-covered uplands, many of the soils on flood plains formed in silt loam material. Along parts of Spring Creek and Troublesome Creek, however, buried bedrock valleys that have been filled with outwash are being exhumed. This process has resulted in an alluvial parent material that contains more sand-sized particles than is normal.

## Climate

McDonough County has a temperate, humid, continental climate. Apart from slight variations related to slope aspect, climatic conditions have not caused any obvious differences among the soils within the county. The influence of climate becomes more obvious, however, when comparisons are made on a broad regional basis.

Climate affects soil formation through its influence on weathering and on plant and animal life. Moisture and temperature combine to influence the rate of the physical and chemical processes involved in weathering. In addition, precipitation and the resulting percolation of water through the soil cause movement of the products of weathering. Consequently, soil horizons form and become increasingly distinct with the movement and accumulation of the products of weathering, such as clay. Differences in the rate and effectiveness of these processes contribute to differences in soils.

## Relief

Relief includes such landscape characteristics as slope gradient, the shape of slopes, and slope aspect. In combination with the other soil-forming factors, relief exerts a strong influence on soil moisture, the rate of erosion, and the rate of soil formation.

Where the parent material is relatively uniform and medium textured, differences in natural drainage generally are closely related to slope. Soils on the more sloping uplands are generally moderately well drained or well drained. Examples are Tama and Fayette soils. In contrast, somewhat poorly drained and poorly drained soils are more likely to be on gently sloping or level landscapes and to have a seasonal high water table relatively close to the surface. Keomah and Sable soils are examples.

Relief also influences the intensity of erosion and the degree of soil development. On the steeper slopes, runoff and the attendant soil loss may be significant enough to prevent the development of well defined horizons or a deep solum. Marseilles soils are examples of soils on the steeper slopes.

## Vegetation and Animal Life

Living organisms interact with the other soil-forming factors and strongly affect soil development. The effect of native vegetation is striking. Native vegetation in McDonough County consisted primarily of tall grass prairie and deciduous hardwood trees. Over time, each of these vegetative types exerted a strong influence on soil characteristics.

Because of the decomposition of leaves, organic matter accumulates primarily on the surface of a soil that formed under deciduous hardwoods. The dark surface layer is relatively thin. In McDonough County, the soils bordering stream valleys typically formed under hardwood forest. Examples are Fayette and Hickory soils. In comparison, Ipava, Sable, and other soils that formed under prairie vegetation have more

organic matter in the surface layer and subsurface layer. The surface layer of Downs, Clarksdale, and other soils that formed under mixed grass and forest or forest encroaching on prairie is intermediate in color and in organic matter content. Regardless of plant type, the protection provided by vegetative cover reduces the rate of erosion.

Animals also affect soil formation. Earthworms, insects, and large burrowing animals play a role in the decomposition of plant and animal remains and the incorporation of these remains into the soil. Micro-organisms are important in decomposition and fixing nitrogen. Human activities, such as installing subsurface drains, building levees for flood protection, and surface mining of mineral resources, can also have a significant effect on soil formation.

## **Time**

Time affects the degree of profile development in a soil. The influence of time, however, can be modified by relief and parent material. In any case, the effect of time cannot be measured simply in terms of years.

The effect of relief interacting with time is expressed most clearly in situations of accelerated erosion or deposition. On some of the steeper slopes, the surface soil is eroded so quickly that only a very thin soil develops in spite of exposure to weathering for thousands of years. Some soils on flood plains, such as Sawmill and Wakeland soils, receive alluvial material during each flood. In terms of soil formation, these soils are much younger than many other soils in the county and have weakly expressed horizons.



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# Glossary

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**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.

**Bisequum.** Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

**Bottom land.** The normal flood plain of a stream, subject to flooding.

**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.

**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.

**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.

**Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

**Complex slope.** Irregular or variable slope. Planning or 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.

**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.

**Depth to rock** (in tables). Bedrock is too near the surface for the specified use.

**Diversion (or diversion terrace).** A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

**Drainage class** (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

*Excessively drained.*—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

*Somewhat excessively drained.*—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

*Well drained.*—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

*Moderately well drained.*—Water is removed from the soil somewhat slowly during some periods.

Moderately well drained soils are wet for only a short time during the growing season, but periodically 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.

**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.

**Frost action** (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

**Genesis, soil.** The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

**Glacial drift** (geology). Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

**Glacial outwash** (geology). Gravel, sand, and silt, commonly stratified, deposited by glacial 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.

**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.

**Irrigation.** Application of water to soils to assist in production of crops. Methods of irrigation are:  
*Basin.*—Water is applied rapidly to nearly level plains surrounded by levees or dikes.  
*Border.*—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

*Controlled flooding.*—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

*Corrugation.*—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

*Drip (or trickle).*—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

*Furrow.*—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

*Sprinkler.*—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

*Subirrigation.*—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

*Wild flooding.*—Water, released at high points, is allowed to flow onto an area without controlled distribution.

**Lacustrine deposit** (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

**Large stones** (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

**Leaching.** The removal of soluble material from soil or other material by percolating water.

**Liquid limit.** The moisture content at which the soil passes from a plastic to a liquid state.

**Loam.** Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

**Loess.** Fine grained material, dominantly of silt-sized particles, deposited by 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) that has high base saturation and pedogenic soil structure. It 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).

**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.

**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*, *plowpan*, and *traffic pan*.

**Parent material.** The unconsolidated organic and mineral material in which soil forms.

**Ped.** An individual natural soil aggregate, such as a granule, a prism, or a block.

**Pedon.** The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

**Percolation.** The downward movement of water through the soil.

**Percs slowly** (in tables). The slow movement of water through the soil, adversely affecting the specified use.

**Permeability.** The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow .....	less than 0.06 inch
Slow.....	0.06 to 0.2 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.

**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
Medium acid .....	5.6 to 6.0
Slightly acid.....	6.1 to 6.5
Neutral .....	6.6 to 7.3
Mildly alkaline.....	7.4 to 7.8
Moderately alkaline.....	7.9 to 8.4
Strongly alkaline .....	8.5 to 9.0
Very strongly alkaline .....	9.1 and higher

**Regolith.** The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

**Relief.** The elevations or inequalities of a land surface, considered collectively.

**Residuum (residual soil material).** Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

**Rill.** A steep-sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

**Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

**Rooting depth** (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

**Root zone.** The part of the soil that can be penetrated by plant roots.

**Runoff.** The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called 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.

**Shrink-swell.** The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

**Silt.** As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

**Siltstone.** Sedimentary rock made up of dominantly silt-sized particles.

**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.

**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 survey, the slope classes are as follows:

Nearly level.....	0 to 2 percent
Gently sloping .....	1 to 5 percent
Moderately sloping .....	5 to 12 percent
Strongly sloping.....	10 to 18 percent
Moderately steep .....	15 to 20 percent
Steep .....	18 to 30 percent
Very steep .....	30 percent and higher

**Slope** (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

**Small stones** (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

**Soil.** A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

**Soil separates.** Mineral particles less than 2 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.

**Stony.** Refers to a soil containing stones in numbers that interfere with or prevent tillage.

**Stripcropping.** Growing crops in a systematic arrangement of strips or bands which provide vegetative barriers to 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 grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

**Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth.

**Substratum.** The part of the soil below the solum.

**Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer.

**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.

**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 nonglaciated regions, alluvium deposited by heavily loaded streams.

**Weathering.** All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

**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.

# Tables

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TABLE 1.--TEMPERATURE AND PRECIPITATION  
(Recorded in the period 1961-90 at La Harpe, Illinois)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	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	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
<u>° F</u>	<u>° F</u>	<u>° F</u>	<u>° F</u>	<u>° F</u>	<u>° F</u>	<u>Units</u>	<u>In</u>	<u>In</u>	<u>In</u>	<u>In</u>	<u>In</u>
January-----	32.3	12.7	22.5	61	-18	1	1.47	0.47	2.29	3	6.5
February-----	37.4	17.3	27.4	66	-12	2	1.28	.70	1.80	3	5.6
March-----	50.1	28.7	39.4	81	4	33	2.98	1.57	4.22	6	3.8
April-----	63.9	40.0	5.9	88	19	148	3.91	2.04	5.56	6	1.1
May-----	74.6	50.2	62.4	91	32	389	3.87	1.98	5.52	7	.0
June-----	83.7	59.3	71.5	97	44	644	4.33	2.29	6.13	6	.0
July-----	87.7	63.2	75.5	101	48	788	4.31	2.00	6.29	6	.0
August-----	85.1	60.5	72.8	99	45	706	3.94	2.33	5.38	6	.0
September---	78.1	53.0	65.5	95	33	468	4.45	1.84	6.66	6	.0
October-----	66.7	41.8	54.3	88	22	193	2.98	1.25	4.63	5	.1
November-----	51.1	30.7	40.9	76	8	35	2.73	1.08	4.12	5	1.7
December-----	36.5	18.3	27.4	65	-12	3	2.21	1.09	3.18	5	5.9
Yearly:											
Average---	62.3	39.7	51.0	---	---	---	---	---	---	---	---
Extreme---	---	---	---	101	-19	---	---	---	---	---	---
Total-----	---	---	---	---	---	3,408	38.46	30.92	45.54	64	24.6

\* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 degrees F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL  
(Recorded in the period 1961-90 at La Harpe, Illinois)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
<b>Last freezing temperature in spring:</b>			
1 year in 10 later than--	Apr. 14	Apr. 26	May 5
2 years in 10 later than--	Apr. 10	Apr. 21	Apr. 30
5 years in 10 later than--	Apr. 1	Apr. 12	Apr. 21
<b>First freezing temperature in fall:</b>			
1 year in 10 earlier than--	Oct. 21	Oct. 4	Sept. 26
2 years in 10 earlier than--	Oct. 25	Oct. 10	Oct. 1
5 years in 10 earlier than--	Nov. 2	Oct. 21	Oct. 11

TABLE 3.--GROWING SEASON  
(Recorded in the period 1961-90 at La Harpe, 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	195	170	152
8 years in 10	202	177	159
5 years in 10	214	191	172
2 years in 10	226	205	185
1 year in 10	233	212	192

