United States Department of Agriculture

Natural Resources Conservation Service

In cooperation with Illinois Agricultural Experiment Station

Soil Survey of Stark County, Illinois

How To Use This Soil Survey

General Soil Map

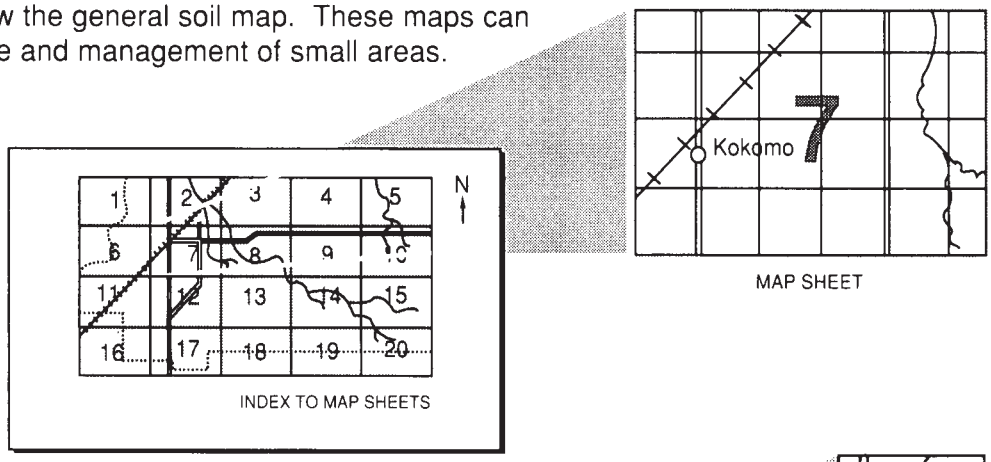
The general soil map, which is the color map preceding the detailed soil maps, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

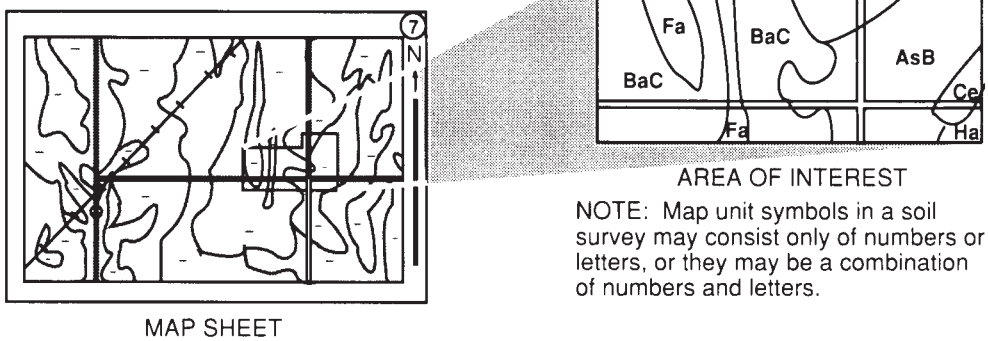
Detailed Soil Maps

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

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



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



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

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

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

Major fieldwork for this soil survey was completed in 1990. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1991. 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 Stark County Soil and Water Conservation District. Financial assistance was provided by the Stark 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 158.

All programs and services of the Natural Resources Conservation Service are offered on a nondiscriminatory basis, without regard to race, color, national origin, religion, sex, age, marital status, or handicap.

Cover: An area of Lenzburg silty clay loam, 7 to 20 percent slopes, stony. This soil consists of spoil from previous surface-mining activity. Most areas have been reseeded to grasses and are used for pasture or recreation.

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Issued September 1996

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Summary of Tables

Foreword

This soil survey contains information that can be used in land-planning programs in Stark 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. Christenson
State Conservationist
Natural Resources Conservation Service

Soil Survey of Stark County, Illinois

By Steven L. Elmer and Steven E. Zwicker, Natural Resources Conservation Service

Soils surveyed by Steven L. Elmer and Steven E. Zwicker, Natural Resources Conservation Service, and John Gumtow and Tim Geiger, Stark County

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

STARK COUNTY is in the northwestern part of Illinois (fig. 1). It has an area of 184,115 acres, or about 288 square miles. It is bordered on the north by Bureau County, on the east by Bureau and Marshall Counties, on the south by Peoria County, on the west by Knox County, and on the northwest by Henry County. In 1990, the population of the county was 6,534. Toulon is the county seat.

This survey updates a soil survey of Stark County published in 1939 *(11)*. It provides more recent information and has larger maps, which show the soils in greater detail.

General Nature of the County

This section provides general information about Stark County. It describes history and development; relief, physiography, and drainage; transportation facilities and industry; native vegetation; and climate.

History and Development

Hunters and gatherers of the Potawatomi Tribe first occupied the Spoon River and Indian Creek area *(5)*. The first European settlers came to the survey area in about 1828. They settled along the Spoon River in an area that later became Essex Township.

Stark County was established in 1839. It was named after the Revolutionary War General Joseph Stark. In 1840, the population of the county was 2,000. By 1880, the population had reached its peak of 11,250. The

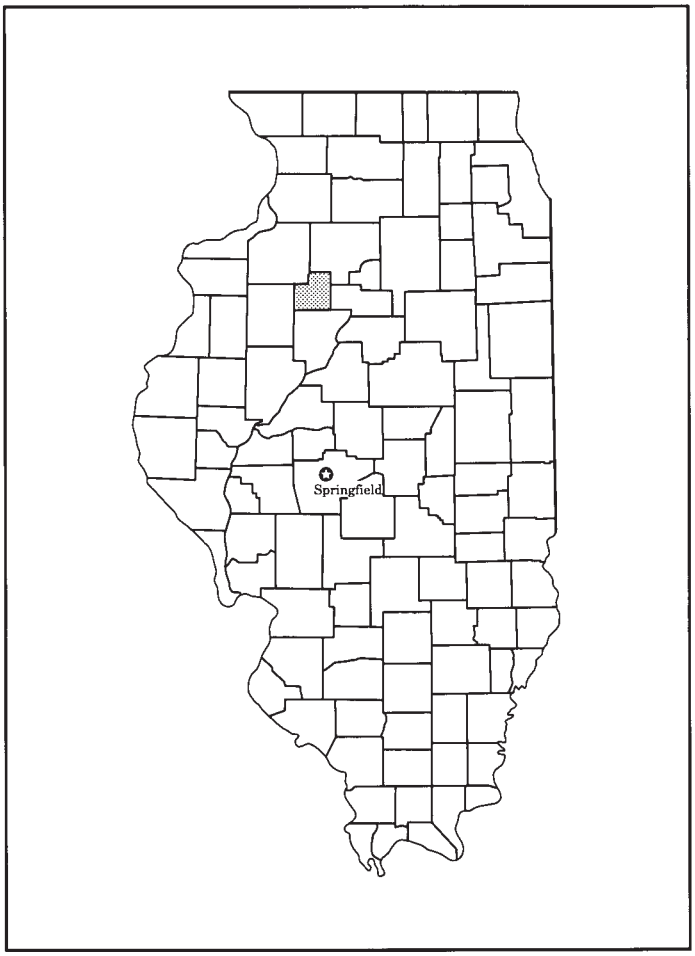

Figure 1.—Location of Stark County in Illinois.

population has declined steadily since then.

All of the original prairie has been under cultivation since the earliest days of settlement. Native tree species still grow along major drainageways, in areas that are not suited to cultivation because of steep slopes.

Agriculture is the most important enterprise in Stark County. In 1987, the total farmland was 179,267 acres. About 92 percent was used as cropland. The county had about 759 farms, which employed 33 percent of the workforce. The average farm size was 413 acres *(10)*.

Most of the acreage in the county is used for corn and soybeans. In 1989, about 165,858 acres was used for crops. About 88,900 acres of this land was used for corn, and 56,000 acres was used for soybeans. Small grain harvested in that year included 3,700 acres of wheat and 2,000 acres of oats. Small amounts of vegetable crops are also grown in the county. In 1989, about 3,400 acres was used as hayland and 9,877 acres for pasture. In addition, about 30,300 hogs and 6,400 beef cattle were raised in the county. Dairy cattle, sheep, horses, and chickens are also raised.

Relief, Physiography, and Drainage

Elevation ranges from 870 feet above sea level at a point about 2.5 miles southwest of Castleton to 600 feet above sea level in an area where the Spoon River leaves the county.

Stark County is underlain by three major types of bedrock—limestone, sandstone, and shale. The limestone and sandstone were quarried in several areas in the past, as were coal exposures as much as 4 to 6 feet thick within the shale *(5)*. Abandoned quarries and surface mines are located primarily in Osceola, Elmira, Toulon, and West Jersey Townships.

The material over the bedrock was deposited during two major glacial periods—the Illinoian and Wisconsinan glaciations. These deposits consist of glacial till, lacustrine material that settled out in still lakes, and loamy or sandy outwash material.

The eastern part of Stark County is a rolling till plain. The ridge on which Bradford and Speer are located is the terminal moraine of the Wisconsinan glaciation and represents the western limit of this glaciation.

Much of Valley Township, in the southeastern part of the county, and Osceola Township, in the northeastern part, is a broad, flat outwash plain that carried meltwaters from the receding glacier. The rest of the county is part of the older Illinoian glacial till plain. In some areas the upper part of the Illinoian till developed a subsequent Sangamonian Paleosol profile.

Many of the Illinoian and Wisconsinan deposits were subsequently covered by as much as 10 feet of windblown loess deposits. Most of the outwash and till deposits in the eastern part of the county are covered by 2 to 5 feet of loess. Elsewhere in the county, the thickness of the loess ranges primarily from 2 to 10 feet over the underlying material.

The most extensive deposits of sand and gravel are associated with the Wisconsinan glacial drift border in the eastern part of the county. Additional deposits occur along the Spoon River and its tributaries.

High-quality ground-water supplies exist within the Wisconsinan drift area in the eastern part of the county. Bedrock sources of ground water in the northern part of the county include sandstone, coal, and fractured shale in the material of Pennsylvanian age. The highest quality ground water is in the upper 200 feet of the formation.

The Spoon River runs in a nearly north-to-south direction through the central part of the county and eventually flows into the Illinois River. The Spoon River, the East Fork of the Spoon River, Cooper's Defeat Creek, and Jack Creek drain the northern part of the county. Indian Creek and Walnut Creek drain the western part. Camp Run and Mud Run drain the southeastern part.

Transportation Facilities and Industry

The county is crossed by five State highways, including routes 88, 78, 93, 91, and 17. Many secondary roads are unpaved but well maintained and provide access to all areas of the county. One railroad provides service to several small towns in the county.

Small industries in the county include a boiler manufacturer, an agrichemical plant, a steel fabricating plant, and a dairy storage facility.

Native Vegetation

Most of the native vegetation in the county has been lost to cultivation. The area was dominated by prairie grasses, and forest vegetation was along the Spoon River, Indian Creek, and Walnut Creek. Vegetation on the upland prairies included big bluestem, little bluestem, indiangrass, switchgrass, and sideoats grama. Woodland wildflowers included snow trillium, bloodroot, sessile bellwort, and springbeauty. Native trees of the area include oaks, hickories, maples, and elms.

Climate

Wayne Armstrong and Wayne Wendland, Illinois State Water Survey, helped prepare this section.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Princeville in the

period 1951 to 1980. 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 24.5 degrees F and the average daily minimum temperature is 15.2 degrees. The lowest temperature on record, which occurred at Princeville on January 8, 1965, and December 29, 1984, is -26 degrees. In summer, the average temperature is 72 degrees and the average daily maximum temperature is 83.5 degrees. The highest recorded temperature, which occurred at Princeville on August 2, 1988, is 105 degrees.

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

The total annual precipitation is 34.10 inches. Of this, 22.56 inches, or 66 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 17.18 inches. The heaviest 1-day rainfall during the period of record was 5.46 inches.

The average seasonal snowfall is 24 inches. The greatest snow depth at any one time during the period of record was 24 inches. On the average, 30 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 heaviest 1-day snowfall on record was more than 20 inches.

The average relative humidity in midafternoon is about 65 percent. Humidity is higher at night, and the average at dawn is about 85 percent. The sun shines 67 percent of the time possible in summer and 46 percent in winter. The prevailing wind is from the south. Average windspeed is highest, 12.3 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.

Map Unit Composition

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

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (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

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.

The general soil map of Stark County joins the general soil maps of Bureau, Henry, Knox, Marshall, and Peoria Counties. The names of the associations may differ slightly across county lines. The differences are the result of variations in the extent of the soils in the different survey areas.

Soil Descriptions

1. Tama-Muscatine Association

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

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

This association makes up about 10 percent of the county. It is about 54 percent Tama soils, 27 percent Muscatine soils, and 19 percent soils of minor extent (fig. 2).

Tama soils are nearly level to moderately sloping. They are on ridgetops and on side slopes along drainageways and are moderately well drained. Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer also is very dark grayish brown silt loam. It is about 5 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown silty clay loam. The next part is yellowish brown, mottled silty clay loam. The lower part is yellowish brown, mottled silt loam.

Muscatine soils are nearly level. They are on wide ridgetops and summits near the head of drainageways and are somewhat poorly drained. Typically, the surface layer is black silt loam about 9 inches thick. The subsurface layer is very dark grayish brown silt loam about 8 inches thick. The subsoil is about 33 inches thick. The upper part is brown, mottled silty clay loam. The next part is grayish brown and brown, mottled silty clay loam. The lower part is grayish brown and yellowish brown, mottled silt loam. The underlying material to a depth of 60 inches or more is light brownish gray, mottled silt loam.

Of minor extent in this association are Catlin, Elkhart, Sable, and Denny soils. The moderately well drained Catlin and well drained Elkhart soils are on ridgetops and side slopes. The poorly drained Sable soils are on broad summits and in depressions. The very poorly drained Denny soils are in depressions. They are subject to ponding.

Most areas of this association are cultivated. The nearly level and gently sloping areas are well suited to cultivated crops. The moderately sloping areas of Tama soils are moderately suited to cultivated crops. The main management needs are measures that maintain the drainage system in the flat areas and that help to control erosion in the sloping areas.

2. Tama-Ipava Association

Nearly level to moderately sloping, moderately well 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 ridgetops, side slopes, and summits. Slopes range from 0 to 10 percent.

This association makes up about 33 percent of the

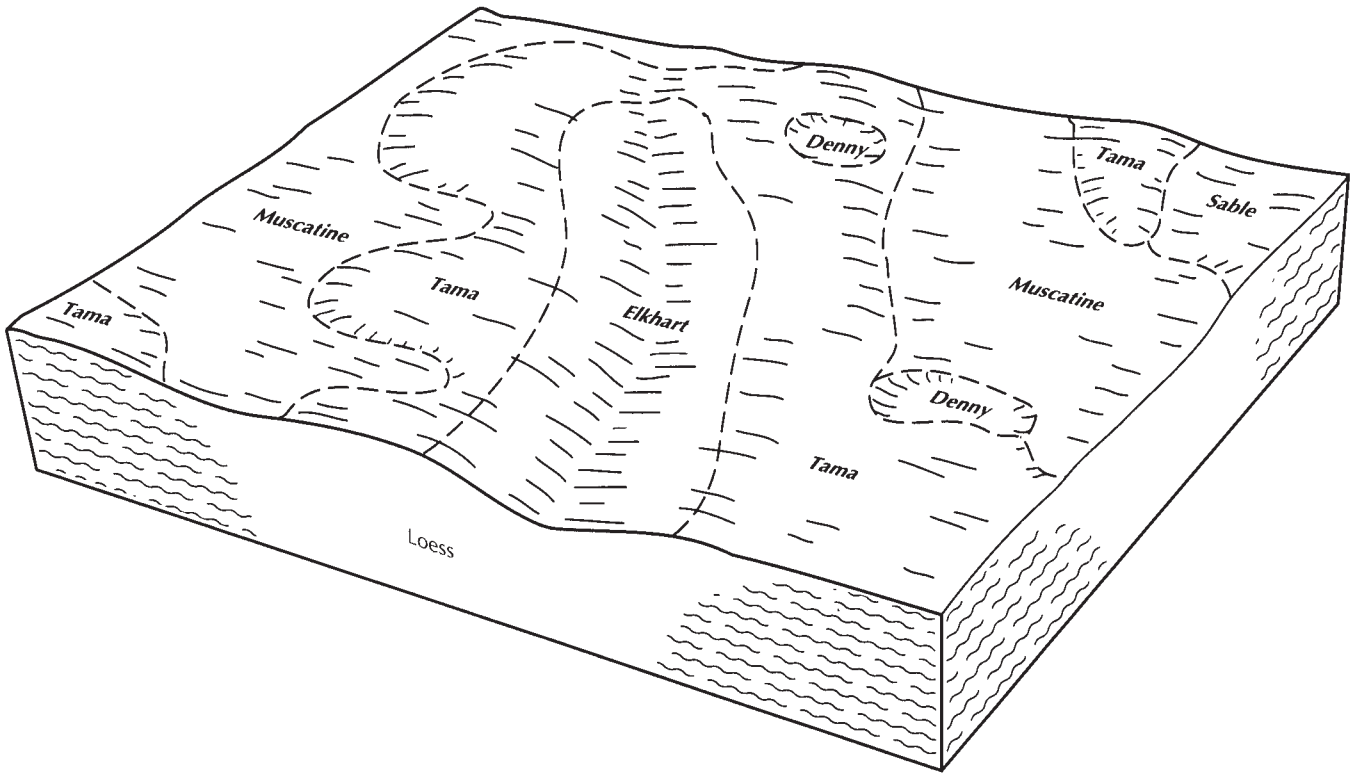

Figure 2.—Typical pattern of soils and parent material in the Tama-Muscatine association.

county. It is about 41 percent Tama soils, 37 percent Ipava soils, and 22 percent soils of minor extent.

Tama soils are nearly level to moderately sloping. They are on ridgetops and on side slopes along drainageways and are moderately well drained. Permeability is moderate. Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer also is very dark grayish brown silt loam. It is about 5 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is dark yellowish brown silty clay loam. The next part is yellowish brown, mottled silty clay loam. The lower part is yellowish brown, mottled silt loam.

Ipava soils are nearly level. They are on wide ridgetops and summits near the head of drainageways and are somewhat poorly drained. Permeability is moderately slow. Typically, the surface layer is black silt loam about 8 inches thick. The subsurface layer also is black silt loam. It is about 9 inches thick. The subsoil is about 33 inches thick. The upper part is brown, mottled silty clay loam. The next part is grayish brown, mottled silty clay loam. The lower part is grayish brown, mottled silt loam. The underlying material to a depth of 60 inches or more is mixed grayish brown and yellowish brown, mottled silt loam.

Of minor extent in this association are Assumption, Elkhart, and Sylvan soils. The moderately well drained Assumption soils and the well drained Elkhart and Sylvan soils are on side slopes along drainageways.

Most areas of this association are cultivated. The nearly level and gently sloping areas are well suited to cultivated crops. The moderately sloping areas of Tama soils are moderately suited to cultivated crops. The main management needs are measures that maintain the drainage system in the flat areas and that help to control erosion in the sloping areas.

3. Rozetta-Hickory Association

Gently sloping to very steep, moderately well drained and well drained, moderately permeable soils that formed in loess or glacial till; on uplands

This association consists of soils on ridgetops and side slopes. Slopes range from 2 to 50 percent.

This association makes up about 18 percent of the county. It is about 51 percent Rozetta and similar soils, 13 percent Hickory and similar soils, and 36 percent soils of minor extent (fig. 3).

The moderately well drained Rozetta soils are on ridgetops and on the upper side slopes along

drainageways. They are gently sloping and moderately sloping. Typically, the surface layer is brown silt loam about 9 inches thick. The subsoil extends to a depth of 60 inches or more. The upper part is yellowish brown silty clay loam. The lower part is yellowish brown silt loam. It is mottled below a depth of about 28 inches.

The well drained Hickory soils are on strongly sloping to very steep side slopes along drainageways. Typically, the surface layer is very dark grayish brown silt loam about 3 inches thick. The subsurface layer is brown silt loam about 4 inches thick. The subsoil is about 43 inches thick. The upper part is dark yellowish brown silty clay loam; the next part is dark yellowish brown, mottled clay loam; and the lower part is yellowish brown, mottled clay loam. The underlying material to a depth of 60 inches or more is yellowish brown clay loam.

Of minor extent in this association are Elco, Sylvan, Lawson, Radford, Downs, and Fayette soils. The moderately well drained Elco and well drained Sylvan soils are on the upper side slopes. The somewhat poorly drained Lawson and Radford soils are in narrow drainageways or on the larger flood plains. They formed in alluvium. The well drained Fayette soils are on side slopes, and the moderately well drained Downs soils are on ridgetops and side slopes.

Most areas of this association are cultivated. The gently sloping areas are well suited to cultivated crops, and the more sloping areas are moderately suited. Most of the steeper areas, however, are used as woodland or for woodland wildlife habitat. Erosion is the major hazard on these soils. Measures that reduce the hazard of erosion, maintain fertility and the content of organic matter, and improve tilth are needed.

4. Lawson-Sawmill Association

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

This association consists of soils on flood plains and in upland drainageways. Slopes range from 0 to 2 percent.

This association makes up about 7 percent of the

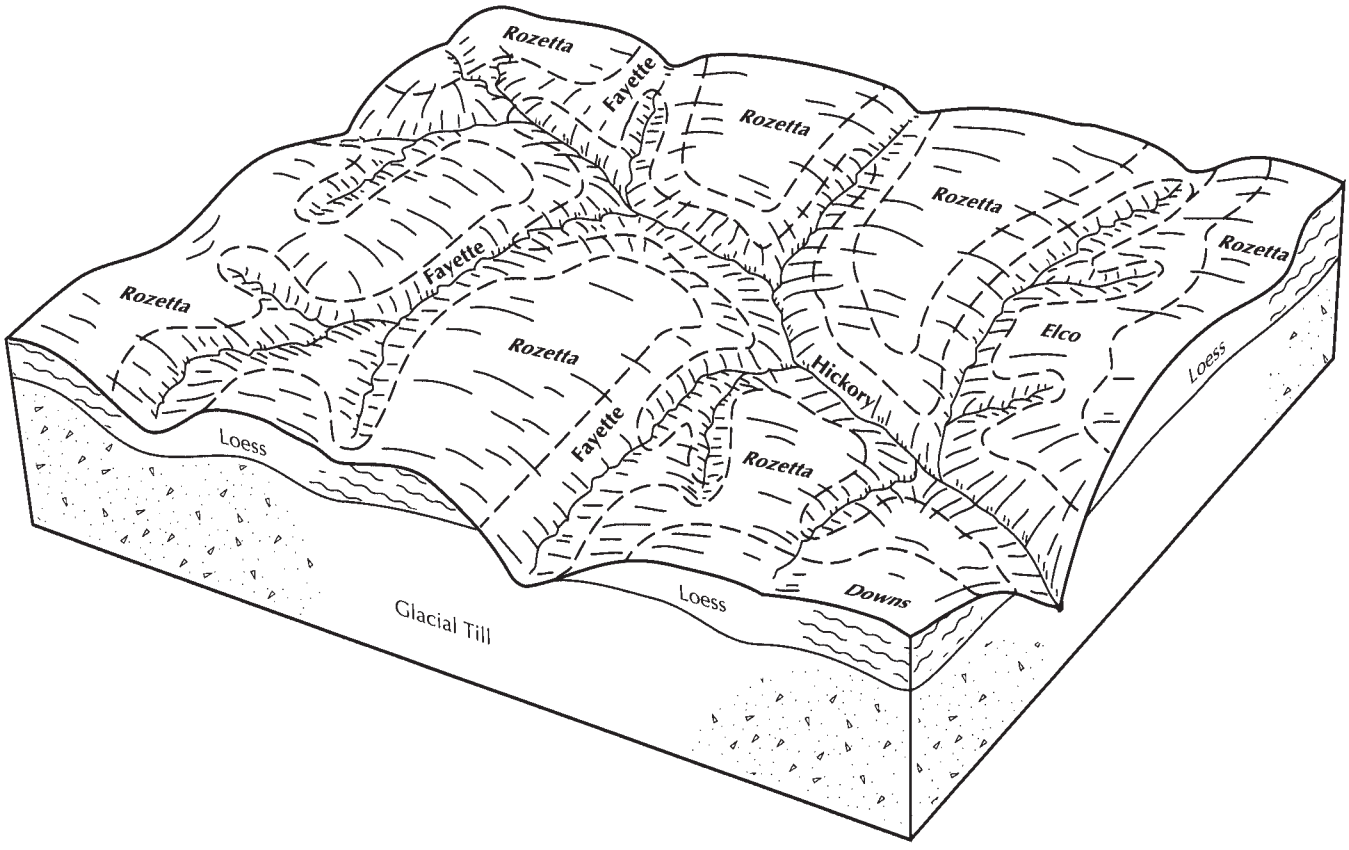

Figure 3.—Typical pattern of soils and parent material in the Rozetta-Hickory association.

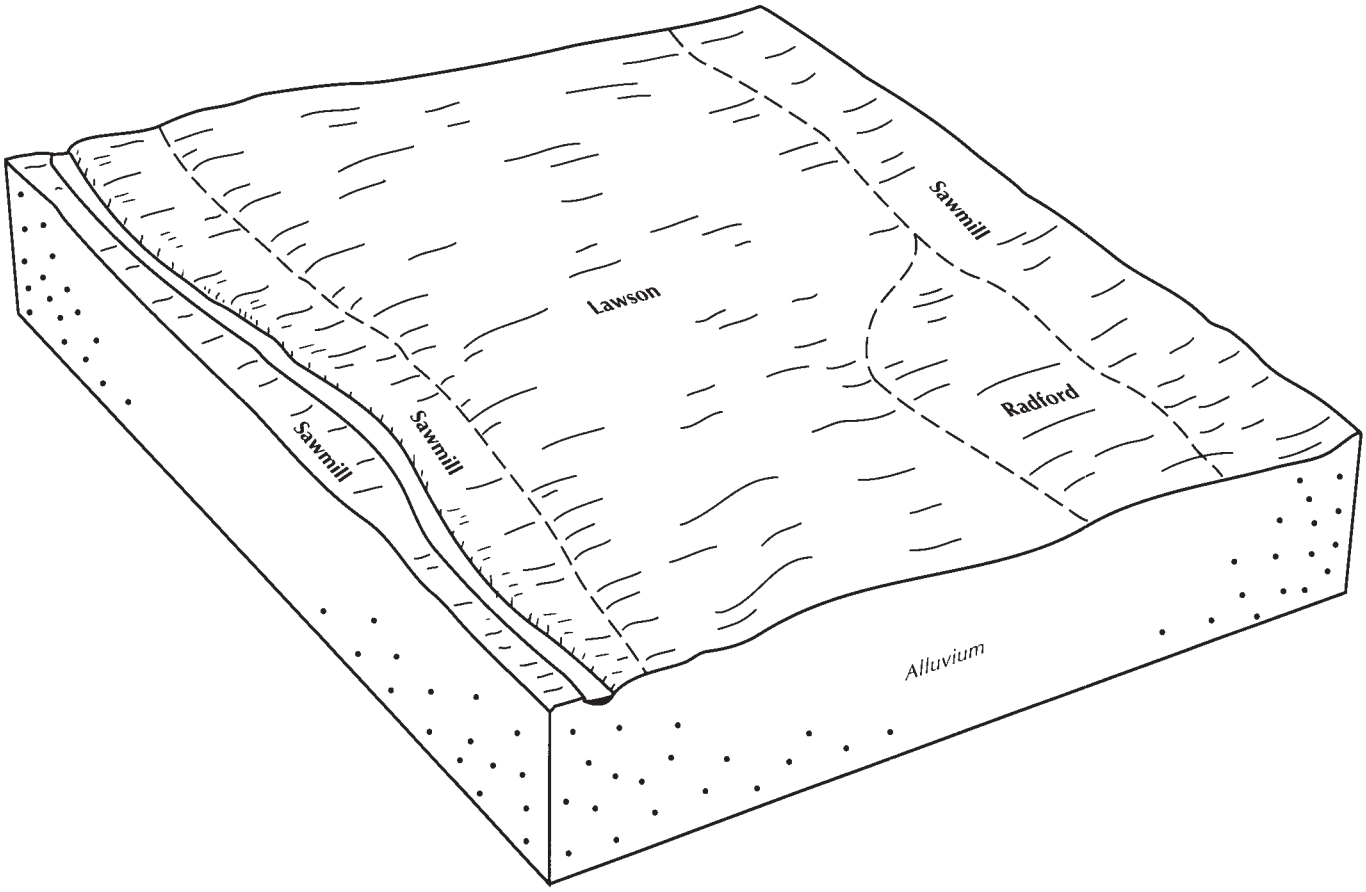

Figure 4.—Typical pattern of soils and parent material in the Lawson-Sawmill association.

county. It is about 41 percent Lawson soils, 26 percent Sawmill soils, and 33 percent soils of minor extent (fig. 4).

The somewhat poorly drained Lawson soils are frequently flooded for brief periods. Typically, the surface layer is black silt loam about 13 inches thick. The subsurface layer is black, very dark grayish brown, and dark grayish brown silt loam about 19 inches thick. The underlying material extends to a depth of 60 inches or more. The upper part is mixed yellowish brown and dark grayish brown silty clay loam. The lower part is mixed yellowish brown and dark grayish brown, stratified sandy loam and silt loam.

The poorly drained Sawmill soils are frequently flooded for brief periods. Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer is about 33 inches thick. It is very dark grayish brown silt loam in the upper part and black silty clay loam in the lower part. The subsoil is olive gray, mottled silty clay loam about 13 inches thick. The underlying material to a depth of 60 inches or more also is olive gray, mottled silty clay loam.

Of minor extent in this association are Huntsville and Radford soils. The moderately well drained Huntsville and somewhat poorly drained Radford soils are in positions on the flood plains similar to or slightly higher than those of the Lawson and Sawmill soils. They are subject to occasional flooding for brief periods.