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
6C2	Fishhook silt loam, 5 to 10 percent slopes, eroded-----	4,550	1.2
6D2	Fishhook silt loam, 10 to 18 percent slopes, eroded-----	1,880	0.5
7C3	Atlas silty clay loam, 5 to 10 percent slopes, severely eroded-----	1,260	0.3
7D3	Atlas silty clay loam, 10 to 18 percent slopes, severely eroded-----	2,340	0.6
8D2	Hickory loam, 10 to 18 percent slopes, eroded-----	5,620	1.5
8F	Hickory silt loam, 18 to 30 percent slopes-----	17,630	4.7
8G	Hickory silt loam, 30 to 60 percent slopes-----	7,220	1.9
16	Rushville silt loam-----	370	0.1
17A	Keomah silt loam, 0 to 2 percent slopes-----	13,380	3.5
17B	Keomah silt loam, 2 to 5 percent slopes-----	6,990	1.9
36B	Tama silt loam, 1 to 5 percent slopes-----	16,080	4.3
36B2	Tama silt loam, 2 to 5 percent slopes, eroded-----	12,080	3.2
36C2	Tama silt loam, 5 to 10 percent slopes, eroded-----	6,980	1.8
41A	Muscatine silt loam, 0 to 2 percent slopes-----	6,460	1.7
41B	Muscatine silt loam, 2 to 5 percent slopes-----	970	0.3
43A	Ipava silt loam, 0 to 2 percent slopes-----	92,120	24.3
43B	Ipava silt loam, 2 to 5 percent slopes-----	12,820	3.4
45	Denny silt loam-----	1,240	0.3
46A	Herrick silt loam, 0 to 2 percent slopes-----	1,680	0.4
50	Viriden silty clay loam-----	7,100	1.9
61A	Atterberry silt loam, 0 to 2 percent slopes-----	450	0.1
68	Sable silty clay loam-----	51,640	13.7
119C2	Elco silt loam, 5 to 10 percent slopes, eroded-----	3,650	1.0
119D2	Elco silt loam, 10 to 15 percent slopes, eroded-----	4,390	1.2
119E	Elco silt loam, 15 to 20 percent slopes-----	1,030	0.3
249	Edinburg silty clay loam-----	890	0.2
257A	Clarksdale silt loam, 0 to 2 percent slopes-----	9,850	2.6
257B	Clarksdale silt loam, 2 to 5 percent slopes-----	5,920	1.6
259C2	Assumption silt loam, 5 to 10 percent slopes, eroded-----	1,820	0.5
259D2	Assumption silt loam, 10 to 15 percent slopes, eroded-----	340	0.1
278A	Stronghurst silt loam, 0 to 2 percent slopes-----	400	0.1
278B	Stronghurst silt loam, 2 to 5 percent slopes-----	290	0.1
279B	Rozetta silt loam, 1 to 5 percent slopes-----	14,550	3.9
279C2	Rozetta silt loam, 5 to 10 percent slopes, eroded-----	20,770	5.5
279D2	Rozetta silt loam, 10 to 18 percent slopes, eroded-----	2,650	0.7
280D2	Fayette silt loam, 10 to 18 percent slopes, eroded-----	50	*
280F	Fayette silt loam, 18 to 30 percent slopes-----	220	0.1
386B	Downs silt loam, 1 to 5 percent slopes-----	5,720	1.5
470C2	Keller silt loam, 5 to 10 percent slopes, eroded-----	1,720	0.5
549F	Marseilles silt loam, 18 to 30 percent slopes-----	400	0.1
549G	Marseilles silt loam, 30 to 60 percent slopes-----	1,830	0.5
605C2	Urza silt loam, 5 to 10 percent slopes, eroded-----	530	0.1
605D2	Urza loam, 10 to 18 percent slopes, eroded-----	2,810	0.7
802B	Orthents, loamy, gently sloping-----	540	0.1
802E	Orthents, loamy, moderately steep-----	750	0.2
824B	Swanwick silt loam, 1 to 5 percent slopes-----	480	0.1
872B	Rapatee silty clay loam, 1 to 5 percent slopes-----	730	0.2
1334	Birds silt loam, wet-----	1,790	0.5
3074	Radford silt loam, frequently flooded-----	2,450	0.6
3107	Sawmill silty clay loam, frequently flooded-----	4,740	1.3
3284	Tice silty clay loam, frequently flooded-----	1,770	0.5
3333	Wakeland silt loam, frequently flooded-----	7,620	2.0
3334	Birds silt loam, frequently flooded-----	1,690	0.4
3451	Lawson silt loam, frequently flooded-----	3,890	1.0
	Water-----	610	0.2
	Total-----	377,750	100.0

\* Less than 0.1 percent.

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
17A	Keomah silt loam, 0 to 2 percent slopes (where drained)
17B	Keomah silt loam, 2 to 5 percent slopes
36B	Tama silt loam, 1 to 5 percent slopes
36B2	Tama silt loam, 2 to 5 percent slopes, eroded
41A	Muscatine silt loam, 0 to 2 percent slopes
41B	Muscatine silt loam, 2 to 5 percent slopes
43A	Ipava silt loam, 0 to 2 percent slopes
43B	Ipava silt loam, 2 to 5 percent slopes
45	Denny silt loam (where drained)
46A	Herrick silt loam, 0 to 2 percent slopes
50	Virden silty clay loam (where drained)
61A	Atterberry silt loam, 0 to 2 percent slopes (where drained)
68	Sable silty clay loam (where drained)
249	Edinburg silty clay loam (where drained)
257A	Clarksdale silt loam, 0 to 2 percent slopes (where drained)
257B	Clarksdale silt loam, 2 to 5 percent slopes
278A	Stronghurst silt loam, 0 to 2 percent slopes (where drained)
278B	Stronghurst silt loam, 2 to 5 percent slopes
279B	Rozetta silt loam, 1 to 5 percent slopes
386B	Downs silt loam, 1 to 5 percent slopes
824B	Swanwick silt loam, 1 to 5 percent slopes
872B	Rapatee silty clay loam, 1 to 5 percent slopes
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)
3333	Wakeland silt loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
3334	Birds silt 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 drained and either protected from flooding or not frequently flooded during the growing season)

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	Bromegrass- alfalfa
		Bu	Bu	Bu	Bu	Tons	AUM*
6C2----- Fishhook	IIIe	69	20	22	42	2.4	3.9
6D2----- Fishhook	IVe	65	19	21	40	2.2	3.7
7C3----- Atlas	IVe	---	---	16	36	2.2	3.6
7D3----- Atlas	VIe	---	---	---	---	2.0	3.4
8D2----- Hickory	IIIe	72	23	26	50	2.7	4.5
8F----- Hickory	VIe	---	---	---	---	2.4	4.0
8G----- Hickory	VIIe	---	---	---	---	---	---
16----- Rushville	IIIw	114	36	47	64	---	---
17A----- Keomah	IIw	131	44	---	72	---	---
17B----- Keomah	IIe	128	43	---	70	---	---
36B----- Tama	IIe	153	46	61	88	---	---
36B2----- Tama	IIe	149	44	60	85	---	---
36C2----- Tama	IIIe	146	43	58	84	---	9.2
41A----- Muscatine	I	167	51	64	95	---	---
41B----- Muscatine	IIe	165	50	63	94	---	---
43A----- Ipava	I	163	52	66	91	---	---
43B----- Ipava	IIe	161	51	65	90	---	---
45----- Denny	IIIw	113	37	47	62	---	---
46A----- Herrick	IIw	141	45	61	78	---	---

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	Brome-grass-alfalfa
		Bu	Bu	Bu	Bu	Tons	AUM*
50----- Viriden	IIw	138	46	57	72	---	---
61A----- Atterberry	I	149	44	60	85	---	---
68----- Sable	IIw	156	51	61	85	---	---
119C2----- Elco	IIIe	105	35	44	60	4.1	6.6
119D2----- Elco	IIIe	101	33	42	58	4.0	6.6
119E----- Elco	IVe	97	---	41	56	3.8	6.4
249----- Edinburg	IIIw	132	43	55	72	---	---
257A----- Clarksdale	I	140	43	57	79	---	---
257B----- Clarksdale	Iie	139	43	56	78	---	---
259C2----- Assumption	IIIe	120	37	52	72	4.7	7.8
259D2----- Assumption	IIIe	116	35	51	70	4.6	7.6
278A----- Stronghurst	IIw	138	42	55	76	---	---
278B----- Stronghurst	Iie	137	42	54	75	---	---
279B----- Rozetta	Iie	130	40	53	72	---	---
279C2----- Rozetta	IIIe	123	38	51	69	4.9	8.2
279D2----- Rozetta	IIIe	126	36	49	65	4.7	7.8
280D2----- Fayette	IVe	116	35	48	66	---	8.0
280F----- Fayette	VIe	---	---	---	---	---	7.6
386B----- Downs	Iie	147	43	58	82	---	---
470C2----- Keller	IIIe	86	30	40	54	3.6	6.0

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*
549F, 549G----- Marseilles	VIIe	---	---	---	---	---	---
605C2----- Ursa	IIIe	57	16	20	34	2.2	3.6
605D2----- Ursa	IVe	54	---	19	32	2.1	3.4
802B, 802E. Orthents							
824B----- Swanwick	IIIe	80	27	29	---	3.2	5.3
872B----- Rapatee	IIe	100	35	47	---	4.2	4.5
1334----- Birds	Vw	---	---	---	---	---	---
3074----- Radford	IIIw	129	41	55	76	---	---
3107----- Sawmill	IIIw	132	42	---	---	---	---
3284----- Tice	IIIw	138	42	55	76	---	---
3333----- Wakeland	IIw	122	41	51	67	---	---
3334----- Birds	IIIw	110	38	47	65	---	---
3451----- Lawson	IIIw	145	39	56	77	---	---

\* 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.--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	Common trees	Site index	Productivity class*	
6C2, 6D2----- Fishhook	4C	Slight	Slight	Slight	Moderate	White oak-----	70	4	Eastern white pine, eastern redcedar.
						Northern red oak----	70	4	
						Green ash-----	---	---	
						Bur oak-----	---	---	
7C3, 7D3----- Atlas	4C	Slight	Slight	Moderate	Moderate	White oak-----	70	4	Green ash, pin oak, red maple, Austrian pine.
						Northern red oak----	70	4	
						Bur oak-----	70	4	
						Green ash-----	---	---	
8D2----- Hickory	5A	Slight	Slight	Slight	Slight	White oak-----	85	5	White oak, yellow-poplar, eastern white pine, red pine, sugar maple, black walnut.
						Northern red oak----	85	5	
						Black oak-----	---	---	
						Green ash-----	---	---	
						Bitternut hickory---	---	---	
Yellow-poplar-----	95	7							
8F----- Hickory	5R	Moderate	Moderate	Slight	Slight	White oak-----	85	5	White oak, yellow-poplar, eastern white pine, red pine, sugar maple, black walnut.
						Northern red oak----	85	5	
						Black oak-----	---	---	
						Green ash-----	---	---	
						Bitternut hickory---	---	---	
Yellow-poplar-----	95	7							
8G----- Hickory	5R	Severe	Severe	Slight	Slight	White oak-----	85	5	White oak, yellow-poplar, eastern white pine, red pine, sugar maple, black walnut.
						Northern red oak----	85	5	
						Black oak-----	---	---	
						Green ash-----	---	---	
						Bitternut hickory---	---	---	
Yellow-poplar-----	95	7							
17A, 17B----- Keomah	3A	Slight	Slight	Slight	Slight	White oak-----	65	3	Eastern white pine, white oak, red pine, northern red oak, black walnut, sugar maple.
						Northern red oak----	70	4	
61A----- Atterberry	4A	Slight	Slight	Slight	Slight	White oak-----	70	4	Eastern white pine, red pine, eastern redcedar.
						Northern red oak----	70	4	
						Green ash-----	---	---	
						Bur oak-----	---	---	
119C2, 119D2---- Elco	4A	Slight	Slight	Slight	Slight	White oak-----	80	4	White oak, northern red oak, black walnut, green ash, eastern white pine, white ash.
						Northern red oak----	---	---	
						Black walnut-----	---	---	

See footnote at end of table.