Most areas of this association are cultivated. The main management needs are measures that protect crops from floodwater and measures that maintain fertility and improve drainage and tilth.

5. Ipava-Sable Association

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

This association consists of soils on wide ridges and broad summits and in depressions on uplands. Slopes range from 0 to 2 percent.

This association makes up about 3 percent of the

county. It is about 45 percent Ipava soils, 33 percent Sable soils, and 22 percent soils of minor extent (fig. 5).

The somewhat poorly drained Ipava soils are on wide ridgetops and summits. Permeability is moderately slow. Typically, the surface layer is black silt loam about 8 inches thick. The subsurface layer also is black silt loam. It is about 9 inches thick. The subsoil is about 33 inches thick. The upper part is brown, mottled silty clay loam. The next part is grayish brown, mottled silty clay loam. The lower part is grayish brown, mottled silt loam. The underlying material to a depth of 60 inches or more is mixed grayish brown and yellowish brown, mottled silt loam.

The poorly drained Sable soils are on broad summits and in shallow depressions. Permeability is moderate. Typically, the surface layer is black silty clay loam about 7 inches thick. The subsurface layer also is black silty clay loam. It is about 9 inches thick. The subsoil is silty clay loam about 29 inches thick. It is mottled. In sequence downward, it is dark grayish brown, grayish brown, light brownish gray, and light olive gray. The underlying material to a depth of 60 inches or more is light olive gray, mottled silty clay loam.

Of minor extent in this association are Elkhart, Tama, and Denny soils. The well drained Elkhart and moderately well drained Tama soils are on ridgetops and side slopes. The very poorly drained Denny soils are in depressions. They are subject to ponding.

Most areas of this association are cultivated. The soils are well suited to all of the crops commonly grown in the county. The main management concerns are adequate drainage, fertility, and tilth.

6. Elburn-Plano Association

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

This association consists of soils on ridgetops, summits, and side slopes. Slopes range from 0 to 5 percent.

This association makes up about 15 percent of the county. It is about 25 percent Elburn soils, 20 percent Plano soils, and 55 percent soils of minor extent (fig. 6).

The somewhat poorly drained Elburn soils are on wide ridgetops and summits. Typically, the surface layer is very dark gray silt loam about 8 inches thick. The upper 6 inches of the subsurface layer is very dark gray silt loam. The lower 4 inches is mixed very dark gray

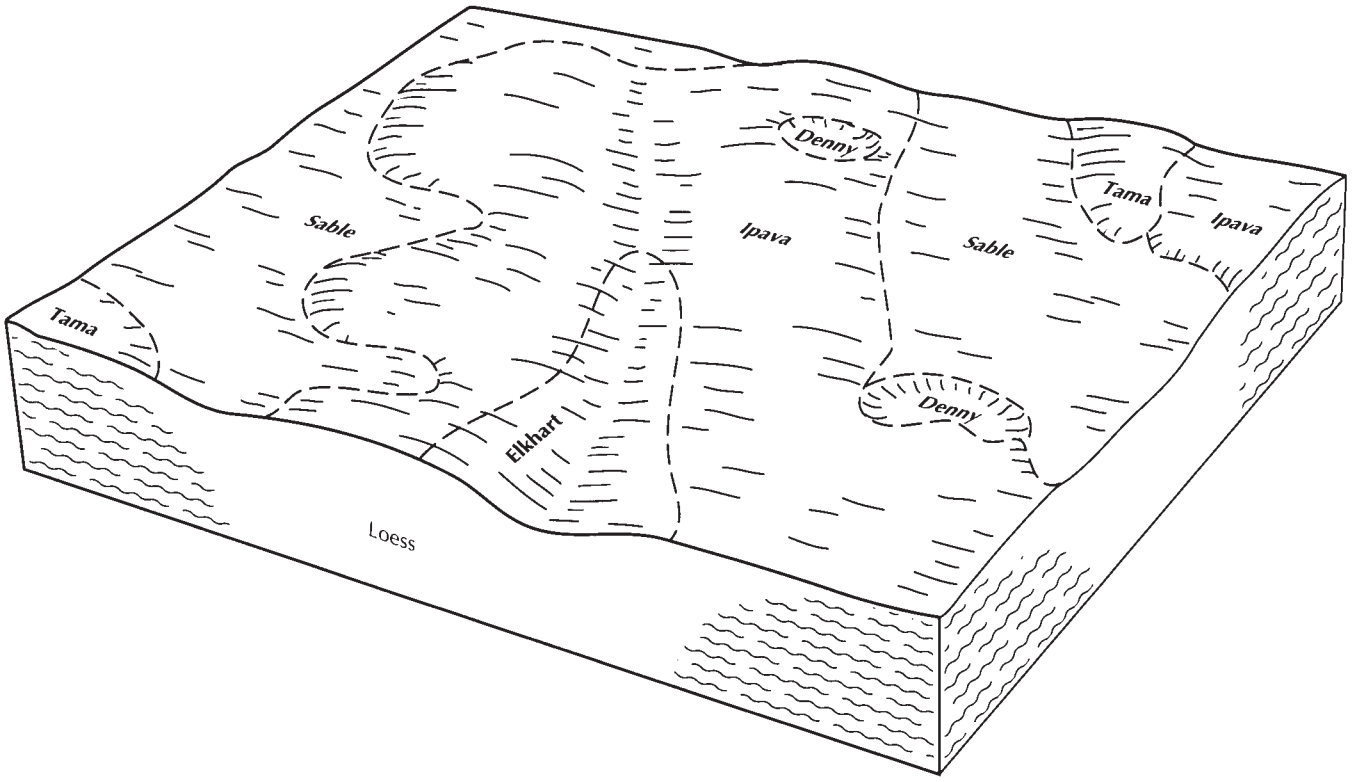

Figure 5.—Typical pattern of soils and parent material in the Ipava-Sable association.

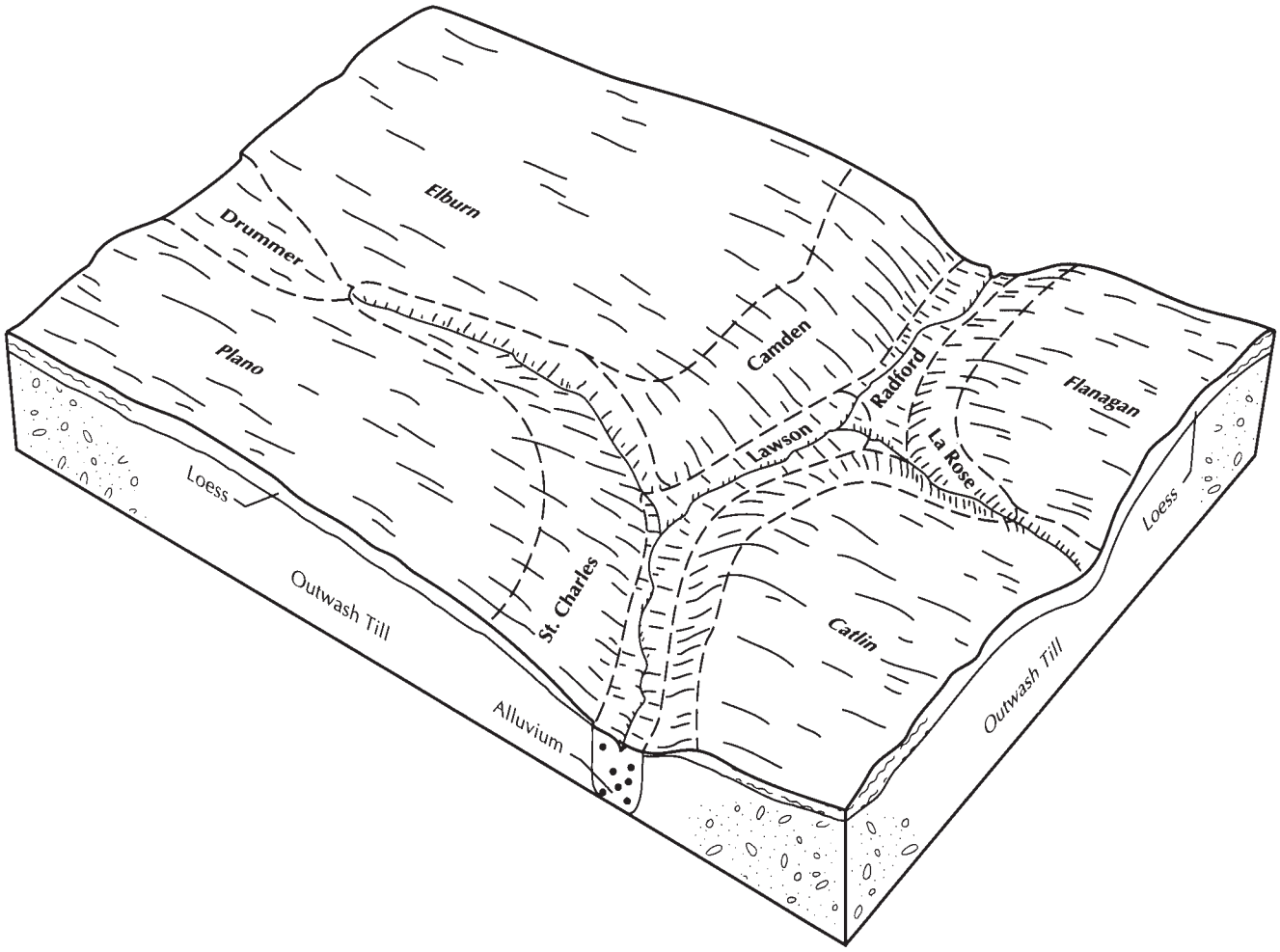

Figure 6.—Typical pattern of soils and parent material in the Elburn-Plano and Catlin-Flanagan associations.

and brown silty clay loam. The subsoil extends to a depth of 60 inches or more. The upper part is brown, mottled silty clay loam. The next part is dark grayish brown, mottled silt loam. The lower part is yellowish brown, mottled, stratified loam and sandy loam.

The well drained Plano soils are on ridgetops, summits, and side slopes. Typically, the surface layer is very dark brown silt loam about 9 inches thick. The subsurface layer is dark brown silt loam about 5 inches thick. The subsoil extends to a depth of 60 inches or more. In sequence downward, it is dark yellowish brown silty clay loam, dark yellowish brown silt loam, dark yellowish brown clay loam, and brown sandy loam.

Of minor extent in this association are Camden, Drummer, Lawson, and St. Charles soils. The well drained Camden soils and the well drained and moderately well drained St. Charles soils are on ridgetops, summits, and side slopes. The poorly drained Drummer soils are on broad flats or in depressions. The somewhat poorly drained Lawson soils are on narrow flood plains.

Most areas of this association are cultivated. The soils are well suited to all of the crops commonly grown in the county. The main management needs are measures that improve or maintain the drainage system in the flat areas and measures that help to control erosion in the sloping areas.

7. Catlin-Flanagan Association

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

This association consists of soils on ridgetops,

summits, and side slopes. Slopes range from 0 to 10 percent.

This association makes up about 13 percent of the county. It is about 37 percent Catlin soils, 18 percent Flanagan soils, and 45 percent soils of minor extent (fig. 6).

The moderately well drained Catlin soils are on ridgetops and side slopes. Permeability is moderate. Typically, the surface layer is very dark grayish brown silt loam about 6 inches thick. The subsurface layer also is very dark grayish brown silt loam. It is about 6 inches thick. The subsoil is about 33 inches thick. The upper part is brown and dark yellowish brown silty clay loam. The next part is dark yellowish brown, mottled silty clay loam. The lower part is brown loam. The underlying material to a depth of 60 inches or more is brown, calcareous loam.

The somewhat poorly drained Flanagan soils are on wide ridgetops and summits. Permeability is moderate in the upper part and moderately slow in the lower part. Typically, the surface layer is black silt loam about 8 inches thick. The subsurface layer is very dark grayish brown silt loam about 4 inches thick. The subsoil is about 35 inches thick. The upper part is yellowish brown, mottled silty clay loam. The next part is yellowish brown, mottled silt loam. The lower part is brown, mottled, calcareous clay loam. The underlying material to a depth of 60 inches or more is brown, calcareous loam.

Of minor extent in this association are the well drained Plano and Saybrook soils on ridgetops and side slopes, the well drained La Rose soils on side slopes, and the somewhat poorly drained Radford soils on narrow flood plains.

Most areas of this association are used for cultivated crops. The Flanagan soils and the gently sloping areas of Catlin soils are well suited to all of the crops commonly grown in the county. The more sloping areas of the Catlin soils are moderately suited. The main management needs are measures that improve or maintain the drainage system on the broad summits and measures that help to control erosion in the sloping areas.

8. Lenzburg-Rapatee Association

Gently sloping to very steep, well drained, moderately slowly permeable and slowly permeable, silty soils that formed in overburden from surface mining

This association consists of soils on ridgetops and side slopes. Slopes range from 1 to 70 percent.

This association makes up about 1 percent of the county. It is about 95 percent Lenzburg soils and 5 percent Rapatee soils.

Lenzburg soils are moderately slowly permeable and are calcareous. Typically, the surface layer is mixed dark grayish brown and yellowish brown channery silty clay loam about 4 inches thick. The subsurface layer is mixed yellowish brown and light brownish gray channery silt loam about 7 inches thick. The underlying material extends to a depth of 60 inches or more. The upper part is mixed yellowish brown and light brownish gray, calcareous channery silt loam. The next part is mixed brown and dark brown silt loam. The lower part is mixed yellowish brown, strong brown, light brownish gray, and dark brown silt loam.

Rapatee soils are slowly permeable. Typically, the surface layer is mixed very dark grayish brown and very dark gray silt loam about 6 inches thick. The underlying material to a depth of 60 inches or more is silty clay loam. The upper part is mixed very dark gray, very dark grayish brown, and dark brown. The next part is mixed dark yellowish brown, brown, and dark gray. The lower part is mixed dark brown, yellowish brown, and dark gray.

Most areas of this association are used for pasture. The soils are suited to pasture, woodland, and wildlife habitat. They are generally unsuited to crops. The main management concerns are a restricted root zone and the hazard of erosion in the sloping areas.

Broad Land Use Considerations

The soils in Stark County vary widely in their suitability for major land uses. About 92 percent of the land in the county is used for cultivated crops, mainly corn and soybeans. Soils in all of the associations are used for crops. Associations 1, 2, 4, 5, 6, and 7 are generally well suited to cultivated crops when managed properly. The hazard of erosion and a seasonal high water table are the main limitations. Flooding is also a hazard in association 4. The major soils in association 3 differ widely in their suitability for crops. Rozetta soils range from well suited to poorly suited. Hickory soils are poorly suited or generally unsuited. Erosion is a hazard in areas of these soils, and the slope is a limitation.

About 10 percent of the county is hayland, pasture, or woodland. These areas are mainly in associations 3 and 8. The major soils are Hickory, Lenzburg, Rapatee, and Rozetta soils. The soils in these associations are generally moderately suited to hay and pasture. Hickory and Lenzburg soils, however, are dominantly poorly suited or generally unsuited because of the hazard of erosion and the slope. The soils in associations 3 and 8 are well suited or moderately suited to woodland. Erosion is a hazard in areas of these soils, and the slope is a limitation.

The soils in the county have fair or poor suitability for

urban uses. Frost action, wetness, and the slope are the major limitations. The soils in association 4 are poorly suited to urban development because of flooding. The steeper areas in associations 3 and 8 are poorly suited because of the slope. Sites that are suitable for houses or small commercial buildings, however, are generally available within areas of these associations.

Suitability for recreation ranges from good to poor, depending upon the intensity of use. Associations 3 and 8 have good potential for intensive recreational development, but the slope is a limitation in the steeper areas. Association 4 has poor potential because of flooding. All of the associations are suitable for hiking or horseback riding. Some small areas that are suitable for intensive development, such as playgrounds and campsites, are available within associations that have generally poor potential for these uses.

Detailed Soil Map Units

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 underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Tama silt loam, 2 to 5 percent slopes, eroded, is a phase of the Tama series.

Some map units are made up of two or more major soils. These map units are called soil complexes. A *soil complex* consists of two or more soils, or one or more soils and a miscellaneous area, in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Hennepin-Casco complex, 30 to 60 percent slopes, is an example.

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

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

8D2—Hickory silt loam, 10 to 18 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Glacial till or loess and glacial till
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: 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 7 inches—brown silt loam

Subsoil:
7 to 36 inches—yellowish brown clay loam
36 to 60 inches—yellowish brown clay loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained soils that have more clay in the subsoil than the Hickory soil; on the upper side slopes
• Marseilles soils, which formed in loess and shale; on the lower side slopes or in positions on the landscape similar to those of the Hickory soil
• Small, isolated areas of sandy outwash

Similar inclusions:
• Soils that have less sand in the subsoil
• Soils that have a darker surface layer or a surface layer of loam

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
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.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
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 promotes the even distribution of effluent.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

8D3—Hickory clay loam, 10 to 18 percent slopes, severely eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Glacial till or loess and glacial till
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: Moderate

Typical Profile

Surface layer:
0 to 7 inches—mixed dark yellowish brown and brown clay loam

Subsoil:
7 to 55 inches—dark yellowish brown clay loam

Substratum:
55 to 60 inches—yellowish brown clay loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained soils that have more clay in the subsoil than the Hickory soil; on the upper side slopes
• Marseilles soils, which formed in loess and shale; on

the lower side slopes or in positions on the landscape similar to those of the Hickory soil
• Small, isolated areas of sandy outwash

Similar inclusions:
• Soils that have less sand in the subsoil
• Soils that have a darker surface layer or a surface layer of loam

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Woodland

Suitability: Well suited
Management measures:
• The woodland should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Moderate
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.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
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 promotes the even distribution of effluent.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IVe

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

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Woodland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Glacial till or loess and glacial till
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: 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—very dark grayish brown silt loam

Subsurface layer:
3 to 7 inches—brown silt loam

Subsoil:
7 to 12 inches—dark yellowish brown silty clay loam
12 to 39 inches—dark yellowish brown clay loam
39 to 50 inches—yellowish brown clay loam

Substratum:
50 to 60 inches—yellowish brown clay loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained soils that have more clay in the subsoil than the Hickory soil; on the upper side slopes
• Marseilles soils, which formed in loess and shale; on the lower side slopes or in positions on the landscape

similar to those of the Hickory soil
• Small, isolated areas of sandy outwash

Similar inclusions:
• Soils that have a darker surface layer or a surface layer of loam
• Soils that have more clay or less sand in the subsoil

Use and Management

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Using a no-till method of seeding or pasture renovation helps to establish forage species and reduces the hazard of erosion.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Woodland

Suitability: Moderate
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
• The use of machinery is limited to periods when the soil is firm.
• The woodland should be protected from fire and from grazing by livestock.

Wildlife habitat

Suitability:
• This soil is suitable for wild herbaceous plants and hardwood trees.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the slope

Interpretive Groups

Land capability classification: VIe

8G—Hickory loam, 30 to 50 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major uses: Woodland and pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Glacial till or loess and glacial till
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: 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 2 inches—very dark grayish brown loam

Subsurface layer:
2 to 11 inches—brown loam

Subsoil:
11 to 20 inches—yellowish brown clay loam
20 to 27 inches—strong brown clay loam
27 to 48 inches—yellowish brown clay loam

Substratum:
8 to 60 inches—yellowish brown clay loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained soils that have more clay in the subsoil than the Hickory soil; on the upper side slopes
• Marseilles soils, which formed in loess and shale; on the lower side slopes
• Small, isolated areas of sandy outwash

Similar inclusions:
• Soils that have less sand in the subsoil
• Soils that have slopes of more than 50 percent or less than 30 percent

Use and Management

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.
• Seeding, fertilizing, and spraying by airplane or by hand reduce the hazard of erosion.

Woodland

Suitability: Poor
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-

legume mixture reduce the hazard of erosion.
• 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.
• The use of machinery is limited to periods when the soil is firm enough to support the equipment.

Wildlife habitat

Suitability:
• This soil is suitable for wild herbaceous plants and hardwood trees.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the slope

Interpretive Groups

Land capability classification: VIIe

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

Composition

Keomah and similar soils: 90 to 98 percent
Contrasting inclusions: 2 to 10 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Wide ridges and broad summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Parent material: Loess
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 2 to 4 feet
Organic matter content: Moderately low
Erosion hazard: Slight
Shrink-swell potential: High
Potential for frost action: High

Typical Profile

Surface layer:
0 to 10 inches—dark grayish brown silt loam
Subsurface layer:
10 to 14 inches—grayish brown silt loam
Subsoil:
14 to 27 inches—dark yellowish brown, mottled silty clay loam
27 to 36 inches—grayish brown and strong brown, mottled silty clay loam
36 to 45 inches—grayish brown and strong brown, mottled silt loam
Substratum:
45 to 60 inches—grayish brown and strong brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Denny soils and other wet spots; in shallow depressions
Similar inclusions:
• Soils that have a darker surface layer
• Soils that have a seasonal high water table at a depth of more than 4 feet
• Soils that have slopes of more than 2 percent
• Soils that are underlain by loamy or sandy outwash within a depth of 60 inches

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth and minimizes crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Poor
Management measures:
• Installing tile drains near the foundations helps to lower the water table.
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIw

19C3—Sylvan silty clay loam, 5 to 10 percent slopes, severely eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Calcareous loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Very low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 8 inches—dark grayish brown silty clay loam
Subsoil:
8 to 22 inches—yellowish brown silty clay loam
Substratum:
22 to 60 inches—yellowish brown and pale brown, calcareous silt loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in drainageways
• Small, isolated areas of sandy outwash
Similar inclusions:
• Soils that have a seasonal high water table within a depth of 6 feet
• Soils that have free lime within a depth of 20 inches
• Soils that have a subsoil that formed in glacial till

Use and Management

Cropland

Suitability: Poorly suited
Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Woodland

Suitability: Well suited
Management measures:
• The woodland should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IVe

19D3—Sylvan silty clay loam, 10 to 18 percent slopes, severely eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Calcareous loess
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Very low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 8 inches—brown silty clay loam
Subsoil:
8 to 22 inches—brown silty clay loam
22 to 30 inches—yellowish brown silt loam
Substratum:
30 to 60 inches—light yellowish brown, calcareous silt loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in drainageways
• Small, isolated areas of sandy outwash
Similar inclusions:
• Soils that have a seasonal high water table within a depth of 6 feet
• Soils that have free lime within a depth of 20 inches
• Soils that have a subsoil that formed in glacial till

Use and Management

Cropland

Suitability: Poorly suited
Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants 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: Moderate
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.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Management measures:
• Installing the filter lines on the contour promotes the even distribution of effluent.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IVe

19F—Sylvan silt loam, 18 to 30 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Woodland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Calcareous loess
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: 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 6 inches—dark grayish brown silt loam

Subsurface layer:
6 to 11 inches—brown silt loam

Subsoil:
11 to 23 inches—dark yellowish brown silty clay loam
23 to 26 inches—dark yellowish brown silt loam

Substratum:
26 to 60 inches—yellowish brown and light brownish gray, mottled silt loam

Inclusions

Contrasting inclusions:
• The moderately well drained Elco soils, which are moderately slowly permeable in the lower part of the subsoil and which have a seasonal high water table at a depth of 2.5 to 4.5 feet; on side slopes below the Sylvan soil
• Small, isolated areas of sandy outwash

Similar inclusions:
• Soils that have a thicker subsoil and that have a high content of lime at a lower depth
• Soils that have free lime within a depth of 20 inches

Use and Management

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Using a no-till method of seeding or pasture renovation helps to establish forage species and reduces the hazard of erosion.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Woodland

Suitability: Moderate
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
• In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
• The use of machinery is limited to periods 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:
• This soil is suitable for wild herbaceous plants and hardwood trees.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the slope

Interpretive Groups

Land capability classification: VIe

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

Composition

Miami and similar soils: 80 to 95 percent
Contrasting inclusions: 5 to 20 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; slow in the lower part
Parent material: Loess and glacial till
Runoff: Rapid
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Low
Erosion hazard: Severe
Shrink-swell potential: Moderate

Potential for frost action: Moderate

Typical Profile

Surface layer:
0 to 5 inches—brown clay loam
Subsoil:
5 to 12 inches—dark yellowish brown clay loam
Substratum:
12 to 60 inches—yellowish brown, calcareous loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways
• The moderately well drained Elco soils; on hillsides
Similar inclusions:
• Soils that are either shallower or deeper over calcareous till

Use and Management

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Woodland

Suitability: Well suited
Management measures:
• The woodland should be protected from fire and from grazing by livestock.

Wildlife habitat

Suitability:
• This soil is suitable for wild herbaceous plants and hardwood trees.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Moderate
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.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
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 promotes the even distribution of effluent.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: VIe

27F—Miami silt loam, 18 to 30 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Woodland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; slow in the lower part
Parent material: Loess and glacial till
Runoff: Rapid
Available water capacity: Moderate
Depth to the seasonal high water table: 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—very dark grayish brown silt loam
Subsurface layer:
3 to 6 inches—brown silt loam
Subsoil:
6 to 26 inches—dark yellowish brown clay loam
Substratum:
26 to 60 inches—yellowish brown, calcareous loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways
• The moderately well drained Elco soils; on hillsides

Similar inclusions:
• Soils that are either shallower or deeper over calcareous till

Use and Management

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Using a no-till method of seeding or pasture renovation helps to establish forage species and reduces the hazard of erosion.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Woodland

Suitability: Moderate
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
• The use of machinery is limited to periods 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.
• The woodland should be protected from fire and from grazing by livestock.

Wildlife habitat

Suitability:
• This soil is suitable for wild herbaceous plants and hardwood trees.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Interpretive Groups

Land capability classification: VIe

36A—Tama silt loam, 0 to 2 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Narrow ridgetops and summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
Organic matter content: Moderate
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown silt loam
Subsurface layer:
8 to 14 inches—very dark grayish brown silt loam
Subsoil:
14 to 19 inches—brown silty clay loam
19 to 26 inches—dark yellowish brown silty clay loam
26 to 46 inches—dark yellowish brown, mottled silty clay loam
Substratum:
46 to 60 inches—dark yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Denny soils, which contain more clay in the subsoil than the Tama soil and are subject to ponding; in depressions
• The poorly drained Sable soils, which are in low areas and are subject to ponding

Similar inclusions:
• Soils that have a seasonal high water table within a depth of 4 feet
• Soils that are underlain by loamy or sandy outwash
• Soils that are calcareous within a depth of 48 inches
• Soils that have a thinner surface layer

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred

grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

36B—Tama silt loam, 2 to 5 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
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 silt loam
Subsurface layer:
6 to 11 inches—very dark grayish brown silt loam
Subsoil:
11 to 34 inches—dark yellowish brown silty clay loam
34 to 56 inches—yellowish brown, mottled silty clay loam
56 to 60 inches—yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Sable soils, which are in depressions or on broad upland summits and are subject to ponding
• The poorly drained Denny soils, which contain more clay in the subsoil than the Tama soil and are subject to ponding; in shallow depressions

Similar inclusions:
• Soils that have a seasonal high water table within a depth of 4 feet
• Soils that are underlain by glacial till or outwash
• Soils that are calcareous within a depth of 48 inches
• Soils that have a thinner surface layer

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate

Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

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

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
Organic matter content: Moderate
Erosion hazard: Moderate
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 7 inches—dark brown silt loam

Subsoil:
7 to 17 inches—dark yellowish brown silty clay loam
17 to 37 inches—dark yellowish brown, mottled silty clay loam
37 to 48 inches—dark yellowish brown, mottled silt loam

Substratum:
48 to 60 inches—dark yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Denny soils, which contain more clay in the subsoil than the Tama soil and are subject to ponding; in shallow depressions
• The poorly drained Sable soils, which are in depressions or on broad upland summits and are subject to ponding

Similar inclusions:
• Soils that have a surface layer of silty clay loam
• Soils that have a thinner and lighter colored surface layer
• Soils that have a seasonal high water table within a depth of 4 feet
• Soils that are underlain by glacial till or outwash
• Soils that are calcareous within a depth of 48 inches

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

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

Composition

Tama and similar soils: 90 to 98 percent
Contrasting inclusions: 2 to 10 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 6 inches—dark brown silt loam

Subsoil:
6 to 24 inches—dark yellowish brown silty clay loam
24 to 40 inches—dark yellowish brown, mottled silty clay loam
40 to 53 inches—dark yellowish brown, mottled silt loam

Substratum:
53 to 60 inches—dark yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways
• The moderately well drained Assumption soils; on the lower side slopes

Similar inclusions:
• Soils that are underlain by glacial till or outwash
• Soils that have a thinner subsoil and have free lime within a depth of 48 inches
• Soils that have a seasonal high water table within a depth of 4 feet
• Soils that have a thinner surface layer

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing tile drains around the absorption field helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

36C3—Tama silty clay loam, 5 to 10 percent slopes, severely eroded

Composition

Tama and similar soils: 90 to 98 percent

Contrasting inclusions: 2 to 10 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
Organic matter content: Moderately low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 7 inches—dark brown silty clay loam
Subsoil:
7 to 10 inches—brown silty clay loam
10 to 22 inches—dark yellowish brown, mottled silty clay loam
22 to 48 inches—dark yellowish brown, mottled silt loam
Substratum:
48 to 60 inches—dark yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways
• The moderately well drained Assumption soils; on the lower side slopes
Similar inclusions:
• Soils that have a surface layer of silt loam
• Soils that have a thinner subsoil and have free lime within a depth of 48 inches
• Soils that are underlain by glacial till or outwash
• Soils that have a seasonal high water table within a depth of 4 feet
• Soils that have a thinner surface layer

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, returning crop residue to the soil, and adding green manure crops or animal manure reduce the hazard of erosion, maintain productivity, improve tilth, and minimize crusting.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IVe

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

Composition

Muscatine and similar soils: 90 to 98 percent
Contrasting inclusions: 2 to 10 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Wide ridgetops and broad summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderate
Parent material: Loess
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 2 to 4 feet
Organic matter content: High
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 9 inches—black silt loam

Subsurface layer:
9 to 17 inches—very dark grayish brown silt loam

Subsoil:
17 to 36 inches—brown, mottled silty clay loam
36 to 45 inches—grayish brown and brown, mottled silty clay loam
45 to 50 inches—grayish brown and yellowish brown, mottled silt loam

Substratum:
50 to 60 inches—light brownish gray, mottled silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Denny soils, which contain more clay in the subsoil than the Muscatine soil and are subject to ponding; in shallow depressions
• The poorly drained Sable soils, which are subject to ponding; on broad summits or in depressions

Similar inclusions:
• Soils having a subsoil that is calcareous above a depth of 48 inches
• Soils that have a seasonal high water table below a depth of 4 feet
• Soils that have a surface layer of silty clay loam

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.
• Maintaining a tile drainage system helps to lower the water table.