TABLE 7.--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	Common trees	Site index	Productivity class*	
119E----- Elco	4R	Moderate	Moderate	Moderate	Slight	White oak----- Northern red oak---- Black walnut-----	80 --- ---	4 --- ---	White oak, northern red oak, black walnut, green ash, eastern white pine, white ash.
257A, 257B----- Clarksdale	4A	Slight	Slight	Slight	Slight	White oak----- Northern red oak---- Yellow-poplar----- Black walnut-----	80 80 90 ---	4 4 6 ---	Black walnut, American sycamore, yellow-poplar, white oak, green ash.
278A, 278B----- Stronghurst	4A	Slight	Slight	Slight	Slight	White oak----- Northern red oak---- Green ash----- Bur oak-----	70 70 --- ---	4 4 --- ---	Eastern white pine, red pine, eastern redcedar.
279B, 279C2, 279D2----- Rozetta	4A	Slight	Slight	Slight	Slight	White oak----- Northern red oak---- Yellow-poplar----- Black walnut-----	80 80 90 ---	4 4 6 ---	Eastern white pine, northern red oak, green ash, yellow-poplar.
280D2----- Fayette	4A	Slight	Slight	Slight	Slight	White oak----- Northern red oak---- Yellow-poplar----- Black walnut-----	80 80 90 ---	4 4 6 ---	Northern red oak, yellow-poplar, eastern white pine, green ash.
280F----- Fayette	4R	Moderate	Moderate	Slight	Slight	White oak----- Northern red oak---- Yellow-poplar----- Black walnut-----	80 80 90 ---	4 4 6 ---	Eastern white pine, northern red oak, green ash, yellow-poplar.
386B----- Downs	4A	Slight	Slight	Slight	Slight	White oak----- Northern red oak---- Yellow-poplar----- Black walnut-----	80 80 90 ---	4 4 6 ---	Northern red oak, yellow-poplar, eastern white pine, green ash.
549F----- Marseilles	3R	Moderate	Moderate	Slight	Slight	White oak----- Northern red oak---- Black oak----- White ash-----	66 66 --- ---	3 3 --- ---	White oak, northern red oak, black oak, white ash, eastern white pine, Scotch pine, black walnut.

See footnote at end of table.

TABLE 7.--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	Common trees	Site index	Productivity class*	
549G----- Marseilles	3R	Severe	Severe	Slight	Slight	White oak----- Northern red oak---- Black oak----- White ash-----	66 66 --- ---	3 3 --- ---	White oak, northern red oak, black oak, white ash, eastern white pine, Scotch pine, black walnut.
605C2, 605D2---- Ursa	4A	Slight	Slight	Slight	Slight	White oak----- Northern red oak---- Black oak----- Green ash-----	70 70 70 ---	4 4 4 ---	Green ash, Austrian pine, red maple, eastern redcedar, pin oak.
1334----- Birds	5W	Slight	Severe	Moderate	Moderate	Pin oak----- Eastern cottonwood-- Sweetgum----- Cherrybark oak----- American sycamore---	90 100 --- --- ---	5 9 --- --- ---	Eastern cottonwood, red maple, American sycamore, baldcypress, water tupelo.
3107----- Sawmill	5W	Slight	Moderate	Moderate	Moderate	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.
3284----- Tice	5A	Slight	Slight	Slight	Slight	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.
3333----- Wakeland	5A	Slight	Slight	Slight	Slight	Pin oak----- Sweetgum----- Yellow-poplar----- Virginia pine-----	90 88 90 85	5 7 6 9	Eastern white pine, baldcypress, American sycamore, red maple, white ash.

See footnote at end of table.

TABLE 7.--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	Common trees	Site index	Productivity class*	
3334----- Birds	5W	Slight	Severe	Moderate	Moderate	Pin oak-----	90	5	Eastern cottonwood, red maple, American sycamore, baldcypress, water tupelo.
						Eastern cottonwood--	100	9	
						Sweetgum-----	---	---	
						Cherrybark oak-----	---	---	
3451----- Lawson	2W	Slight	Moderate	Slight	Slight	Silver maple-----	70	2	White spruce, silver maple, white ash.
						White ash-----	---	---	
						Red maple-----	---	---	

\* 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 8.--WINDBREAKS AND ENVIRONMENTAL PLANTINGS

(The symbol < means less than; > means more than. Absence of an entry indicates that trees generally do not grow to the given height on that soil)

Soil name and map symbol	Trees having predicted 20-year average height, in feet, of--			
	8-15	16-25	26-35	>35
6C2, 6D2----- Fishhook	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
7C3, 7D3----- Atlas	American cranberrybush, silky dogwood, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
8D2, 8F, 8G----- Hickory	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
16----- Rushville	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
17A, 17B----- Keomah	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
36B----- Tama	American cranberrybush, Amur honeysuckle, Amur privet, silky dogwood.	Blue spruce, northern whitecedar, Washington hawthorn, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
36B2----- Tama	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
36C2----- Tama	American cranberrybush, Amur honeysuckle, Amur privet, silky dogwood.	Blue spruce, northern whitecedar, Washington hawthorn, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
41A, 41B----- Muscatine	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.

TABLE 8.--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
43A, 43B----- Ipava	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
45----- Denny	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Austrian pine, northern whitecedar, Norway spruce, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
46A----- Herrick	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
50----- Virden	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
61A----- Atterberry	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
68----- Sable	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
119C2, 119D2, 119E----- Elco	Silky dogwood, honeysuckle, Amur privet, American cranberrybush.	Northern whitecedar, Washington hawthorn, blue spruce, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
249----- Edinburg	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
257A, 257B----- Clarksdale	American cranberrybush, Amur honeysuckle, silky dogwood, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir, Austrian pine.	Norway spruce-----	Eastern white pine, pin oak.
259C2, 259D2----- Assumption	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
278A, 278B----- Stronghurst	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.

TABLE 8.--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
279B, 279C2, 279D2----- Rozetta	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
280D2, 280F----- Fayette	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
386B----- Downs	American cranberrybush, Amur honeysuckle, autumn-olive, silky dogwood.	Blue spruce, northern whitecedar, Washington hawthorn, white fir.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
470C2----- Keller	American cranberrybush, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Eastern white pine, pin oak.	---
549F, 549G----- Marseilles	Lilac, Amur honeysuckle, autumn-olive, Washington hawthorn, eastern redcedar, radiant crabapple.	Eastern white pine, jack pine, red pine, Austrian pine.	---	---
605C2, 605D2----- Ursa	American cranberrybush, silky dogwood, Amur honeysuckle, arrowwood, Amur privet, Washington hawthorn, eastern redcedar.	Osage-orange, green ash, Austrian pine.	Pin oak, eastern white pine.	---
802B, 802E----- Orthents	Silky dogwood, Amur honeysuckle, American cranberry, Amur privet.	Blue spruce, northern whitecedar, white fir, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
824B----- Swanwick	Eastern redcedar, American cranberrybush, Amur privet, Washington hawthorn, Amur honeysuckle, autumn-olive.	Austrian pine, green ash, Osage-orange.	Eastern white pine, pin oak.	---
872B----- Rapatee	Eastern redcedar, jack pine, Washington hawthorn, Osage-orange, Russian-olive.	Honeylocust, northern catalpa.	---	---

TABLE 8.--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
1334----- Birds	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
3074----- Radford	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
3107----- Sawmill	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Norway spruce, Austrian pine, northern whitecedar, blue spruce, white fir, Washington hawthorn.	Eastern white pine----	Pin oak.
3284----- Tice	Silky dogwood, Amur privet, American cranberrybush, Amur honeysuckle.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
3333----- Wakeland	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	Northern whitecedar, Austrian pine, white fir, blue spruce, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.
3334----- Birds	Silky dogwood, Amur privet, Amur honeysuckle, American cranberrybush.	Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine, Norway spruce.	Eastern white pine----	Pin oak.
3451----- Lawson	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, white fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce-----	Eastern white pine, pin oak.

TABLE 9.--RECREATIONAL DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
6C2----- Fishhook	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: wetness.
6D2----- Fishhook	Severe: wetness.	Moderate: slope, wetness, percs slowly.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: wetness, slope.
7C3----- Atlas	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, droughty.
7D3----- Atlas	Severe: wetness, percs slowly.	Severe: percs slowly.	Severe: slope, wetness, percs slowly.	Severe: erodes easily.	Moderate: wetness, droughty, slope.
8D2----- Hickory	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
8F----- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
8G----- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
16----- Rushville	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.
17A----- Keomah	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight-----	Slight.
17B----- Keomah	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Slight-----	Slight.
36B, 36B2----- Tama	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
36C2----- Tama	Slight-----	Slight-----	Severe: slope.	Slight-----	Slight.
41A----- Muscatine	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight-----	Slight.
41B----- Muscatine	Moderate: wetness.	Moderate: wetness.	Moderate: slope, wetness.	Slight-----	Slight.
43A, 43B----- Ipava	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
45----- Denny	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
46A----- Herrick	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
50----- Virden	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
61A----- Atterberry	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
68----- Sable	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
119C2----- Elco	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
119D2----- Elco	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
119E----- Elco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
249----- Edinburg	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
257A, 257B----- Clarksdale	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
259C2----- Assumption	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight-----	Slight.
259D2----- Assumption	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight-----	Moderate: slope.
278A, 278B----- Stronghurst	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
279B----- Rozetta	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
279C2----- Rozetta	Slight-----	Slight-----	Severe: slope.	Slight-----	Slight.
279D2----- Rozetta	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
280D2----- Fayette	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
280F----- Fayette	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
386B----- Downs	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
470C2----- Keller	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: slope, wetness.	Severe: erodes easily.	Moderate: wetness.
549F----- Marseilles	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
549G----- Marseilles	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
605C2----- Ursa	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Slight.
605D2----- Ursa	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
802B----- Orthents	Slight-----	Slight-----	Moderate: slope.	Slight-----	Slight.
802E----- Orthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
824B----- Swanwick	Severe: percs slowly.	Severe: percs slowly.	Severe: percs slowly.	Slight-----	Slight.
872B----- Rapatee	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight-----	Moderate: droughty.
1334----- Birds	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
3074----- Radford	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
3107----- Sawmill	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
3284----- Tice	Severe: flooding.	Moderate: flooding, wetness.	Severe: flooding.	Moderate: wetness, flooding.	Severe: flooding.
3333----- Wakeland	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
3334----- Birds	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding, flooding.	Severe: ponding.	Severe: ponding, flooding.
3451----- Lawson	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.