Dwellings

Suitability: Poor for dwellings with basements; moderate for dwellings without basements
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

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

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Wide ridgetops and broad summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Parent material: Loess
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 1 to 3 feet
Organic matter content: High
Erosion hazard: Slight
Shrink-swell potential: High
Potential for frost action: High

Typical Profile

Surface layer:
0 to 8 inches—black silt loam

Subsurface layer:
8 to 17 inches—black silt loam

Subsoil:
17 to 24 inches—brown, mottled silty clay loam
24 to 41 inches—grayish brown, mottled silty clay loam
41 to 50 inches—grayish brown, mottled silt loam

Substratum:
50 to 60 inches—grayish brown and yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Sable soils, which are subject to ponding; on broad summits and in depressions
• The poorly drained Denny soils, which are subject to ponding; in depressions

Similar inclusions:
• Soils that have a lighter colored subsurface layer
• Soils that have a seasonal high water table at a depth of more than 3 feet
• Soils that have a surface layer of silty clay loam

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth.
• Maintaining a tile drainage system helps to lower the water table.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.
• Maintaining a tile drainage system helps to lower the water table.

Dwellings

Suitability: Poor
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

45—Denny silt loam

Composition

Denny and similar soils: 92 to 97 percent
Contrasting inclusions: 3 to 8 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Depressions
Slope range: 0 to 2 percent
Major use: Cropland

Soil Properties and Qualities

Drainage class: Very poorly drained
Permeability: Slow
Parent material: Loess
Runoff: Slow to ponded (fig. 7)
Available water capacity: High
Seasonal high water table: 1 foot above to 2 feet below the surface
Organic matter content: Moderate
Erosion hazard: Slight
Shrink-swell potential: High
Potential for frost action: High

Typical Profile

Surface layer:
0 to 5 inches—very dark gray silt loam

Subsurface layer:
5 to 9 inches—black silt loam
9 to 17 inches—grayish brown silt loam

Subsoil:
17 to 20 inches—dark gray, mottled silty clay loam
20 to 46 inches—gray, mottled silty clay loam
46 to 60 inches—gray, mottled silt loam

Figure 7.—Ponding in an area of Denny silt loam.

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Muscatine and Ipava soils and the moderately well drained Tama soils; on the slightly higher ridgetops and summits

Similar inclusions:
• Soils that have a lighter colored surface layer
• Soils having a thicker surface layer that is silty clay loam

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth and minimizes crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Generally unsuited because of the ponding

Septic tank absorption fields

Suitability: Generally unsuited because of the ponding

Interpretive Groups

Land capability classification: IIIw

59A—Lisbon silt loam, 0 to 2 percent slopes

Composition

Lisbon and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Broad ridgetops and summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Parent material: Loess and glacial till
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 1 to 3 feet
Organic matter content: High
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 7 inches—black silt loam

Subsurface layer:
7 to 11 inches—black silt loam
11 to 14 inches—very dark grayish brown silty clay loam

Subsoil:
14 to 28 inches—brown, mottled silty clay loam
28 to 31 inches—brown, mottled clay loam

Substratum:
31 to 60 inches—brown, mottled loam

Inclusions

Contrasting inclusions:
• Isolated gravel spots

Similar inclusions:
• Soils that formed in less than 20 inches of loess and glacial till
• Soils that formed in more than 40 inches of loess and glacial till
• Soils that have a seasonal high water table at a depth of more than 3 feet
• Soils that are underlain by glacial outwash

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.
• Maintaining a tile drainage system helps to lower the water table.

Dwellings

Suitability: Poor
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

60C2—La Rose silt loam, 5 to 10 percent slopes, eroded

Composition

La Rose and similar soils: 85 to 90 percent
Contrasting inclusions: 10 to 15 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Glacial till
Runoff: Medium

Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: Moderate
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 8 inches—dark brown and dark yellowish brown silt loam
Subsoil:
8 to 18 inches—dark yellowish brown clay loam
Substratum:
18 to 60 inches—brown, calcareous loam

Inclusions

Contrasting inclusions:
• Isolated gravel spots
Similar inclusions:
• Soils that have a thicker subsoil and are deeper over calcareous glacial till
• Soils that have a thinner surface layer
• Soils that have a surface layer of clay loam or loam
• Soils that have a thinner subsoil and are shallower over calcareous glacial till

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

67—Harpster silty clay loam

Composition

Harpster and similar soils: 92 to 98 percent
Contrasting inclusions: 2 to 8 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Broad summits and depressions
Slope range: 0 to 2 percent
Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained
Permeability: Moderate
Parent material: Loess and glacial drift
Runoff: Slow to ponded
Available water capacity: Very high
Seasonal high water table: 0.5 foot above to 2.0 feet below the surface
Organic matter content: High
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 6 inches—black, calcareous silty clay loam
Subsurface layer:
6 to 11 inches—black, calcareous silty clay loam
11 to 17 inches—black and dark gray, calcareous silty clay loam

Subsoil:
17 to 24 inches—dark gray, calcareous silty clay loam
24 to 36 inches—dark gray and brownish yellow, mottled, calcareous silty clay loam
36 to 42 inches—gray, mottled, calcareous silty clay loam
42 to 46 inches—dark gray, mottled, calcareous silty clay loam

Substratum:
46 to 51 inches—dark gray, mottled, calcareous silty clay loam
51 to 60 inches—dark gray, calcareous clay loam

Inclusions

Contrasting inclusions:
• The poorly drained Sable soils, which formed in more than 60 inches of loess and are not calcareous; in landscape positions similar to those of the Harpster soil

Similar inclusions:
• Soils that have a thicker surface layer
• Soils that are not calcareous

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize compaction.
• Adding soil amendments helps to lower the pH level.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Generally unsuited because of the ponding

Septic tank absorption fields

Suitability: Generally unsuited because of the ponding

Interpretive Groups

Land capability classification: IIw

68—Sable silty clay loam

Composition

Sable and similar soils: 92 to 98 percent
Contrasting inclusions: 2 to 8 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Broad summits and depressions
Slope range: 0 to 2 percent
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
Organic matter content: High
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 7 inches—black silty clay loam

Subsurface layer:
7 to 16 inches—black silty clay loam

Subsoil:
16 to 20 inches—dark grayish brown, mottled silty clay loam
20 to 25 inches—grayish brown, mottled silty clay loam
25 to 35 inches—light brownish gray, mottled silty clay loam
35 to 45 inches—light olive gray, mottled silty clay loam

Substratum:
45 to 60 inches—light olive gray, mottled, calcareous silty clay loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Muscatine and Ipava soils and the moderately well drained Tama soils; on the slightly higher ridgetops and summits
• The poorly drained Denny soils, which contain less clay in the surface layer and more clay in the subsoil than the Sable soil; in shallow depressions

Similar inclusions:
• Soils that have a thicker surface layer
• Soils that have carbonates within a depth of 35 inches
• Soils that are underlain by glacial outwash or till within a depth of 60 inches

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize compaction.
• The surface layer is friable but becomes hard and cloddy if it is tilled when wet.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Generally unsuited because of the ponding

Septic tank absorption fields

Suitability: Generally unsuited because of the ponding

Interpretive Groups

Land capability classification: IIw

68+—Sable silt loam, overwash

Composition

Sable and similar soils: 90 to 98 percent
Contrasting inclusions: 2 to 10 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Depressions
Slope range: 0 to 2 percent
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
Organic matter content: Moderate
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 7 inches—very dark gray silt loam

Subsurface layer:
7 to 24 inches—black, mottled silty clay loam

Subsoil:
24 to 31 inches—dark grayish brown, mottled silty clay loam
31 to 46 inches—light brownish gray, mottled silty clay loam
46 to 55 inches—light olive gray, mottled silty clay loam

Substratum:
55 to 60 inches—light olive gray, mottled silty clay loam

Inclusions

Contrasting inclusions:
• The poorly drained Denny soils; in landscape positions similar to those of the Sable soil
• The somewhat poorly drained Ipava soils; in the higher landscape positions

Similar inclusions:
• Soils that have a thicker surface layer

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth and minimizes crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Generally unsuited because of the ponding

Septic tank absorption fields

Suitability: Generally unsuited because of the ponding

Interpretive Groups

Land capability classification: IIw

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

Composition

Elco and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate in the upper part; moderately slow in the next part; slow in the lower part
Parent material: Loess and glacial till
Runoff: Medium
Available water capacity: High
Seasonal high water table: Perched at a depth of 2.5 to 4.5 feet
Organic matter content: Moderately low
Erosion hazard: Severe
Shrink-swell potential: High
Potential for frost action: High

Typical Profile

Surface layer:
0 to 5 inches—dark brown silt loam

Subsoil:
5 to 9 inches—dark yellowish brown silty clay loam
9 to 19 inches—yellowish brown silty clay loam
19 to 38 inches—yellowish brown, mottled silty clay loam
38 to 49 inches—yellowish brown, mottled clay loam
49 to 55 inches—dark yellowish brown, mottled clay loam

Substratum:
55 to 60 inches—dark yellowish brown, mottled clay loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained, very slowly permeable soils that have a clayey subsoil within a depth of 20 inches
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways
• Isolated gravel spots

Similar inclusions:
• Soils that formed in less than 20 inches or more than 40 inches of loess and in glacial till
• Soils that have a darker surface layer
• Soils that are calcareous in the subsoil

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

119D2—Elco silt loam, 10 to 18 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate in the upper part; moderately slow in the next part; slow in the lower part
Parent material: Loess and glacial till
Runoff: Rapid
Available water capacity: High
Seasonal high water table: Perched at a depth of 2.5 to 4.5 feet
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—brown silt loam
Subsoil:
7 to 21 inches—dark yellowish brown silty clay loam
21 to 24 inches—yellowish brown silty clay loam
24 to 31 inches—yellowish brown clay loam
31 to 60 inches—yellowish brown, mottled clay loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained, very slowly permeable soils that have a clayey subsoil within a depth of 20 inches
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways
• Isolated gravel spots
Similar inclusions:
• Soils that formed in less than 20 inches or more than 40 inches of loess and in glacial till
• Soils that have a darker surface layer
• Soils that are calcareous in the subsoil

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
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.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
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 promotes the even distribution of effluent.
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

119D3—Elco silty clay loam, 10 to 18 percent slopes, severely eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate in the upper part; moderately slow in the next part; slow in the lower part
Parent material: Loess and glacial till
Runoff: Rapid
Available water capacity: High
Seasonal high water table: Perched at a depth of 2.5 to 4.5 feet
Organic matter content: Low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 5 inches—brown silty clay loam

Subsoil:
5 to 23 inches—yellowish brown silty clay loam
23 to 32 inches—brown silt loam
32 to 37 inches—yellowish brown silty clay loam
37 to 60 inches—yellowish brown, mottled clay loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained, very slowly permeable soils that have a clayey subsoil within a depth of 20 inches
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways
• Isolated gravel spots

Similar inclusions:
• Soils that formed in less than 20 inches or more than 40 inches of loess and in glacial till
• Soils that have a darker surface layer
• Soils that are calcareous in the subsoil

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants 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: Moderate
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.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
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 promotes the even distribution of effluent.
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IVe

119F2—Elco silt loam, 18 to 25 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate in the upper part; moderately slow in the next part; slow in the lower part
Parent material: Loess and glacial till
Runoff: Rapid
Available water capacity: High
Seasonal high water table: Perched at a depth of 2.5 to 4.5 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—brown silt loam

Subsoil:
5 to 24 inches—dark yellowish brown silty clay loam
24 to 34 inches—dark yellowish brown, mottled silty clay loam
34 to 51 inches—dark yellowish brown, mottled clay loam
51 to 60 inches—brown, mottled clay loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained, very slowly permeable soils that have a clayey subsoil within a depth of 20 inches
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways
• Isolated gravel spots

Similar inclusions:
• Soils that formed in less than 20 inches or more than 40 inches of loess and in glacial till
• Soils that have a darker surface layer
• Soils that are calcareous in the subsoil

Use and Management

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Using a no-till method of seeding or pasture renovation helps to establish forage species and reduces the hazard of erosion.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Woodland

Suitability: Moderate
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
• In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
• The use of machinery is limited to periods 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:
• This soil is suitable for wild herbaceous plants and hardwood trees.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the slope

Interpretive Groups

Land capability classification: VIe

131D—Alvin sandy loam, 8 to 15 percent slopes

Composition

Alvin and similar soils: 90 to 98 percent

Contrasting inclusions: 2 to 10 percent

Setting

Landscape: Uplands
Landform: Outwash plains
Landform position: Side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Windblown or water-deposited, loamy and sandy sediments
Runoff: Rapid
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Low
Erosion hazard: Severe
Shrink-swell potential: Low
Potential for frost action: Moderate

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown sandy loam
Subsoil:
5 to 14 inches—dark yellowish brown sandy clay loam
14 to 30 inches—dark yellowish brown fine sandy loam
30 to 60 inches—stratified yellowish brown sandy loam and dark yellowish brown loam

Inclusions

Contrasting inclusions:
• Hickory soils, which formed in glacial till; in landscape positions similar to those of the Alvin soil
• Fayette soils, which formed in loess; in landscape positions similar to those of the Alvin soil
Similar inclusions:
• Soils that formed in 20 to 40 inches of loess and outwash
• Soils that have more sand and gravel in the solum
• Soils that have a surface layer of fine sandy loam

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.
• Irrigation systems may be needed because of the limited available water.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Land shaping by cutting and filling helps to overcome the slope.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing the filter lines on the contour promotes the even distribution of effluent.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

131F—Alvin sandy loam, 15 to 30 percent slopes

Composition

Alvin and similar soils: 90 to 100 percent
Contrasting inclusions: 0 to 10 percent

Setting

Landscape: Uplands
Landform: Outwash plains
Landform position: Side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately rapid
Parent material: Windblown or water-deposited, loamy and sandy sediments
Runoff: Rapid
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Low

Erosion hazard: Severe
Shrink-swell potential: Low
Potential for frost action: Moderate

Typical Profile

Surface layer:
0 to 8 inches—mixed dark yellowish brown and very dark brown sandy loam

Subsoil:
8 to 38 inches—yellowish brown sandy loam
38 to 60 inches—stratified yellowish brown sandy loam and dark yellowish brown sand

Inclusions

Contrasting inclusions:
• Hickory soils, which formed in glacial till; in landscape positions similar to those of the Alvin soil
• Fayette soils, which formed in loess; in landscape positions similar to those of the Alvin soil

Similar inclusions:
• Soils that formed in 20 to 40 inches of loess and outwash
• Soils that have more sand and gravel in the solum
• Soils that have a surface layer of fine sandy loam

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.
• Using a no-till method of seeding or pasture renovation helps to establish forage species and reduces the hazard of erosion.

Woodland

Suitability: Moderate
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
• In openings where timber has been harvested, competition from undesirable species can be controlled by chemical or mechanical means.
• The use of machinery is limited to periods 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:
• This soil is suitable for wild herbaceous plants and hardwood trees.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the slope

Interpretive Groups

Land capability classification: VIe

134C2—Camden silt loam, 5 to 10 percent slopes, eroded

Composition

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

Setting

Landscape: Terraces
Landform: Stream terraces
Landform position: Side slopes and ridgetops
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess and outwash
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 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—brown and dark yellowish brown silt loam

Subsoil:
4 to 24 inches—dark yellowish brown silty clay loam
24 to 27 inches—dark yellowish brown clay loam
27 to 36 inches—dark yellowish brown sandy clay loam
36 to 51 inches—yellowish brown clay loam
51 to 60 inches—yellowish brown, stratified loam, sandy clay loam, and silt loam

Inclusions

Contrasting inclusions:
• Casco soils, which have more sand and gravel in the solum than the Camden soil
• Mona soils, which are underlain by lacustrine material

Similar inclusions:
• Soils that formed in less than 20 inches or more than 40 inches of loess and in outwash
• Soils that are severely eroded and have a surface layer of silty clay loam

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate for dwellings without basements; well suited for dwellings with basements
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

134D2—Camden silt loam, 10 to 18 percent slopes, eroded

Composition

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

Setting

Landscape: Terraces
Landform: Stream terraces
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess and outwash
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: 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—brown and dark yellowish brown silt loam

Subsoil:
5 to 20 inches—dark yellowish brown silty clay loam
20 to 26 inches—dark yellowish brown clay loam
26 to 55 inches—dark yellowish brown, stratified silty clay loam, clay loam, and silt loam
55 to 60 inches—dark yellowish brown loam

Inclusions

Contrasting inclusions:
• Casco soils, which have more sand and gravel in the solum than the Camden soil
• Mona soils, which are underlain by lacustrine material

Similar inclusions:
• Soils that formed in less than 20 inches or more than 40 inches of loess and in outwash
• Soils that are severely eroded and have a surface layer of silty clay loam

Use and Management

Cropland

Suitability: Moderate

Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
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.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing the filter lines on the contour promotes the even distribution of effluent.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

145B2—Saybrook silt loam, 2 to 5 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Parent material: Loess and glacial till
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderate
Erosion hazard: Moderate
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 9 inches—very dark brown and dark yellowish brown silt loam

Subsoil:
9 to 25 inches—dark yellowish brown silty clay loam
25 to 37 inches—brown clay loam

Substratum:
37 to 60 inches—brown, calcareous loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Flanagan soils; in the lower positions on the landscape

Similar inclusions:
• Soils that are underlain by loamy or sandy glacial outwash
• Soils that formed in less than 20 inches or more than 40 inches of calcareous glacial till

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

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

Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for dwellings.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

145C2—Saybrook silt loam, 5 to 10 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Parent material: Loess and glacial till
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown and brown silt loam

Subsoil:
7 to 15 inches—brown and dark yellowish brown silty clay loam
15 to 26 inches—dark yellowish brown silty clay loam
26 to 32 inches—dark yellowish brown clay loam

Substratum:
32 to 60 inches—brown, calcareous loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Flanagan soils; in the lower positions on the landscape

Similar inclusions:
• Soils that are underlain by loamy or sandy glacial outwash
• Soils that formed in less than 20 inches or more than 40 inches of calcareous glacial till
• Soils that are severely eroded

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for dwellings.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor

Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

148B—Proctor silt loam, 2 to 5 percent slopes

Composition

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

Setting

Landscape: Terraces
Landform: Outwash plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess and outwash
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 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 8 inches—very dark brown silt loam
Subsurface layer:
8 to 12 inches—very dark grayish brown silt loam
Subsoil:
12 to 29 inches—dark yellowish brown silty clay loam
29 to 35 inches—dark yellowish brown sandy clay loam
35 to 60 inches—dark yellowish brown, stratified sandy loam and loamy sand

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Elburn soils, which formed in more than 40 inches of loess and glacial outwash; in the slightly lower areas
• Dakota soils, which formed in less than 20 inches of loess and glacial outwash

Similar inclusions:
• Soils that formed in more than 40 inches of loess and glacial outwash
• Soils that are underlain by glacial till
• Soils that have a thinner surface layer

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate for dwellings without basements; well suited for dwellings with basements
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

148C2—Proctor silt loam, 5 to 10 percent slopes, eroded

Composition

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

Setting

Landscape: Terraces
Landform: Outwash plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess and outwash
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown and dark yellowish brown silt loam

Subsoil:
8 to 29 inches—dark yellowish brown silty clay loam
29 to 39 inches—dark yellowish brown clay loam
39 to 60 inches—dark yellowish brown sandy loam that has few thin strata of loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Elburn soils, which formed in more than 40 inches of loess and glacial outwash; in the slightly lower positions on the landscape
• Dakota soils, which have more sand in the solum than the Proctor soil

Similar inclusions:
• Soils that formed in more than 40 inches of loess and outwash
• Soils that have a thinner, lighter colored surface layer of silty clay loam
• Soils that are underlain by glacial till

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate for dwellings without basements; well suited for dwellings with basements
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

152—Drummer silty clay loam

Composition

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

Setting

Landscape: Uplands
Landform: Outwash plains
Landform position: Depressions and low areas
Slope range: 0 to 2 percent
Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained
Permeability: Moderate
Parent material: Loess and outwash

Runoff: Slow to ponded
Available water capacity: Very high
Seasonal high water table: 0.5 foot above to 2.0 feet below the surface
Organic matter content: High
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 10 inches—black silty clay loam
Subsurface layer:
10 to 14 inches—black silty clay loam
Subsoil:
14 to 28 inches—dark grayish brown, mottled silty clay loam
28 to 46 inches—grayish brown, mottled silty clay loam
46 to 53 inches—grayish brown, mottled silt loam
53 to 60 inches—grayish brown, mottled sandy loam that has strata of loam

Inclusions

Contrasting inclusions:
• Harpster soils, which are calcareous in the solum
Similar inclusions:
• Soils that formed in more than 60 inches of loess and outwash
• Soils that are underlain by glacial till
• Soils that have a seasonal high water table at a depth of more than 2 feet

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize compaction.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Generally unsuited because of flooding

Septic tank absorption fields

Suitability: Generally unsuited because of flooding

Interpretive Groups

Land capability classification: IIw

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

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Wide ridgetops and summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Parent material: Loess and glacial till
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 1.5 to 3.5 feet
Organic matter content: High
Erosion hazard: Slight
Shrink-swell potential: High
Potential for frost action: High

Typical Profile

Surface layer:
0 to 8 inches—black silt loam
Subsurface layer:
8 to 12 inches—very dark grayish brown silt loam
Subsoil:
12 to 36 inches—yellowish brown, mottled silty clay loam
36 to 44 inches—yellowish brown, mottled silt loam
44 to 47 inches—brown, mottled, calcareous clay loam
Substratum:
47 to 60 inches—brown, calcareous loam

Inclusions

Contrasting inclusions:
• The poorly drained Drummer soils; in the lower positions on the landscape
• Osceola soils, which have soft shale at a depth of 40 to 60 inches; in Valley Township

Similar inclusions:
• Soils that formed in less than 40 inches of loess and glacial till
• Soils that have a seasonal high water table at a depth of more than 3.5 feet
• Soils that have a surface layer of silty clay loam
• Soils that formed in loess and loamy and sandy sediments

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Poor
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

171B—Catlin silt loam, 2 to 5 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Glacial till plains and moraines (fig. 8)
Landform position: Narrow ridgetops
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess and glacial till
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 3.5 to 6.0 feet
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 silt loam
Subsurface layer:
6 to 12 inches—very dark grayish brown silt loam
Subsoil:
12 to 20 inches—brown and dark yellowish brown silt loam
20 to 42 inches—dark yellowish brown, mottled silty clay loam
42 to 45 inches—brown loam
Substratum:
45 to 60 inches—brown, calcareous loam

Inclusions

Contrasting inclusions:
• The poorly drained Sable soils, which formed in loess; in depressions and the lower positions on the landscape
Similar inclusions:
• Soils that formed in less than 40 inches of loess and glacial till
• Soils that have a thicker solum and formed in more than 60 inches of loess
• Soils that have a seasonal high water table within a depth of 4 feet

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves

Figure 8.—An area of Catlin silt loam, 2 to 5 percent slopes, on the Bloomington Moraine in the eastern part of the county.

crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

171B2—Catlin silt loam, 2 to 5 percent slopes, eroded

Composition

Catlin and similar soils: 90 to 95 percent

Contrasting inclusions: 5 to 10 percent

Setting

Landscape: Uplands
Landform: Glacial till plains and moraines
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess and glacial till
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 3.5 to 6.0 feet
Organic matter content: Moderate
Erosion hazard: Moderate
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 5 inches—very dark grayish brown and dark yellowish brown silt loam

Subsoil:
5 to 16 inches—dark yellowish brown silty clay loam
16 to 41 inches—dark yellowish brown, mottled silty clay loam
41 to 45 inches—brown clay loam

Substratum:
45 to 60 inches—brown, calcareous clay loam

Inclusions

Contrasting inclusions:
• The poorly drained Sable soils, which formed in loess; in drainageways and the lower positions on the landscape

Similar inclusions:
• Soils that formed in less than 40 inches of loess and glacial till
• Soils that have a thicker solum and are more than 60 inches deep over calcareous till
• Soils that have a seasonal high water table within a depth of 4 feet
• Soils that have a thinner, lighter colored surface layer of silty clay loam

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.
• The surface layer is friable but becomes hard and cloddy if it is tilled when wet.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

171C2—Catlin silt loam, 5 to 10 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Glacial till plains and moraines
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess and glacial till
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 3.5 to 6.0 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 5 inches—very dark grayish brown silt loam
Subsoil:
5 to 9 inches—brown silty clay loam
9 to 47 inches—dark yellowish brown, mottled silty clay loam
47 to 51 inches—brown, mottled clay loam
Substratum:
51 to 60 inches—brown, calcareous clay loam

Inclusions

Contrasting inclusions:
• The poorly drained Sable soils, which formed in loess; in drainageways and the lower positions on the landscape
Similar inclusions:
• Soils that formed in less than 40 inches of loess and glacial till
• Soils that have a thicker solum and are more than 60 inches deep over calcareous till
• Soils that have a seasonal high water table within a depth of 4 feet

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.
• The surface layer is friable but becomes hard and cloddy if it is tilled when wet.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

198A—Elburn silt loam, 0 to 2 percent slopes

Composition

Elburn and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landscape: Uplands
Landform: Outwash plains
Landform position: Wide ridgetops and summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderate
Parent material: Loess and glacial outwash
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 1 to 3 feet

Organic matter content: High
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 8 inches—very dark gray silt loam

Subsurface layer:
8 to 14 inches—very dark gray silt loam
14 to 18 inches—mixed very dark gray and brown silty clay loam

Subsoil:
18 to 32 inches—brown, mottled silty clay loam
32 to 51 inches—dark grayish brown, mottled silt loam
51 to 60 inches—yellowish brown, mottled loam that has strata of sandy loam

Inclusions

Contrasting inclusions:
• The well drained Plano soils; in the slightly higher or more sloping positions
• The well drained Proctor soils, which formed in less than 40 inches of loess and glacial outwash; in the slightly higher or more sloping positions

Similar inclusions:
• Soils that formed in more than 60 inches of loess and glacial outwash
• Soils that have a thinner surface layer
• Soils that are underlain by glacial till

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Poor
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

199A—Plano silt loam, 0 to 2 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Outwash plains
Landform position: Narrow ridgetops and summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess and outwash
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderate
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 9 inches—very dark brown silt loam

Subsurface layer:
9 to 14 inches—dark brown silt loam

Subsoil:
14 to 43 inches—dark yellowish brown silty clay loam
43 to 49 inches—dark yellowish brown silt loam
49 to 53 inches—dark yellowish brown clay loam
53 to 60 inches—brown sandy loam

Inclusions

Contrasting inclusions:
• The moderately well drained Catlin soils, which formed in loess and calcareous glacial till

Similar inclusions:
• Soils that formed in more than 60 inches or less than 40 inches of loess and outwash
• Soils that have a seasonal high water table within a depth of 6 feet
• Soils that have a thinner surface layer

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

199B—Plano silt loam, 2 to 5 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Outwash plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess and outwash
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 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 9 inches—very dark grayish brown silt loam

Subsurface layer:
9 to 13 inches—dark grayish brown silt loam

Subsoil:
13 to 39 inches—dark yellowish brown silty clay loam
39 to 43 inches—brown silty clay loam
43 to 46 inches—strong brown sandy clay loam
46 to 60 inches—dark yellowish brown sandy loam that has strata of loamy sand

Inclusions

Contrasting inclusions:
• The moderately well drained Catlin soils, which formed in loess and calcareous glacial till

Similar inclusions:
• Soils that formed in more than 60 inches or less than 40 inches of loess and glacial outwash
• Soils that have a seasonal high water table within a depth of 6 feet
• Soils that have a thinner surface layer

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

199B2—Plano silt loam, 2 to 5 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Outwash plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess and outwash
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderate
Erosion hazard: Moderate
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown and dark yellowish brown silt loam

Subsoil:
8 to 35 inches—dark yellowish brown silty clay loam
35 to 47 inches—yellowish brown silty clay loam
47 to 56 inches—yellowish brown and brown, stratified sandy loam, clay loam, and silt loam
56 to 60 inches—yellowish brown, stratified loam and sandy loam

Inclusions

Contrasting inclusions:
• The moderately well drained Catlin soils, which formed in loess and calcareous glacial till

Similar inclusions:
• Soils that formed in more than 60 inches or less than 40 inches of loess and glacial outwash
• Soils that have a seasonal high water table within a depth of 6 feet
• Soils that have a thinner surface layer

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited

Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

206—Thorp silt loam

Composition

Thorp and similar soils: 100 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Depressions
Slope range: 0 to 2 percent
Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained
Permeability: Slow in the upper part; moderately rapid in the lower part
Parent material: Loess and outwash
Runoff: Slow to ponded
Available water capacity: High
Seasonal high water table: 0.5 foot above to 2.0 feet below the surface
Organic matter content: High
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 11 inches—very dark brown silt loam