TABLE 10.--WILDLIFE HABITAT

(See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated)

Soil name and map symbol	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hardwood trees	Conif-erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
6C2, 6D2----- Fishhook	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
7C3, 7D3----- Atlas	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
8D2----- Hickory	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
8F----- Hickory	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
8G----- Hickory	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
16----- Rushville	Poor	Fair	Poor	Fair	Fair	Good	Good	Poor	Fair	Good.
17A, 17B----- Keomah	Good	Good	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair.
36B----- Tama	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
36B2----- Tama	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
36C2----- Tama	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
41A, 41B----- Muscatine	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
43A----- Ipava	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
43B----- Ipava	Good	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
45----- Denny	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
46A----- Herrick	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
50----- Virden	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair	Fair	Fair.
61A----- Atterberry	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
68----- Sable	Fair	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
119C2, 119D2----- Elco	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

TABLE 10.--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	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
119E----- Elco	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
249----- Edinburg	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
257A----- Clarksdale	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
257B----- Clarksdale	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
259C2, 259D2----- Assumption	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
278A----- Stronghurst	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
278B----- Stronghurst	Fair	Good	Good	Good	Good	Fair	Poor	Good	Good	Poor.
279B----- Rozetta	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
279C2----- Rozetta	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
279D2----- Rozetta	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
280D2----- Fayette	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
280F----- Fayette	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
386B----- Downs	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
470C2----- Keller	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
549F----- Marseilles	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
549G----- Marseilles	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
605C2, 605D2----- Ursa	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
802B, 802E. Orthents										
824B----- Swanwick	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
872B----- Rapatee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
1334----- Birds	Good	Fair	Good	Good	Fair	Good	Good	Good	Good	Good.

TABLE 10.--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	Conif- erous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
3074----- Radford	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
3107----- Sawmill	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
3284----- Tice	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
3333----- Wakeland	Poor	Fair	Fair	Good	Good	Fair	Fair	Fair	Good	Fair.
3334----- Birds	Good	Fair	Good	Good	Fair	Good	Good	Good	Good	Good.
3451----- Lawson	Good	Good	Fair	Good	Good	Fair	Fair	Good	Good	Fair.

TABLE 11.--BUILDING SITE DEVELOPMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. 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
6C2----- Fishhook	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
6D2----- Fishhook	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, slope.	Severe: low strength, frost action.	Moderate: wetness, slope.
7C3----- Atlas	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength.	Moderate: wetness, droughty.
7D3----- Atlas	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: wetness, droughty, slope.
8D2----- Hickory	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
8F, 8G----- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
16----- Rushville	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
17A, 17B----- Keomah	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
36B----- Tama	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
36B2----- Tama	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
36C2----- Tama	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
41A, 41B----- Muscatine	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
43A, 43B----- Ipava	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.

TABLE 11.--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
45----- Denny	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
46A----- Herrick	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
50----- Virden	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
61A----- Atterberry	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
68----- Sable	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
119C2----- Elco	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
119D2----- Elco	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
119E----- Elco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
249----- Edinburg	Severe: ponding.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: ponding, shrink-swell.	Severe: shrink-swell, low strength, ponding.	Severe: ponding.
257A, 257B----- Clarksdale	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
259C2----- Assumption	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Severe: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
259D2----- Assumption	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Severe: shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
278A, 278B----- Stronghurst	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.

TABLE 11.--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
279B----- Rozetta	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
279C2----- Rozetta	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
279D2----- Rozetta	Moderate: wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
280D2----- Fayette	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
280F----- Fayette	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
386B----- Downs	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
470C2----- Keller	Severe: wetness.	Severe: wetness.	Severe: wetness, shrink-swell.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
549F, 549G----- Marseilles	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
605C2----- Ursa	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength.	Slight.
605D2----- Ursa	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: shrink-swell, low strength.	Moderate: slope.
802B----- Orthents	Slight-----	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength.	Slight.
802E----- Orthents	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
824B----- Swanwick	Moderate: dense layer, wetness.	Slight-----	Moderate: wetness.	Slight-----	Severe: low strength, frost action.	Slight.
872B----- Rapatee	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Moderate: droughty.
1334----- Birds	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.

TABLE 11.--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
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.
3284----- Tice	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: low strength, flooding, frost action.	Severe: flooding.
3333----- Wakeland	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
3334----- Birds	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding, flooding.
3451----- Lawson	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "fair," and other terms. Absence of an entry indicates that the soil was not rated. 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	Area sanitary landfill	Daily cover for landfill
6C2, 6D2----- Fishhook	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Poor: too clayey, hard to pack.
7C3, 7D3----- Atlas	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Poor: too clayey, hard to pack.
8D2----- Hickory	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Fair: too clayey, small stones, slope.
8F, 8G----- Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
16----- Rushville	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
17A, 17B----- Keomah	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
36B----- Tama	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness.	Fair: too clayey.
36B2----- Tama	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness.	Fair: too clayey.
36C2----- Tama	Moderate: wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Fair: too clayey.
41A, 41B----- Muscatine	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
43A, 43B----- Ipava	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
45----- Denny	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Poor: ponding.
46A----- Herrick	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Poor: wetness.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Area sanitary landfill	Daily cover for landfill
50----- Viriden	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
61A----- Atterberry	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
68----- Sable	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: hard to pack, ponding.
119C2----- Elco	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Fair: too clayey, wetness.
119D2----- Elco	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
119E----- Elco	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: slope.	Poor: slope.
249----- Edinburg	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Poor: too clayey, hard to pack, ponding.
257A, 257B----- Clarksdale	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
259C2----- Assumption	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness.	Poor: too clayey.
259D2----- Assumption	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope.	Poor: too clayey.
278A, 278B----- Stronghurst	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack, wetness.
279B----- Rozetta	Moderate: wetness.	Moderate: seepage, slope, wetness.	Moderate: wetness.	Fair: too clayey.
279C2----- Rozetta	Moderate: wetness.	Severe: slope.	Moderate: wetness.	Fair: too clayey.
279D2----- Rozetta	Moderate: wetness, slope.	Severe: slope.	Moderate: wetness, slope.	Fair: too clayey, slope.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Area sanitary landfill	Daily cover for landfill
280D2----- Fayette	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope.	Fair: too clayey, slope.
280F----- Fayette	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
386B----- Downs	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Moderate: wetness.	Fair: too clayey.
470C2----- Keller	Severe: wetness, percs slowly.	Severe: slope.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
549F, 549G----- Marseilles	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
605C2----- Ursa	Severe: percs slowly.	Severe: slope.	Slight-----	Poor: too clayey, hard to pack.
605D2----- Ursa	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Poor: too clayey, hard to pack.
802B----- Orthents	Severe: percs slowly.	Moderate: slope.	Slight-----	Fair: too clayey.
802E----- Orthents	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Poor: slope.
824B----- Swanwick	Severe: percs slowly.	Moderate: slope, wetness.	Slight-----	Fair: too clayey.
872B----- Rapatee	Severe: percs slowly.	Moderate: slope.	Slight-----	Fair: too clayey, small stones.
1334----- Birds	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
3074----- Radford	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
3107----- Sawmill	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
3284----- Tice	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: hard to pack.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Area sanitary landfill	Daily cover for landfill
3333----- Wakeland	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
3334----- Birds	Severe: flooding, ponding, percs slowly.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
3451----- Lawson	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.

TABLE 13.--CONSTRUCTION MATERIALS

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. 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
6C2----- Fishhook	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
6D2----- Fishhook	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer, slope.
7C3, 7D3----- Atlas	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
8D2----- Hickory	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
8F----- Hickory	Fair: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
8G----- Hickory	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
16----- Rushville	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
17A, 17B----- Keomah	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
36B, 36B2, 36C2----- Tama	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
41A, 41B----- Muscatine	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
43A, 43B----- Ipava	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
45----- Denny	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
46A----- Herrick	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
50----- Virden	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
61A----- Atterberry	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
68----- Sable	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
119C2----- Elco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
119D2----- Elco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
119E----- Elco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
249----- Edinburg	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, wetness.
257A, 257B----- Clarksdale	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
259C2----- Assumption	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
259D2----- Assumption	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer, slope.
278A, 278B----- Stronghurst	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
279B, 279C2----- Rozetta	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
279D2----- Rozetta	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
280D2----- Fayette	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
280F----- Fayette	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
386B----- Downs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
470C2----- Keller	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
549F----- Marseilles	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
549G----- Marseilles	Poor: depth to rock, low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey, slope.
605C2, 605D2----- Urza	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
802B----- Orthents	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
802E----- Orthents	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
824B----- Swanwick	Fair: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, small stones.
872B----- Rapatee	Good-----	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
1334----- Birds	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.
3284----- Tice	Fair: shrink-swell, low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
3333----- Wakeland	Fair: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
3334----- Birds	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3451----- Lawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.

TABLE 14.--WATER MANAGEMENT

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. 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
6C2----- Fishhook	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
6D2----- Fishhook	Severe: slope.	Moderate: hard to pack, wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
7C3----- Atlas	Moderate: slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Slope, wetness, droughty.	Erodes easily, wetness.	Wetness, erodes easily.
7D3----- Atlas	Severe: slope.	Severe: hard to pack.	Percs slowly, frost action, slope.	Slope, wetness, droughty.	Slope, erodes easily, wetness.	Wetness, slope, erodes easily.
8D2, 8F, 8G----- Hickory	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
16----- Rushville	Slight-----	Severe: ponding, hard to pack.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
17A----- Keomah	Slight-----	Moderate: wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
17B----- Keomah	Moderate: slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
36B, 36B2, 36C2--- Tama	Moderate: seepage, slope.	Slight-----	Deep to water	Slope-----	Erodes easily	Erodes easily.
41A----- Muscatine	Moderate: seepage.	Moderate: wetness.	Frost action---	Wetness-----	Erodes easily, wetness.	Erodes easily.
41B----- Muscatine	Moderate: seepage, slope.	Moderate: wetness.	Frost action, slope.	Slope, wetness.	Erodes easily, wetness.	Erodes easily.
43A----- Ipava	Slight-----	Severe: wetness.	Frost action---	Wetness-----	Erodes easily, wetness.	Wetness, erodes easily.
43B----- Ipava	Moderate: slope.	Severe: wetness.	Frost action, slope.	Slope, wetness.	Erodes easily, wetness.	Wetness, erodes easily.
45----- Denny	Slight-----	Severe: ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding.	Wetness, erodes easily, percs slowly.
46A----- Herrick	Slight-----	Severe: wetness.	Frost action---	Wetness-----	Erodes easily, wetness.	Wetness, erodes easily.
50----- Virden	Slight-----	Severe: ponding.	Ponding, frost action.	Ponding-----	Ponding-----	Wetness.