Subsurface layer:
11 to 15 inches—dark grayish brown, mottled silt loam

Subsoil:
15 to 45 inches—grayish brown, mottled silty clay loam
45 to 60 inches—grayish brown, mottled sandy loam

Inclusions

Similar inclusions:
• Soils that formed in more than 60 inches of loess and outwash
• Soils that have a seasonal high water table at a depth of more than 2 feet
• Soils that formed in loess and glacial till

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth and minimizes crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Generally unsuited because of the ponding

Septic tank absorption fields

Suitability: Generally unsuited because of the ponding

Interpretive Groups

Land capability classification: IIw

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

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Wide ridgetops and summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Parent material: Loess and till
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 1.5 to 3.5 feet
Organic matter content: Moderate

Erosion hazard: Slight
Shrink-swell potential: High
Potential for frost action: High

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown silt loam

Subsurface layer:
9 to 13 inches—brown silt loam

Subsoil:
13 to 52 inches—brown, mottled silty clay loam
52 to 60 inches—yellowish brown, mottled clay loam

Inclusions

Contrasting inclusions:
• The poorly drained Thorp soils; in depressions

Similar inclusions:
• Soils that have a thicker surface layer
• Soils that have a sandy layer between the loess and the underlying glacial till
• Soils that have a seasonal high water table within a depth of 1.5 feet
• Soils that have less clay in the subsoil
• Soils that formed in less than 40 inches of loess and glacial till

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth and minimizes crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Poor
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

243A—St. Charles silt loam, 0 to 2 percent slopes

Composition

St. Charles and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Setting

Landscape: Terraces
Landform: Terraces
Landform position: Narrow ridges and summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess and outwash
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 3 to 6 feet
Organic matter content: Moderately low
Erosion hazard: Slight
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 8 inches—brown silt loam

Subsoil:
8 to 11 inches—dark yellowish brown silty clay loam
11 to 21 inches—yellowish brown silty clay loam
21 to 50 inches—yellowish brown, mottled silty clay loam
50 to 60 inches—yellowish brown sandy loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained areas
Similar inclusions:
• Soils that formed in less than 40 inches or more than 60 inches of loess and outwash
• Soils that contain gravel within a depth of 60 inches

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

243B—St. Charles silt loam, 2 to 5 percent slopes

Composition

St. Charles and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Setting

Landscape: Terraces
Landform: Stream terraces
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess and outwash
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderately low
Erosion hazard: Moderate
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 6 inches—brown silt loam
Subsurface layer:
6 to 10 inches—brown silt loam
Subsoil:
10 to 53 inches—yellowish brown silty clay loam
53 to 60 inches—dark yellowish brown sandy loam that has strata of loam

Inclusions

Contrasting inclusions:
• Somewhat poorly drained areas
Similar inclusions:
• Soils that formed in less than 40 or more than 60 inches of loess and in outwash
• Soils that contain gravel within a depth of 60 inches

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate

Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

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

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Wide ridgetops and summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Parent material: Loess
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 1 to 3 feet
Organic matter content: Moderate
Erosion hazard: Slight
Shrink-swell potential: High
Potential for frost action: High

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown silt loam

Subsurface layer:
9 to 16 inches—dark grayish brown silt loam

Subsoil:
16 to 19 inches—dark grayish brown silt loam
19 to 26 inches—grayish brown and brown, mottled silty clay loam
26 to 31 inches—brown and grayish brown, mottled silty clay loam
31 to 37 inches—light brownish gray, mottled silty clay loam
37 to 48 inches—light brownish gray and strong brown silty clay loam
48 to 60 inches—light brownish gray and strong brown silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Denny soils; in shallow depressions

Similar inclusions:
• Soils that have a thicker or lighter colored surface layer
• Soils that formed in loess and in the underlying glacial till or outwash, which is within a depth of 60 inches

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth and minimizes crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.
• Maintaining a tile drainage system helps to lower the water table.

Dwellings

Suitability: Poor
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.

• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: I

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

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate in the upper part; moderately slow in the next part; slow in the lower part
Parent material: Loess and glacial till
Runoff: Medium
Available water capacity: High
Seasonal high water table: Perched at a depth of 2.5 to 4.5 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: High
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 6 inches—dark brown and brown silt loam

Subsoil:
6 to 14 inches—brown silty clay loam
14 to 29 inches—dark yellowish brown silty clay loam
29 to 36 inches—dark grayish brown, mottled silty clay loam
36 to 50 inches—dark grayish brown, mottled clay loam
50 to 60 inches—light olive brown, mottled clay loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways

Similar inclusions:
• Soils that are calcareous in the subsoil
• Soils that formed entirely in loess or loamy till
• Soils that formed in less than 20 inches of loess and glacial till

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate for dwellings without basements; poor for dwellings with basements
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.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

259D2—Assumption silt loam, 10 to 18 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate in the upper part; moderately slow in the next part; slow in the lower part
Parent material: Loess and glacial till
Runoff: Rapid
Available water capacity: High
Seasonal high water table: Perched at a depth of 2.5 to 4.5 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: High
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 8 inches—very dark brown and dark yellowish brown silt loam

Subsoil:
8 to 19 inches—dark yellowish brown silty clay loam
19 to 30 inches—yellowish brown silty clay loam
30 to 50 inches—dark grayish brown silty clay
50 to 60 inches—olive gray silty clay

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways

Similar inclusions:
• Soils that are calcareous in the subsoil
• Soils that formed in less than 20 inches of loess and glacial till
• Soils that formed entirely in either loess or loamy till

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate for dwellings without basements; poor for dwellings with basements
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.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
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 promotes the even distribution of effluent.
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

259D3—Assumption silty clay loam, 10 to 18 percent slopes, severely eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate in the upper part; moderately slow in the next part; slow in the lower part
Parent material: Loess and glacial till
Runoff: Rapid
Available water capacity: High
Seasonal high water table: Perched at a depth of 2.5 to 4.5 feet
Organic matter content: Moderately low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 5 inches—dark brown and yellowish brown silty clay loam

Subsoil:
5 to 10 inches—yellowish brown silty clay loam
10 to 15 inches—dark yellowish brown, mottled silty clay loam
15 to 20 inches—yellowish brown, mottled silt loam
20 to 25 inches—grayish brown, mottled silt loam
25 to 38 inches—brown, mottled silty clay loam
38 to 60 inches—brown, mottled clay loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in drainageways

Similar inclusions:
• Soils that are calcareous in the subsoil
• Soils that have less than 20 inches of loess
• Soils that formed entirely in either loess or loamy till

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Contour farming, stripcropping, and terraces combined with a conservation tillage system that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate for dwellings without basements; poor for dwellings with basements
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.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
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 promotes the even distribution of effluent.
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IVe

279B—Rozetta silt loam, 2 to 5 percent slopes

Composition

Rozetta and similar soils: 90 to 98 percent
Contrasting inclusions: 2 to 10 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
Organic matter content: Moderately low
Erosion hazard: Moderate
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 9 inches—brown silt loam
Subsoil:
9 to 28 inches—yellowish brown silty clay loam
28 to 49 inches—yellowish brown, mottled silty clay loam
49 to 60 inches—yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Clarksdale soils; in nearly level areas
• The poorly drained Denny soils; in depressions
Similar inclusions:
• Soils that have a darker surface layer
• Soils that have a seasonal high water table within a depth of 4 feet or below a depth of 6 feet
• Soils that are underlain by glacial till within a depth of 60 inches

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth and minimizes crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

279C2—Rozetta silt loam, 5 to 10 percent slopes, eroded

Composition

Rozetta and similar soils: 90 to 98 percent
Contrasting inclusions: 2 to 10 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 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 7 inches—mixed brown and yellowish brown silt loam

Subsoil:
7 to 23 inches—yellowish brown silty clay loam
23 to 60 inches—yellowish brown, mottled silty clay loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in drainageways

Similar inclusions:
• Soils that have a darker surface layer
• Soils that have a seasonal high water table within a depth of 4 feet or below a depth of 6 feet
• Soils that are underlain by glacial till within a depth of 60 inches

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth and minimizes crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

279C3—Rozetta silty clay loam, 5 to 10 percent slopes, severely eroded

Composition

Rozetta and similar soils: 90 to 98 percent
Contrasting inclusions: 2 to 10 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
Organic matter content: Very low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 6 inches—mixed dark yellowish brown and brown silty clay loam

Subsoil:
6 to 34 inches—dark yellowish brown, mottled silty clay loam
34 to 39 inches—dark yellowish brown, mottled silt loam

Substratum:
39 to 56 inches—yellowish brown, mottled silt loam
56 to 60 inches—light brownish gray, mottled silt loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways

Similar inclusions:
• Soils that have a darker surface layer
• Soils that have a seasonal high water table within a depth of 4 feet or below a depth of 6 feet
• Soils that are underlain by glacial till within a depth of 60 inches

Use and Management

Cropland

Suitability: Poorly suited
Management measures:
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Woodland

Suitability: Well suited
Management measures:
• The woodland should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IVe

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

Composition

Fayette and similar soils: 92 to 97 percent
Contrasting inclusions: 3 to 8 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: 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 6 inches—dark grayish brown and dark yellowish brown silt loam

Subsoil:
6 to 27 inches—dark yellowish brown silty clay loam
27 to 48 inches—yellowish brown silty clay loam
48 to 60 inches—yellowish brown silt loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Lawson and Radford soils, which formed in alluvium and are subject to flooding; in drainageways or on the larger flood plains
• The moderately well drained Elco soils, which formed in loess and glacial till

Similar inclusions:
• Soils that have a seasonal high water table within a depth of 6 feet
• Soils that have free lime within a depth of 40 inches

Figure 9.—An apple orchard in an area of Fayette silt loam, 10 to 18 percent slopes, eroded.

- Soils that have a subsoil that formed in glacial till
- Soils that contain outwash deposits

Use and Management

Cropland

Suitability: Moderate (fig. 9)
Management measures:
- Contour farming, stripcropping, and terraces combined with a system of conservation tillage that leaves crop residue on the surface after planting help to control erosion.
- A crop rotation dominated by forage crops helps to control erosion.
- Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

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

Management measures:
- Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
- Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
- Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
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.
- Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing the filter lines on the contour promotes the even distribution of effluent.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

319—Aurelius muck

Composition

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

Setting

Landscape: Uplands
Landform: Outwash plains
Landform position: Depressions
Slope range: 0 to 2 percent
Major use: Pasture

Soil Properties and Qualities

Drainage class: Very poorly drained
Permeability: Moderate
Parent material: Shallow organic deposits over marl that is underlain by loamy material
Runoff: Slow to ponded
Available water capacity: Moderate
Seasonal high water table: 1 foot above to 1 foot below the surface
Organic matter content: Very high
Shrink-swell potential: Low
Potential for frost action: High

Typical Profile

Surface layer:
0 to 8 inches—black sapric material

Substratum:
8 to 33 inches—light brownish gray marl
33 to 37 inches—black sapric material
37 to 60 inches—dark gray silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Harpster and Drummer soils, which formed in adjacent areas and do not have organic deposits in the solum

Similar inclusions:
• Soils that have more than 40 inches of organic deposits on the surface

Use and Management

Cropland

Suitability: Poorly suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, and returning crop residue to the soil help to maintain productivity and tilth.
• Applying soil amendments lowers the pH level.

Pasture and hay

Suitability: Moderate
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Interpretive Groups

Land capability classification: IIIw

323D3—Casco clay loam, 10 to 18 percent slopes, severely eroded

Composition

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

Setting

Landscape: Terraces
Landform: Stream terraces
Landform position: Side slopes
Major use: Pasture and hay

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; very rapid in the lower part
Parent material: Loamy material over calcareous sand and gravel (fig. 10)
Runoff: Rapid
Available water capacity: Low
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Low
Erosion hazard: Severe
Shrink-swell potential: Low
Potential for frost action: Low

Figure 10.—Casco clay loam, 10 to 18 percent slopes, severely eroded, is a good source of sand and gravel.

Typical Profile

Surface layer:
0 to 4 inches—brown clay loam

Subsoil:
4 to 8 inches—brown clay loam
8 to 16 inches—brown gravelly sandy clay loam

Substratum:
16 to 60 inches—brown, calcareous, stratified sand and gravel

Inclusions

Contrasting inclusions:
• Hennepin soils, which formed in calcareous glacial till

Similar inclusions:
• Soils that formed in as much as 40 inches of loess and outwash
• Soils that have a surface layer of sandy loam, loam, or sandy clay loam

Use and Management

Pasture and hay

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

Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Woodland

Suitability: Moderate

Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.

• 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:
• This soil is suitable for wild herbaceous plants and coniferous trees.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Moderate
Management measures:
• Land shaping by cutting and filling helps to overcome the slope.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing the filter lines on the contour promotes the even distribution of effluent.
• Replacing the soil with less permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: VIe

379C2—Dakota silt loam, 5 to 10 percent slopes, eroded

Composition

Dakota and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Setting

Landscape: Terraces
Landform: Stream terraces
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; rapid in the lower part
Parent material: Loamy outwash over sandy outwash
Runoff: Medium
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: Low
Potential for frost action: Moderate
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 6 inches—very dark grayish brown and dark yellowish brown silt loam
Subsoil:
6 to 15 inches—dark yellowish brown clay loam
15 to 20 inches—dark brown sandy clay loam
20 to 24 inches—dark brown sandy loam
24 to 32 inches—dark brown loamy sand
Substratum:
32 to 54 inches—dark brown sand
54 to 60 inches—dark yellowish brown gravelly sand

Inclusions

Contrasting inclusions:
• Soils that have more sand, more gravel, or both
Similar inclusions:
• Soils that have a lighter colored surface layer of clay loam
• Soils that have less sand in the surface layer and subsoil
• Soils that have a surface layer of sandy loam or loam

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be

avoided until the plants are sufficiently established.