TABLE 14.--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
61A----- Atterberry	Moderate: seepage.	Severe: wetness.	Frost action--	Wetness-----	Erodes easily, wetness.	Wetness, erodes easily.
68----- Sable	Moderate: seepage.	Severe: ponding.	Ponding, frost action.	Ponding-----	Ponding-----	Wetness.
119C2----- Elco	Moderate: seepage, slope.	Moderate: piping, wetness.	Frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily.
119D2, 119E----- Elco	Severe: slope.	Moderate: piping, wetness.	Frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily.
249----- Edinburg	Moderate: seepage.	Severe: hard to pack, ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
257A----- Clarksdale	Slight-----	Severe: wetness.	Frost action--	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
257B----- Clarksdale	Moderate: slope.	Severe: wetness.	Frost action, slope.	Slope, wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
259C2----- Assumption	Moderate: seepage, slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
259D2----- Assumption	Severe: slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
278A----- Stronghurst	Moderate: seepage.	Severe: wetness.	Frost action--	Wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
278B----- Stronghurst	Moderate: seepage, slope.	Severe: wetness.	Frost action, slope.	Slope, wetness, erodes easily.	Erodes easily, wetness.	Wetness, erodes easily.
279B, 279C2----- Rozetta	Moderate: seepage, slope.	Slight-----	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
279D2----- Rozetta	Severe: slope.	Slight-----	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
280D2----- Fayette	Severe: slope.	Slight-----	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
280F----- Fayette	Severe: slope.	Slight-----	Deep to water	Slope-----	Slope, erodes easily.	Slope, erodes easily.
386B----- Downs	Moderate: seepage, slope.	Slight-----	Deep to water	Slope-----	Erodes easily	Erodes easily.
470C2----- Keller	Moderate: seepage, slope.	Moderate: hard to pack, wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.

TABLE 14.--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
549F, 549G----- Marseilles	Severe: slope.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Slope, depth to rock, erodes easily.	Slope, erodes easily, depth to rock.
605C2----- Urza	Moderate: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Erodes easily, percs slowly.	Erodes easily.
605D2----- Urza	Severe: slope.	Moderate: hard to pack.	Deep to water	Slope, percs slowly.	Slope, erodes easily, percs slowly.	Slope, erodes easily.
802B----- Orthents	Moderate: slope.	Moderate: piping.	Deep to water	Slope, rooting depth, erodes easily.	Erodes easily	Erodes easily, rooting depth.
802E----- Orthents	Severe: slope.	Moderate: piping.	Deep to water	Slope, rooting depth, erodes easily.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
824B----- Swanwick	Moderate: slope.	Severe: piping.	Deep to water	Percs slowly, rooting depth, slope.	Erodes easily	Erodes easily, rooting depth.
872B----- Rapatee	Moderate: slope.	Severe: piping.	Deep to water	Slope, droughty, percs slowly.	Erodes easily, percs slowly.	Erodes easily, droughty.
1334----- Birds	Slight-----	Severe: ponding.	Ponding, flooding, frost action.	Ponding, erodes easily, flooding.	Erodes easily, ponding.	Wetness, erodes easily.
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.
3284----- Tice	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness-----	Wetness-----	Favorable.
3333----- Wakeland	Moderate: seepage.	Severe: piping, wetness.	Flooding, frost action.	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
3334----- Birds	Slight-----	Severe: ponding.	Ponding, flooding, frost action.	Ponding, erodes easily, flooding.	Erodes easily, ponding.	Wetness, erodes easily.
3451----- Lawson	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.

TABLE 15.--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	
6C2, 6D2----- Fishhook	0-10	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-15
	10-26	Silty clay loam.	CL, ML	A-6, A-7	0	100	100	95-100	90-100	35-50	10-25
	26-60	Clay loam, clay, silty clay loam.	CH, CL	A-7	0-5	95-100	90-100	80-90	75-85	40-60	20-35
7C3, 7D3----- Atlas	0-8	Silty clay loam.	CH, CL	A-7	0	100	100	95-100	75-100	40-60	25-40
	8-36	Silty clay loam, clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
	36-60	Silty clay loam, clay, clay loam.	CH	A-7	0	100	95-100	95-100	75-95	50-70	30-45
8D2----- Hickory	0-4	Loam-----	CL	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	8-15
	4-44	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	44-60	Sandy loam, loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8F----- Hickory	0-9	Silt loam-----	CL, ML, CL-ML	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	3-15
	9-60	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
8G----- Hickory	0-8	Silt loam-----	CL, ML, CL-ML	A-6, A-4	0-5	95-100	90-100	90-100	75-95	20-35	3-15
	8-39	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	39-60	Sandy loam, loam, gravelly clay loam.	CL-ML, CL	A-4, A-6	0-5	85-100	75-95	70-95	60-80	20-40	5-20
16----- Rushville	0-9	Silt loam-----	CL, CL-ML, ML	A-4, A-6	0	100	100	95-100	90-100	25-40	NP-15
	9-19	Silt loam, silt.	ML, CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-40	NP-15
	19-37	Silty clay loam, silty clay.	CH, CL	A-7-6	0	100	100	95-100	95-100	45-60	20-35
	37-60	Silty clay loam, silty clay.	CH, CL, ML, MH	A-7-6, A-7-5	0	100	100	95-100	95-100	45-60	15-30

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments >3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
17A, 17B----- Keomah	0-12	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	12-39	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	4-15
	39-60	Silty clay, silty clay loam.	CH	A-7	0	100	100	100	95-100	45-60	30-45
36B----- Tama	0-11	Silt loam-----	ML, CL	A-6, A-7	0	100	100	100	95-100	35-45	10-20
	11-50	Silty clay loam.	CL	A-7	0	100	100	100	95-100	40-50	15-25
	50-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
36B2----- Tama	0-9	Silt loam-----	ML, CL	A-6, A-4	0	100	100	100	95-100	35-45	10-20
	9-36	Silty clay loam.	CL	A-7	0	100	100	100	95-100	40-50	15-25
	36-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
36C2----- Tama	0-9	Silt loam-----	ML, CL	A-6, A-7	0	100	100	100	95-100	35-45	10-20
	9-36	Silty clay loam.	CL	A-7	0	100	100	100	95-100	40-50	15-25
	36-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
41A----- Muscatine	0-9	Silt loam-----	CL, CL-ML	A-6, A-4	0	100	100	100	95-100	25-40	5-15
	9-43	Silty clay loam.	CL	A-7	0	100	100	100	95-100	40-50	20-30
	43-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
41B----- Muscatine	0-14	Silt loam-----	CL, CL-ML	A-6, A-4	0	100	100	100	95-100	25-40	5-15
	14-47	Silty clay loam.	CL	A-7	0	100	100	100	95-100	40-50	20-30
	47-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
43A----- Ipava	0-17	Silt loam-----	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	17-60	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	45-70	25-40
43B----- Ipava	0-15	Silt loam-----	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	15-50	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	45-70	25-40
	50-60	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	100	100	95-100	90-100	25-40	5-20

TABLE 15.--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	
45----- Denny	0-9	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	95-100	30-40	8-15
	9-21	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	25-40	5-15
	21-38	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	100	100	95-100	95-100	35-60	15-35
	38-60	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	95-100	25-40	11-20
46A----- Herrick	0-13	Silt loam-----	CL, ML	A-4, A-6	0	100	100	95-100	90-100	30-40	5-15
	13-31	Silty clay loam, silty clay.	CH, CL	A-7-6	0	100	100	95-100	90-100	45-60	25-40
	31-49	Silty clay loam, silt loam.	CL	A-6, A-7-6	0	100	100	95-100	90-100	35-50	20-35
	49-60	Silt loam, loam, clay loam.	CL	A-6	0	100	100	90-100	80-100	30-40	10-20
50----- Virden	0-13	Silty clay loam.	CL	A-7, A-6	0	100	100	95-100	95-100	30-45	10-25
	13-38	Silty clay, silty clay loam.	CH, CL	A-7-6	0	100	100	95-100	95-100	40-55	15-30
	38-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	90-100	30-45	10-20
61A----- Atterberry	0-12	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	25-40	5-15
	12-51	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	25-35	5-15
	51-60	Silt loam, silty clay loam.	CL, CH	A-6, A-7	0	100	100	95-100	95-100	35-55	15-30
68----- Sable	0-14	Silty clay loam.	CL, CH, ML, MH	A-7	0	100	100	95-100	95-100	41-65	15-35
	14-18	Silty clay loam.	CL, CH, ML, MH	A-6, A-7	0	100	100	95-100	95-100	41-65	15-35
	18-51	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	95-100	40-55	20-35
	51-60	Silt loam, silty clay loam.	CL	A-6	0	100	100	95-100	95-100	30-40	10-20
119C2----- Elco	0-4	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	4-37	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	25-45	10-30
	37-60	Silty clay loam, clay loam, silt loam.	CL	A-7, A-6	0	100	90-100	85-95	75-95	25-45	10-30
119D2----- Elco	0-6	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	6-30	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	25-45	10-30
	30-60	Silty clay loam, loam, clay.	CL	A-7, A-6	0	100	90-100	80-100	60-95	25-50	10-30

TABLE 15.--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		
119E----- Elco	0-9	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	95-100	90-100	25-40	5-15
	9-24	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	95-100	85-100	25-45	10-30
	24-31	Silty clay loam, clay loam, silt loam.	CL	A-7, A-6	0	100	90-100	85-95	75-95	25-45	10-30
	31-60	Silty clay loam, loam, clay.	CL	A-7, A-6	0	100	90-100	80-100	60-95	25-50	10-30
249----- Edinburg	0-12	Silty clay loam.	CL	A-7, A-6	0	100	100	95-100	90-100	35-50	16-25
	12-43	Silty clay loam, silty clay.	CH, CL	A-7	0	100	100	95-100	90-100	45-70	25-45
	43-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	100	100	95-100	90-100	35-45	15-20
257A----- Clarksdale	0-7	Silt loam-----	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	7-11	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	90-100	20-35	8-18
	11-43	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-65	25-40
	43-60	Silt loam, silty clay loam.	CL	A-6	0	95-100	95-100	95-100	90-100	25-40	10-25
257B----- Clarksdale	0-9	Silt loam-----	CL	A-6	0	100	100	95-100	90-100	25-40	10-20
	9-13	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	90-100	20-35	8-18
	13-35	Silty clay loam, silty clay.	CL, CH	A-7	0	100	100	95-100	90-100	40-65	25-40
	35-60	Silt loam, silty clay loam.	CL	A-6	0	95-100	95-100	95-100	90-100	25-40	10-25
259C2----- Assumption	0-9	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	90-100	25-40	8-20
	9-29	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	10-30
	29-36	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	90-100	85-95	75-90	30-50	10-30
	36-60	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0-5	100	95-100	90-100	70-90	35-50	20-35
259D2----- Assumption	0-7	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	90-100	25-40	8-20
	7-28	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	95-100	90-100	30-50	10-30
	28-60	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0-5	100	95-100	90-100	70-90	35-50	20-35
278A, 278B---- Stronghurst	0-19	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	25-35	5-15
	19-46	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	95-100	25-35	5-15
	46-60	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	100	98-100	40-55	20-35

TABLE 15.--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	
279B----- Rozetta	0-5	Silt loam-----	CL	A-4, A-6	0	100	100	95-100	95-100	24-35	8-15
	5-11	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	11-58	Silty clay loam.	CL	A-7, A-6	0	100	100	95-100	95-100	35-50	15-30
	58-60	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	85-100	25-40	7-20
279C2----- Rozetta	0-7	Silt loam-----	CL	A-4, A-6	0	100	100	95-100	95-100	24-35	8-15
	7-10	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	95-100	95-100	20-30	5-15
	10-53	Silty clay loam.	CL	A-7, A-6	0	100	100	95-100	95-100	35-50	15-30
	53-60	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	85-100	25-40	7-20
279D2----- Rozetta	0-6	Silt loam-----	CL	A-4, A-6	0	100	100	95-100	95-100	24-35	8-15
	6-49	Silty clay loam.	CL	A-7, A-6	0	100	100	95-100	95-100	35-50	15-30
	49-60	Silt loam-----	CL	A-6, A-4	0	100	100	95-100	85-100	25-40	7-20
280D2----- Fayette	0-8	Silt loam-----	CL	A-6, A-7	0	100	100	100	95-100	30-45	10-25
	8-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
280F----- Fayette	0-8	Silt loam-----	CL-ML, CL	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	8-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	100	95-100	35-45	15-25
386B----- Downs	0-13	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	100	95-100	25-35	5-15
	13-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	100	100	100	95-100	35-45	15-25
470C2----- Keller	0-9	Silt loam-----	CL, ML	A-6, A-4	0	100	100	95-100	90-100	30-40	5-15
	9-21	Silty clay loam.	CL, ML	A-7, A-6	0	100	100	95-100	90-100	35-50	10-25
	21-60	Silty clay loam, clay loam, clay.	CH, CL	A-7, A-6	0-5	95-100	90-100	80-95	75-90	35-55	15-30
549F----- Marseilles	0-5	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-15
	5-35	Silty clay loam, silty clay, clay loam.	CL, CH	A-7	0-5	95-100	90-100	85-100	80-95	40-60	15-30
	35-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
549G----- Marseilles	0-4	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	95-100	85-100	25-40	5-15
	4-37	Silty clay loam, silty clay, clay loam.	CL, CH	A-7	0-5	95-100	90-100	85-100	80-95	40-60	15-30
	37-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---
605C2----- Ursa	0-7	Silt loam-----	CL, CL-ML	A-6, A-4	0	100	95-100	90-100	80-100	20-40	5-20
	7-50	Clay, clay loam, silty clay.	CH, CL	A-7	0-5	95-100	90-95	70-90	55-90	40-60	20-35
	50-60	Clay loam, loam, clay.	CL, CH	A-6, A-7	0-5	95-100	90-95	80-90	60-85	35-55	20-35

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag- ments >3 inches Pct	Percentage passing sieve number--				Liquid limit Pct	Plas- ticity index
			Unified	AASHTO		4	10	40	200		
605D2----- Ursa	0-7	Loam-----	CL, CL-ML	A-6, A-4	0	100	95-100	90-100	80-100	20-40	5-20
	7-50	Clay, clay loam, silty clay.	CH, CL	A-7	0-5	95-100	90-95	70-90	55-90	40-60	20-35
	50-60	Clay loam, loam, clay.	CL, CH	A-6, A-7	0-5	95-100	90-95	80-90	60-85	35-55	20-35
802B----- Orthents	0-3	Loam, silt loam, silty clay loam.	CL	A-6	0-5	95-100	90-100	85-95	60-90	20-40	10-20
	3-60	Loam, silt loam, silty clay loam.	CL	A-6	0-5	95-100	90-100	85-95	60-90	20-40	10-20
802E----- Orthents	0-6	Loam, silt loam, clay loam.	CL	A-6	0-5	95-100	90-100	85-95	60-90	20-40	10-20
	6-60	Loam, silt loam, clay loam.	CL	A-6	0-5	95-100	90-100	85-95	60-90	20-40	10-20
824B----- Swanwick	0-7	Silt loam-----	ML, CL	A-4, A-6, A-7	0	100	100	95-100	90-100	30-45	7-20
	7-29	Silty clay loam, silt loam, loam.	CL-ML, ML, CL	A-4, A-6, A-7	0	95-100	90-100	90-100	85-95	25-50	5-20
	29-60	Silty clay loam, clay loam, loam.	ML, CL	A-4, A-6, A-7	0	95-100	90-100	85-100	80-95	30-50	7-25
872B----- Rapatee	0-10	Silty clay loam.	ML	A-6, A-7	0	100	100	95-100	85-100	35-50	10-20
	10-60	Silty clay loam, silt loam.	CL-ML, ML, CL	A-4, A-6, A-7	0-10	100	75-100	70-100	65-95	25-50	5-20
1334----- Birds	0-8	Silt loam-----	CL	A-4, A-6	0	100	95-100	90-100	80-100	24-34	8-15
	8-60	Silt loam-----	CL	A-4, A-6	0	100	95-100	90-100	80-100	24-34	8-15
3074----- Radford	0-15	Silt loam-----	ML, CL	A-4, A-6	0	100	100	95-100	80-100	30-40	5-15
	15-24	Silt loam-----	CL, ML	A-4, A-6	0	100	100	95-100	80-100	25-35	5-15
	24-60	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	100	100	95-100	80-95	35-50	15-25
3107----- Sawmill	0-28	Silty clay loam.	CL	A-6, A-7	0	100	100	95-100	85-100	30-50	15-30
	28-57	Silty clay loam, clay loam, loam.	CL	A-6, A-7, A-4	0	100	100	85-100	70-95	25-50	8-25
	57-60	Silty clay loam, clay loam, silt loam.	CL	A-4, A-6, A-7	0	100	100	75-100	65-95	20-50	8-30
3284----- Tice	0-15	Silty clay loam.	CL	A-6, A-7	0	100	100	90-100	80-95	30-45	10-20
	15-39	Silty clay loam, silt loam.	CL, CH	A-7	0	100	100	95-100	85-95	40-55	15-30
	39-60	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

TABLE 15.--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	
3333----- Wakeland	0-9	Silt loam-----	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
	9-60	Silt loam-----	ML	A-4	0	100	100	90-100	80-90	27-36	4-10
3334----- Birds	0-9	Silt loam-----	CL	A-4, A-6	0	100	95-100	90-100	80-100	24-34	8-15
	9-60	Silt loam-----	CL	A-4, A-6	0	100	95-100	90-100	80-100	24-34	8-15
3451----- Lawson	0-9	Silt loam-----	CL, CL-ML	A-4, A-6	0	100	100	90-100	85-100	20-40	5-20
	9-27	Silt loam, silty clay loam.	CL, CL-ML	A-4	0	100	100	90-100	85-100	20-30	5-10
	27-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	100	100	90-100	60-100	20-45	10-25

TABLE 16.--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. Absence of an entry indicates that data were not available or were not estimated)

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
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					
6C2, 6D2----- Fishhook	0-10	20-27	1.30-1.50	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.37	4	6	1-3
	10-26	27-35	1.40-1.60	0.6-2.0	0.18-0.20	4.5-7.3	Moderate----	0.37			
	26-60	35-45	1.55-1.75	0.06-0.2	0.09-0.16	4.5-7.8	High-----	0.37			
7C3, 7D3----- Atlas	0-8	30-40	1.35-1.55	0.06-0.2	0.14-0.19	4.5-7.3	High-----	0.43	2	7	.5-1
	8-36	35-45	1.35-1.55	<0.06	0.07-0.19	4.5-7.3	High-----	0.32			
	36-60	30-45	1.35-1.55	<0.06	0.07-0.19	4.5-7.8	High-----	0.32			
8D2----- Hickory	0-4	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low-----	0.37	5	6	1-2
	4-44	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate----	0.28			
	44-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low-----	0.28			
8F----- Hickory	0-9	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low-----	0.37	5	6	1-2
	9-60	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-7.3	Moderate----	0.28			
8G----- Hickory	0-8	19-25	1.30-1.50	0.6-2.0	0.20-0.22	4.5-7.3	Low-----	0.37	5	6	1-2
	8-39	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-7.3	Moderate----	0.28			
	39-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low-----	0.28			
16----- Rushville	0-9	15-27	1.25-1.45	0.6-2.0	0.22-0.24	4.5-7.3	Low-----	0.43	3	6	1-3
	9-19	10-22	1.30-1.50	0.06-0.2	0.15-0.20	4.5-7.3	Low-----	0.43			
	19-37	35-45	1.30-1.50	<0.06	0.09-0.20	4.5-6.5	High-----	0.43			
	37-60	30-42	1.40-1.60	<0.2	0.11-0.20	4.5-7.8	High-----	0.43			
17A, 17B----- Keomah	0-12	16-26	1.30-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low-----	0.37	3	6	1-3
	12-39	16-26	1.35-1.45	0.2-0.6	0.18-0.20	4.5-7.3	Low-----	0.37			
	39-60	35-42	1.30-1.45	0.06-0.6	0.18-0.20	4.5-5.5	High-----	0.37			
36B----- Tama	0-11	20-26	1.25-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Moderate----	0.28	5	6	3-4
	11-50	27-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-6.5	Moderate----	0.43			
	50-60	20-30	1.35-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate----	0.43			
36B2----- Tama	0-9	24-27	1.25-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Moderate----	0.32	5	6	2-3
	9-36	27-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-6.5	Moderate----	0.43			
	36-60	22-28	1.35-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate----	0.43			
36C2----- Tama	0-9	20-26	1.25-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Moderate----	0.28	5	6	3-4
	9-36	27-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-6.5	Moderate----	0.43			
	36-60	20-30	1.35-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate----	0.43			
41A----- Muscatine	0-9	24-27	1.28-1.32	0.6-2.0	0.22-0.24	5.1-7.3	Moderate----	0.28	5	6	4-6
	9-43	30-35	1.28-1.35	0.6-2.0	0.18-0.20	5.1-7.3	Moderate----	0.43			
	43-60	22-30	1.35-1.40	0.6-2.0	0.18-0.20	6.6-7.8	Moderate----	0.43			
41B----- Muscatine	0-14	24-27	1.28-1.32	0.6-2.0	0.22-0.24	5.1-7.3	Moderate----	0.28	5	6	4-6
	14-47	30-35	1.28-1.35	0.6-2.0	0.18-0.20	5.1-7.3	Moderate----	0.43			
	47-60	22-30	1.35-1.40	0.6-2.0	0.18-0.20	6.6-7.8	Moderate----	0.43			
43A----- Ipava	0-17	20-27	1.15-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Moderate----	0.28	5	6	4-5
	17-60	35-43	1.25-1.50	0.2-0.6	0.11-0.20	5.6-7.8	High-----	0.43			
43B----- Ipava	0-15	20-27	1.15-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Moderate----	0.28	5	6	4-5
	15-50	35-43	1.25-1.50	0.2-0.6	0.11-0.20	5.6-7.8	High-----	0.43			
	50-60	20-30	1.30-1.55	0.2-0.6	0.20-0.22	6.1-8.4	Moderate----	0.43			

TABLE 16.--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
45----- Denny	0-9	20-27	1.25-1.45	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.37	3	6	3-4
	9-21	15-22	1.25-1.45	0.2-0.6	0.18-0.20	5.6-6.5	Low-----	0.37			
	21-38	35-45	1.20-1.40	0.06-0.2	0.11-0.22	5.6-6.5	High-----	0.37			
	38-60	25-35	1.40-1.60	0.2-0.6	0.20-0.22	5.6-7.8	Moderate----	0.37			
46A----- Herrick	0-13	20-27	1.15-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Moderate----	0.28	5	6	3-4
	13-31	35-42	1.20-1.40	0.2-0.6	0.12-0.17	4.5-6.0	High-----	0.43			
	31-49	25-40	1.20-1.40	0.2-0.6	0.16-0.20	5.6-7.3	Moderate----	0.43			
	49-60	20-30	1.30-1.50	0.2-0.6	0.16-0.21	5.6-8.4	Moderate----	0.43			
50----- Viriden	0-13	27-30	1.20-1.40	0.6-2.0	0.21-0.24	5.6-7.8	Moderate----	0.28	5	7	4-6
	13-38	35-42	1.20-1.45	0.2-0.6	0.11-0.20	5.6-7.8	High-----	0.28			
	38-60	25-33	1.25-1.55	0.2-0.6	0.18-0.22	6.1-8.4	Moderate----	0.28			
61A----- Atterberry	0-12	20-26	1.35-1.55	0.6-2.0	0.22-0.25	5.6-7.3	Low-----	0.32	5	6	2-4
	12-51	15-26	1.40-1.60	0.6-2.0	0.21-0.24	5.1-7.3	Low-----	0.32			
	51-60	25-35	1.40-1.60	0.6-2.0	0.14-0.24	5.1-7.3	Moderate----	0.43			
68----- Sable	0-14	27-35	1.15-1.35	0.6-2.0	0.21-0.23	5.6-7.3	Moderate----	0.28	5	7	5-6
	14-18	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate----	0.28			
	18-51	24-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.8	Moderate----	0.28			
	51-60	20-28	1.30-1.50	0.6-2.0	0.20-0.22	6.6-8.4	Low-----	0.28			
119C2----- Elco	0-4	20-27	1.20-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.37	5	6	1-3
	4-37	23-35	1.25-1.45	0.6-2.0	0.18-0.21	5.1-7.8	Moderate----	0.37			
	37-60	23-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.8	Moderate----	0.37			
119D2----- Elco	0-6	20-27	1.20-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.37	5	6	1-3
	6-30	23-35	1.25-1.45	0.6-2.0	0.18-0.21	5.1-7.8	Moderate----	0.37			
	30-60	25-45	1.45-1.70	0.06-0.6	0.14-0.20	5.1-7.8	High-----	0.37			
119E----- Elco	0-9	20-27	1.20-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.37	5	6	1-3
	9-24	23-35	1.25-1.45	0.6-2.0	0.18-0.21	5.1-7.8	Moderate----	0.37			
	24-31	23-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.8	Moderate----	0.37			
	31-60	25-45	1.45-1.70	0.06-0.6	0.14-0.20	5.1-7.8	High-----	0.37			
249----- Edinburg	0-12	27-35	1.10-1.30	0.6-2.0	0.21-0.24	5.6-7.8	High-----	0.37	3	7	3-4
	12-43	35-46	1.20-1.40	0.06-0.2	0.13-0.20	5.6-7.3	High-----	0.37			
	43-60	22-30	1.30-1.50	0.2-2.0	0.18-0.22	6.6-7.8	Moderate----	0.37			
257A----- Clarksdale	0-7	20-27	1.30-1.50	0.6-2.0	0.22-0.25	5.1-7.3	Moderate----	0.37	5	6	2-3
	7-11	15-27	1.25-1.50	0.2-0.6	0.20-0.22	5.1-6.5	Low-----	0.37			
	11-43	35-45	1.30-1.50	0.2-0.6	0.11-0.20	5.1-7.3	High-----	0.37			
	43-60	20-30	1.40-1.60	0.2-0.6	0.20-0.22	6.1-8.4	Moderate----	0.37			
257B----- Clarksdale	0-9	20-27	1.30-1.50	0.6-2.0	0.22-0.25	5.1-7.3	Moderate----	0.37	5	6	2-3
	9-13	15-27	1.25-1.50	0.2-0.6	0.20-0.22	5.1-6.5	Low-----	0.37			
	13-35	35-45	1.30-1.50	0.2-0.6	0.11-0.20	5.1-7.3	High-----	0.37			
	35-60	20-30	1.40-1.60	0.2-0.6	0.20-0.22	6.1-8.4	Moderate----	0.37			
259C2----- Assumption	0-9	20-27	1.25-1.45	0.6-2.0	0.23-0.25	5.6-7.3	Low-----	0.28	5	6	3-4
	9-29	25-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Moderate----	0.43			
	29-36	25-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.3	Moderate----	0.43			
	36-60	30-45	1.45-1.65	0.06-0.6	0.14-0.20	5.1-7.3	High-----	0.43			
259D2----- Assumption	0-7	20-27	1.25-1.45	0.6-2.0	0.23-0.25	5.6-7.3	Low-----	0.28	5	6	3-4
	7-28	25-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Moderate----	0.43			
	28-60	30-45	1.45-1.65	0.06-0.6	0.14-0.20	5.1-7.3	High-----	0.43			
278A, 278B----- Stronghurst	0-19	20-27	1.25-1.45	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.37	5	6	1-3
	19-46	20-27	1.30-1.50	0.6-2.0	0.20-0.22	5.1-7.3	Low-----	0.37			
	46-60	27-35	1.30-1.55	0.6-2.0	0.18-0.20	5.1-7.3	Moderate----	0.37			

TABLE 16.--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
279B----- Rozetta	0-5	15-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.37	5	6	1-3
	5-11	12-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low-----	0.37			
	11-58	27-35	1.35-1.55	0.6-2.0	0.18-0.22	4.5-6.0	Moderate----	0.37			
	58-60	20-27	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.8	Low-----	0.37			
279C2----- Rozetta	0-7	15-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.37	5	6	1-3
	7-10	12-27	1.20-1.40	0.6-2.0	0.22-0.24	4.5-7.3	Low-----	0.37			
	10-53	27-35	1.35-1.55	0.6-2.0	0.18-0.22	4.5-6.0	Moderate----	0.37			
	53-60	20-27	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.8	Low-----	0.37			
279D2----- Rozetta	0-6	15-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Low-----	0.37	5	6	1-3
	6-49	27-35	1.35-1.55	0.6-2.0	0.18-0.22	4.5-6.0	Moderate----	0.37			
	49-60	20-27	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.8	Low-----	0.37			
280D2----- Fayette	0-8	25-27	1.35-1.45	0.6-2.0	0.18-0.20	5.1-7.3	Moderate----	0.37	5	6	1-2
	8-60	25-35	1.30-1.45	0.6-2.0	0.18-0.20	4.5-6.0	Moderate----	0.43			
280F----- Fayette	0-8	15-27	1.30-1.35	0.6-2.0	0.20-0.22	5.1-7.3	Low-----	0.32	5	6	2-3
	8-60	25-35	1.30-1.45	0.6-2.0	0.18-0.20	4.5-6.5	Moderate----	0.43			
386B----- Downs	0-13	15-25	1.25-1.30	2.0-6.0	0.21-0.23	5.1-7.3	Low-----	0.32	5	6	2-3
	13-60	26-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-7.3	Moderate----	0.43			
470C2----- Keller	0-9	20-27	1.30-1.40	0.6-2.0	0.22-0.24	5.6-7.8	Low-----	0.37	4	6	3-5
	9-21	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.1-7.3	Moderate----	0.37			
	21-60	30-42	1.50-1.70	0.06-0.2	0.10-0.19	5.1-7.8	High-----	0.37			
549F----- Marseilles	0-5	20-27	1.20-1.40	0.6-2.0	0.20-0.24	5.1-6.5	Low-----	0.37	4	6	1-3
	5-35	27-42	1.35-1.60	0.06-0.2	0.09-0.20	4.5-6.5	Moderate----	0.37			
	35-60	---	---	0.01-0.2	---	---	-----	---			
549G----- Marseilles	0-4	20-27	1.20-1.40	0.6-2.0	0.20-0.24	5.1-6.5	Low-----	0.37	4	6	1-3
	4-37	27-42	1.35-1.60	0.06-0.2	0.09-0.20	4.5-6.5	Moderate----	0.37			
	37-60	---	---	0.01-0.2	---	---	-----	---			
605C2, 605D2----- Ursa	0-7	15-27	1.30-1.50	0.6-2.0	0.20-0.24	4.5-7.3	Low-----	0.43	3	6	1-3
	7-50	35-45	1.50-1.70	0.06-0.2	0.09-0.17	4.5-7.3	High-----	0.32			
	50-60	25-45	1.55-1.75	0.2-0.6	0.08-0.18	5.6-7.8	Moderate----	0.32			
802B----- Orthents	0-3	22-30	1.70-1.75	0.2-0.6	0.18-0.22	5.6-7.8	Moderate----	0.43	5	4	.5-2
	3-60	22-30	1.70-1.80	0.2-0.6	0.16-0.20	5.6-7.8	Moderate----	0.43			
802E----- Orthents	0-6	22-30	1.70-1.75	0.2-0.6	0.18-0.22	5.6-7.8	Moderate----	0.43	5	4	.5-2
	6-60	22-30	1.70-1.80	0.2-0.6	0.16-0.20	5.6-7.8	Moderate----	0.43			
824B----- Swanwick	0-7	18-27	1.30-1.60	0.2-0.6	0.20-0.22	5.1-7.8	Low-----	0.43	5	6	.5-1
	7-29	15-35	1.50-1.70	0.06-0.2	0.08-0.12	4.5-8.4	Low-----	0.43			
	29-60	18-35	1.50-1.70	0.2-0.6	0.15-0.19	4.5-8.4	Low-----	0.43			
872B----- Rapatee	0-10	27-35	1.30-1.60	0.2-0.6	0.10-0.20	6.1-7.3	Moderate----	0.37	3	7	3-5
	10-60	15-35	1.50-1.90	0.06-0.6	0.08-0.15	6.6-8.4	Moderate----	0.37			
1334----- Birds	0-8	15-25	1.30-1.50	0.2-0.6	0.21-0.25	5.6-7.8	Low-----	0.43	5	6	1-3
	8-60	18-27	1.40-1.60	0.2-0.6	0.20-0.22	5.1-7.8	Low-----	0.43			
3074----- Radford	0-15	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
	15-24	18-27	1.40-1.60	0.6-2.0	0.20-0.22	6.1-7.8	Low-----	0.28			
	24-60	24-35	1.35-1.55	0.6-2.0	0.18-0.20	6.6-7.8	Moderate----	0.28			
3107----- Sawmill	0-28	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
	28-57	25-35	1.30-1.45	0.6-2.0	0.17-0.20	6.1-7.8	Moderate----	0.28			
	57-60	18-35	1.35-1.50	0.6-2.0	0.15-0.19	6.1-8.4	Moderate----	0.28			

TABLE 16.--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
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
3284----- Tice	0-15	27-35	1.25-1.45	0.6-2.0	0.21-0.24	6.1-7.8	Moderate-----	0.32	5	7	2-3
	15-39	24-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.8	Moderate-----	0.32			
	39-60	15-30	1.40-1.60	0.6-2.0	0.11-0.18	5.6-7.8	Moderate-----	0.32			
3333----- Wakeland	0-9	10-17	1.30-1.50	0.6-2.0	0.22-0.24	5.6-7.3	Low-----	0.37	5	5	1-3
	9-60	10-17	1.30-1.50	0.6-2.0	0.20-0.22	5.6-7.8	Low-----	0.37			
3334----- Birds	0-9	15-25	1.30-1.50	0.2-0.6	0.21-0.25	5.6-7.8	Low-----	0.43	5	6	1-3
	9-60	18-27	1.40-1.60	0.2-0.6	0.20-0.22	5.1-7.8	Low-----	0.43			
3451----- Lawson	0-9	10-27	1.20-1.55	0.6-2.0	0.22-0.24	6.1-7.8	Low-----	0.28	5	5	3-7
	9-27	10-30	1.20-1.55	0.6-2.0	0.18-0.22	6.1-7.8	Low-----	0.28			
	27-60	18-30	1.55-1.65	0.6-2.0	0.18-0.20	6.1-7.8	Moderate-----	0.43			

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "frequent," "brief," "apparent," and "perched" 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			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					<u>Ft</u>			<u>In</u>				
6C2, 6D2----- Fishhook	D	None-----	---	---	1.0-3.0	Perched	Mar-Jun	>60	---	High-----	High-----	High.
7C3, 7D3----- Atlas	D	None-----	---	---	1.0-2.0	Perched	Apr-Jun	>60	---	High-----	High-----	Moderate.
8D2, 8F, 8G----- Hickory	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
16----- Rushville	D	None-----	---	---	+1-1.0	Perched	Mar-Jun	>60	---	High-----	High-----	High.
17A, 17B----- Keomah	C	None-----	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Moderate.
36B----- Tama	B	None-----	---	---	4.0-6.0	Apparent	Nov-Jun	>60	---	High-----	Moderate	Moderate.
36B2----- Tama	B	None-----	---	---	4.0-6.0	Apparent	Nov-Jun	>60	---	High-----	Moderate	Moderate.
36C2----- Tama	B	None-----	---	---	4.0-6.0	Apparent	Nov-Jun	>60	---	High-----	Moderate	Moderate.
41A, 41B----- Muscatine	B	None-----	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High-----	High-----	Moderate.
43A, 43B----- Ipava	B	None-----	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
45----- Denny	D	None-----	---	---	+1-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
46A----- Herrick	B	None-----	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	High.
50----- Virden	B/D	None-----	---	---	+ .5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
61A----- Atterberry	B	None-----	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					<u>Ft</u>			<u>In</u>				
68----- Sable	B/D	None-----	---	---	+ .5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
119C2, 119D2, 119E----- Elco	B	None-----	---	---	2.5-4.5	Perched	Mar-May	>60	---	High-----	High-----	Moderate.
249----- Edinburg	C/D	None-----	---	---	+1-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
257A, 257B----- Clarksdale	C	None-----	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
259C2, 259D2----- Assumption	B	None-----	---	---	2.5-4.5	Perched	Feb-May	>60	---	High-----	High-----	Moderate.
278A, 278B----- Stronghurst	B	None-----	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
279B, 279C2, 279D2----- Rozetta	B	None-----	---	---	4.0-6.0	Apparent	Mar-Jun	>60	---	High-----	Moderate	Moderate.
280D2, 280F----- Fayette	B	None-----	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
386B----- Downs	B	None-----	---	---	4.0-6.0	Apparent	Mar-Jun	>60	---	High-----	Moderate	Moderate.
470C2----- Keller	C	None-----	---	---	1.0-3.0	Perched	Mar-Jun	>60	---	High-----	High-----	Moderate.
549F, 549G----- Marseilles	B	None-----	---	---	>6.0	---	---	20-40	Soft	High-----	High-----	Moderate.
605C2, 605D2----- Ursa	C	None-----	---	---	>6.0	---	---	>60	---	Moderate	High-----	Moderate.
802B, 802E----- Orthents	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
824B----- Swanwick	D	None-----	---	---	4.0-6.0	Perched	Feb-May	>60	---	High-----	Moderate	High.
872B----- Rapatee	D	None-----	---	---	>6.0	---	---	>60	---	High-----	Moderate	Low.
1334----- Birds	C/D	Frequent----	Long-----	Mar-Jun	+ .5-1.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydro-logic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
3074----- Radford	B	Frequent----	Brief-----	Mar-Jun	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
3107----- Sawmill	B/D	Frequent----	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
3284----- Tice	B	Frequent----	Brief-----	Jan-Jun	1.5-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
3333----- Wakeland	C	Frequent----	Brief-----	Jan-May	1.0-3.0	Apparent	Jan-Apr	>60	---	High-----	High-----	Low.
3334----- Birds	C/D	Frequent----	Brief-----	Mar-Jun	+ .5-1.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Moderate.
3451----- Lawson	C	Frequent----	Brief-----	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High-----	Moderate	Low.

TABLE 18.--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							
Assumption silt loam: 1,900 feet north and 2,510 feet east of the southwest corner of sec. 15, T. 6 N., R. 4 W.	87IL-109-65 -1 -3 -6	Ap Bt2 2Btg	0-9 17-27 48-60	101 106 110	18.4 18.6 17.6	100 100 100	100 100 99	96 98 92	95 91 65	34.2 40.6 34.9	7.4 22.6 21.9	A-4(8) A-7-6(21) A-6(11)	ML CL CL
Atterberry silt loam: 150 feet south and 100 feet west of the northeast corner of sec. 5, T. 7 N., R. 4 W.	87IL-109-67 -1 -4 -7	Ap Btg1 Cg	0-7 21-32 54-60	99 103 109	21.5 21.0 17.3	100 100 100	100 100 100	99 99 100	95 99 99	40.3 45.3 39.9	15.9 28.1 21.7	A-7-6(17) A-7-6(30) A-6(23)	CL CL CL
Clarksdale silt loam: 2,580 feet south and 200 feet west of the northeast corner of sec. 8, T. 4 N., R. 4 W.	87IL-109-66 -1 -4 -7	Ap Bt1 Cg	0-9 22-36 55-60	102 97 109	19.5 23.0 18.3	100 100 100	100 100 100	98 100 100	96 99 98	39.7 57.8 36.9	13.2 41.2 17.9	A-6(15) A-7-6(45) A-6(18)	ML CH CL
Denny silt loam: 1,700 feet east and 230 feet north of the southwest corner of sec. 25, T. 7 N., R. 3 W.	87IL-109-64 -1 -3 -5 -7	Ap Eg2 Btg2 Cg	0-7 12-21 29-37 49-60	103 108 98 112	18.5 17.3 21.1 16.4	100 100 100 100	100 99 99 100	98 94 97 99	96 92 96 98	29.5 29.4 50.2 37.5	6.1 4.5 31.0 20.2	A-4(6) A-4(4) A-7-6(32) A-6(20)	ML ML CH CL
Sable silty clay loam: 1,860 feet east and 2,485 feet north of the southwest corner of sec. 24, T. 6 N., R. 3 W.	87IL-109-68 -1 -5 -7	Ap Btg2 Cg	0-9 30-36 49-60	100 100 113	20.5 22.3 16.5	100 100 100	100 100 100	100 98 99	99 98 98	47.6 63.0 34.7	27.4 46.2 16.1	A-7-6(30) A-7-6(50) A-6	CL CH CL

TABLE 19.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that one or more map units for that soil are taxadjuncts to the series. See text for a description of those characteristics of the soils that are outside the range of the series)

Soil name	Family or higher taxonomic class
*Assumption-----	Fine-silty, mixed, mesic Typic Argiudolls
Atlas-----	Fine, montmorillonitic, mesic, sloping Aeric Ochraqualfs
Atterberry-----	Fine-silty, mixed, mesic Udollic Ochraqualfs
Birds-----	Fine-silty, mixed, nonacid, mesic Typic Fluvaquents
Clarksdale-----	Fine, montmorillonitic, mesic Udollic Ochraqualfs
Denny-----	Fine, montmorillonitic, mesic Mollic Albaqualfs
Downs-----	Fine-silty, mixed, mesic Mollic Hapludalfts
Edinburg-----	Fine, montmorillonitic, mesic Typic Argiaquolls
Elco-----	Fine-silty, mixed, mesic Typic Hapludalfts
Fayette-----	Fine-silty, mixed, mesic Typic Hapludalfts
Fishhook-----	Fine-silty, mixed, mesic Aquic Hapludalfts
Herrick-----	Fine, montmorillonitic, mesic Aquic Argiudolls
Hickory-----	Fine-loamy, mixed, mesic Typic Hapludalfts
Ipava-----	Fine, montmorillonitic, mesic Aquic Argiudolls
*Keller-----	Fine-silty, mixed, mesic Aquic Argiudolls
Keomah-----	Fine, montmorillonitic, mesic Aeric Ochraqualfs
Lawson-----	Fine-silty, mixed, mesic Cumulic Hapludolls
Marseilles-----	Fine-silty, mixed, mesic Typic Hapludalfts
Muscatine-----	Fine-silty, mixed, mesic Aquic Hapludolls
Orthents-----	Orthents
Radford-----	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Rapatee-----	Fine-silty, mixed, nonacid, mesic Typic Udorthents
Rozetta-----	Fine-silty, mixed, mesic Typic Hapludalfts
Rushville-----	Fine, montmorillonitic, mesic Typic Albaqualfs
Sable-----	Fine-silty, mixed, mesic Typic Haplaquolls
Sawmill-----	Fine-silty, mixed, mesic Cumulic Haplaquolls
Stronghurst-----	Fine-silty, mixed, mesic Aeric Ochraqualfs
Swanwick-----	Fine-silty, mixed, nonacid, mesic Typic Udorthents
*Tama-----	Fine-silty, mixed, mesic Typic Argiudolls
Tice-----	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Ursa-----	Fine, montmorillonitic, mesic Typic Hapludalfts
Viriden-----	Fine, montmorillonitic, mesic Typic Argiaquolls
Wakeland-----	Coarse-silty, mixed, nonacid, mesic Aeric Fluvaquents

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