Dwellings

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for dwellings.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Replacing the soil with less permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

386B—Downs silt loam, 2 to 5 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
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 brown silt loam

Subsoil:
8 to 14 inches—dark yellowish brown silt loam
14 to 24 inches—dark yellowish brown silty clay loam
24 to 34 inches—yellowish brown, mottled silty clay loam
34 to 45 inches—yellowish brown, mottled silt loam

Substratum:
45 to 60 inches—yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Denny soils, which have more clay in the subsoil than the Downs soil; in shallow depressions

Similar inclusions:
• Soils that have a thicker or lighter colored surface layer
• Soils that have a seasonal high water table within a depth of 4 feet
• Soils that have more clay in the subsoil

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

386C2—Downs silt loam, 5 to 10 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Narrow ridgetops and side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown and brown silt loam

Subsoil:
7 to 13 inches—brown silty clay loam
13 to 24 inches—dark yellowish brown silty clay loam
24 to 36 inches—yellowish brown, mottled silty clay loam
36 to 49 inches—yellowish brown, mottled silt loam

Substratum:
49 to 60 inches—yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in drainageways

Similar inclusions:
• Soils that have a thinner or lighter colored surface layer
• Soils that have a thicker surface layer
• Soils that have underlying calcareous material at a depth of 20 to 40 inches

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

448C2—Mona silt loam, 5 to 10 percent slopes, eroded

Composition

Mona and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderately slow in the upper part; slow in the lower part
Parent material: Thin loess and outwash and lacustrine sediments
Runoff: Medium
Available water capacity: Moderate
Depth to the seasonal high water table: 2.5 to 4.0 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: Moderate
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 8 inches—very dark grayish brown and yellowish brown silt loam

Subsoil:
8 to 13 inches—dark yellowish brown silty clay loam
13 to 24 inches—dark yellowish brown clay loam
24 to 30 inches—dark yellowish brown, mottled sandy clay loam
30 to 37 inches—brown silty clay

Substratum:
37 to 60 inches—brown, calcareous silty clay

Inclusions

Contrasting inclusions:
• The well drained Dakota soils, which are underlain by sandy outwash
• The well drained Marseilles soils, which are underlain by shale bedrock

Similar inclusions:
• Soils that have a lighter colored surface layer of silty clay loam

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Installing tile drains around the absorption field helps to lower the water table.
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

448D3—Mona clay loam, 10 to 18 percent slopes, severely eroded

Composition

Mona and similar soils: 80 to 90 percent
Contrasting inclusions: 10 to 20 percent

Setting

Landscape: Uplands
Landform: Till plains

Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderately slow in the upper part; slow in the lower part
Parent material: Loess, outwash, and lacustrine sediments
Runoff: Rapid
Available water capacity: Moderate
Seasonal high water table: Perched at a depth of 2.5 to 4.0 feet
Organic matter content: Moderate
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: Moderate
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 8 inches—dark brown and dark yellowish brown clay loam

Subsoil:
8 to 13 inches—dark yellowish brown clay loam
13 to 22 inches—yellowish brown, mottled silty clay loam
22 to 31 inches—brown, calcareous silty clay loam

Substratum:
31 to 60 inches—brown, calcareous silty clay

Inclusions

Contrasting inclusions:
• The well drained Dakota soils, which are underlain by sandy outwash
• The well drained Marseilles soils, which are underlain by shale bedrock

Similar inclusions:
• Soils that have darker surface layer of silt loam

Use and Management

Cropland

Suitability: Poor
Management measures:
• Contour farming, stripcropping, and terraces combined with a system of conservation tillage that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Woodland

Suitability: Moderate
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
• 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: Moderate
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.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Moderate
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 promotes the even distribution of effluent.
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: VIe

549C2—Marseilles silt loam, 5 to 10 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Truncated till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; slow in the lower part
Parent material: Loess and shale
Runoff: Medium
Available water capacity: Moderate
Depth to the seasonal high water table: 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—mixed dark brown and dark yellowish brown silt loam

Subsoil:
5 to 16 inches—dark yellowish brown silty clay loam
16 to 21 inches—yellowish brown silty clay loam
21 to 26 inches—light olive brown silty clay loam

Substratum:
26 to 60 inches—light olive brown shale

Inclusions

Contrasting inclusions:
• The moderately well drained Mona soils, which formed in outwash and lacustrine materials

Similar inclusions:
• Soils that have a lighter colored surface layer of silty clay loam
• Soils that formed in more than 30 inches of loess and shale
• Soils that have a darker surface layer
• Soils that have more clay in the solum

Use and Management

Cropland

Suitability: Poor
Management measures:
• Contour farming and stripcropping combined with a system of conservation tillage that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• The shale at a depth of 20 to 40 inches is rippable and can be removed with a backhoe.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Generally unsuited because of shale bedrock at a depth of 20 to 40 inches

Interpretive Groups

Land capability classification: IIIe

549D2—Marseilles silt loam, 10 to 18 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Truncated till plains
Landform position: Side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; slow in the lower part
Parent material: Loess and shale
Runoff: Rapid

Available water capacity: Moderate
Depth to the seasonal high water table: 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 grayish brown silt loam
Subsoil:
4 to 30 inches—dark yellowish brown silty clay loam
30 to 38 inches—light brownish gray and brownish yellow silty clay loam
Substratum:
38 to 60 inches—mixed yellowish brown, light brownish gray, and gray shale

Inclusions

Contrasting inclusions:
• Somewhat poorly drained soils that formed in glacial till; on the upper side slopes
• The moderately well drained Elco soils, which formed in loess and glacial till; on the upper side slopes
• The well drained Hickory soils, which formed in glacial till; on the upper side slopes or in positions on the landscape similar to those of the Marseilles soil
Similar inclusions:
• Soils that contain more clay in the solum
• Soils that have calcareous shale at a depth of 40 to 60 inches
• Soils that are underlain by sand, sandstone, or limestone instead of shale

Use and Management

Cropland

Suitability: Poorly suited
Management measures:
• Contour farming and stripcropping combined with a system of conservation tillage that leaves crop residue on the surface after planting help to control erosion.
• A crop rotation dominated by forage crops helps to control erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Woodland

Suitability: Well suited
Management measures:
• The woodland should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Moderate
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.
• The shale at a depth of 20 to 40 inches is rippable and can be removed with a backhoe.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Generally unsuited because of shale bedrock at a depth of 20 to 40 inches

Interpretive Groups

Land capability classification: IVe

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

Composition

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

Setting

Landscape: Uplands
Landform: Truncated till plains
Landform position: Side slopes
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; slow in the lower part
Parent material: Loess and shale
Runoff: Rapid
Available water capacity: Moderate
Depth to the seasonal high water table: 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 3 inches—dark grayish brown silt loam

Subsurface layer:
3 to 7 inches—dark grayish brown silt loam

Subsoil:
7 to 20 inches—light olive brown silty clay loam
20 to 28 inches—mixed light olive brown and grayish brown silty clay loam
28 to 34 inches—grayish brown clay loam

Substratum:
34 to 60 inches—light olive brown shale

Inclusions

Contrasting inclusions:
• Somewhat poorly drained soils that formed in glacial till; on the upper side slopes
• The moderately well drained Elco soils, which formed in loess and glacial till; on the upper side slopes
• The well drained Hickory soils, which formed in glacial till; on the upper side slopes or in positions on the landscape similar to those of the Marseilles soil
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; on flood plains

Similar inclusions:
• Soils that contain more clay
• Soils that have calcareous shale
• Soils that are underlain by sand, sandstone, or limestone instead of shale
• Soils that have a lighter colored surface layer of silty clay loam

Use and Management

Woodland

Suitability: Moderate
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
• The use of machinery is limited to periods 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.
• The woodland should be protected from fire and from grazing by livestock.

Wildlife habitat

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

Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of shale bedrock at a depth of 20 to 40 inches

Interpretive Groups

Land capability classification: VIIe

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

Composition

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

Setting

Landscape: Uplands
Landform: Truncated till plains
Landform position: Side slopes
Major use: Woodland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate in the upper part; slow in the lower part
Parent material: Loess and shale
Runoff: Rapid
Available water capacity: Moderate
Depth to the seasonal high water table: 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 6 inches—dark brown silt loam

Subsurface:
6 to 10 inches—dark yellowish brown silt loam

Subsoil:
10 to 23 inches—yellowish brown, mottled silty clay loam

Substratum:
23 to 60 inches—light yellowish brown, mottled shale

Inclusions

Contrasting inclusions:
• Somewhat poorly drained soils that formed in glacial till; on the upper side slopes

• The moderately well drained Elco soils, which formed in loess and glacial till; on the upper side slopes
• Hickory soils, which formed in glacial till; on the upper side slopes or in positions on the landscape similar to those of the Marseilles soil
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; on flood plains

Similar inclusions:
• Soils that contain more clay
• Soils that have calcareous shale
• Soils that are underlain by sand, sandstone, or limestone instead of shale
• Soils that have a lighter colored surface layer of silty clay loam

Use and Management

Woodland

Suitability: Poor
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
• 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.
• The use of machinery is limited to periods when the soil is firm enough to support the equipment.

Wildlife habitat

Suitability:
• This soil is suitable for wild herbaceous plants and hardwood trees.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the slope and the depth to shale bedrock

Interpretive Groups

Land capability classification: VIIe

567C2—Elkhart silt loam, 5 to 10 percent slopes, eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderately low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 9 inches—mixed very dark grayish brown and brown silt loam

Subsoil:
9 to 27 inches—brown silty clay loam

Substratum:
27 to 42 inches—yellowish brown, mottled, calcareous silt loam
42 to 60 inches—pale brown and strong brown, mottled, calcareous silt loam

Inclusions

Contrasting inclusions:
• Assumption soils, which are moderately slowly permeable in the lower part of the subsoil and have a seasonal high water table at a depth of 2.5 to 4.5 feet; on the lower side slopes
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways

Similar inclusions:
• Soils that have a thicker subsoil and that do not have a high lime content within a depth of 40 inches
• Soils that have a lighter colored surface layer of silty clay loam

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves

Figure 11.—Hay in an area of Elkhart silt loam, 5 to 10 percent slopes, eroded.

crop residue on the surface after planting helps to control erosion.

• Contour farming, stripcropping, or terraces reduce the hazard of erosion.

• Using a rotation that includes 1 or more years of forage crops, such as hay, helps to control erosion (fig. 11).

• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

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

Management measures:

• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.

• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.

• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIIe

567C3—Elkhart silty clay loam, 5 to 10 percent slopes, severely eroded

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderate
Parent material: Loess
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 4 to 6 feet
Organic matter content: Low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: High
Taxadjunct feature: The surface layer is less than 10 inches thick.

Typical Profile

Surface layer:
0 to 7 inches—mixed brown and dark brown silty clay loam

Subsoil:
7 to 18 inches—yellowish brown, mottled silty clay loam
18 to 24 inches—yellowish brown, mottled silt loam

Substratum:
24 to 60 inches—light yellowish brown, mottled silt loam

Inclusions

Contrasting inclusions:
• Assumption soils, which are moderately slowly permeable in the lower part of the subsoil and have a seasonal high water table at a depth of 2.5 to 4.5 feet; on the lower side slopes
• The somewhat poorly drained Radford soils, which formed in alluvium and are subject to flooding; in narrow drainageways

Similar inclusions:
• Soils that have a surface layer of silt loam and have a high content of lime throughout the profile

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, returning crop residue to the soil, and adding green manure crops or animal manure reduce the hazard of erosion, maintain productivity, improve tilth, and minimize crusting.
• Using a rotation that includes 1 or more years of forage crops helps to control erosion.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants are sufficiently established.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Well suited
Management measures:
• Few limitations affect the use of this soil as a site for septic tank absorption fields.

• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IVe

709A—Osceola silt loam, 0 to 2 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Truncated till plains
Landform position: Wide ridgetops and summits
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Parent material: Loess, outwash, and shale
Runoff: Slow
Available water capacity: High
Depth to the seasonal high water table: 1 to 3 feet
Organic matter content: Moderate
Erosion hazard: Slight
Shrink-swell potential: High
Potential for frost action: High

Typical Profile

Surface layer:
0 to 9 inches—very dark grayish brown silt loam
Subsurface layer:
9 to 15 inches—grayish brown, mottled silt loam
Subsoil:
15 to 22 inches—dark grayish brown, mottled silty clay
22 to 33 inches—light brownish gray, mottled silty clay loam
33 to 41 inches—mixed light brownish gray and strong brown silty clay loam
41 to 47 inches—mixed grayish brown and brown sandy clay loam
47 to 52 inches—gray, mottled silty clay
Substratum:
52 to 60 inches—gray, mottled shale

Inclusions

Contrasting inclusions:
• Soils that have a seasonal high water table within a depth of 1 foot
Similar inclusions:
• Soils that formed in loess and glacial outwash
• Soils that have a thicker surface layer

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining a tile drainage system helps to lower the water table.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, or adding green manure crops or animal manure helps to maintain productivity and tilth and minimizes crusting.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, alsike clover, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.
• Maintaining a tile drainage system helps to lower the water table.

Dwellings

Suitability: Poor
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIw

753B—Massbach silt loam, 2 to 5 percent slopes

Composition

Massbach and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Setting

Landscape: Uplands
Landform: Truncated till plains
Landform position: Ridgetops and side slopes
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate in the upper part; slow in the lower part
Parent material: Loess, outwash, and shale residuum
Runoff: Medium
Available water capacity: High
Depth to the seasonal high water table: 3 to 5 feet
Organic matter content: Moderate
Erosion hazard: Moderate
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 7 inches—very dark grayish brown silt loam

Subsoil:
7 to 11 inches—brown silt loam
11 to 17 inches—dark yellowish brown silty clay loam
17 to 33 inches—brown, mottled silty clay loam
33 to 47 inches—yellowish brown, mottled silty clay loam
47 to 55 inches—yellowish brown, mottled sandy clay loam
55 to 60 inches—olive gray silty clay shale

Inclusions

Contrasting inclusions:
• Deposits of glacial outwash or till that extend below the loess to a depth of more than 60 inches

Similar inclusions:
• Soils that have a thicker surface layer
• Soils that have a seasonal high water table within a depth of 4 feet

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Installing tile drains near the foundations helps to lower the water table on sites for dwellings with basements.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Installing tile drains around the absorption field helps to lower the water table.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

820G—Hennepin-Casco complex, 30 to 60 percent slopes

Composition

Hennepin and similar soils: 40 to 50 percent
Casco and similar soils: 40 to 45 percent
Contrasting inclusions: 10 to 15 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Major use: Woodland

Soil Properties and Qualities

Hennepin

Drainage class: Well drained
Permeability: Moderately slow
Parent material: Glacial till
Runoff: Rapid
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet

Organic matter content: Moderately low
Erosion hazard: Severe
Shrink-swell potential: Low
Potential for frost action: Moderate

Casco

Drainage class: Well drained
Permeability: Moderate in the upper part; very rapid in the lower part
Parent material: Loamy material over calcareous sand and gravel
Runoff: Rapid
Available water capacity: Moderate
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Moderately low
Erosion hazard: Severe
Shrink-swell potential: Low
Potential for frost action: Low

Typical Profile

Hennepin

Surface layer:
0 to 4 inches—brown, calcareous loam
Subsoil:
4 to 19 inches—brown, calcareous loam
Substratum:
19 to 60 inches—brown, calcareous loam

Casco

Surface layer:
0 to 5 inches—brown silt loam
Subsurface layer:
5 to 8 inches—brown silt loam
Subsoil:
8 to 23 inches—dark yellowish brown loam
Substratum:
23 to 60 inches—yellowish brown, calcareous, stratified sand and gravel

Inclusions

Contrasting inclusions:
- Marseilles soils, which formed in loess and shale
- Small seep areas on side slopes
- Small gravel areas

Similar inclusions:
- Soils that have noncalcareous glacial till in the surface layer and the upper part of the subsoil
- Soils that have a surface layer of sandy loam or clay loam

Use and Management

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
- Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.
- Seeding, fertilizing, and spraying by airplane or by hand reduce the hazard of erosion.

Woodland

Suitability: Poor
Management measures:
- Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
- 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.
- The use of machinery is limited to periods when the soil is firm enough to support the equipment.

Wildlife habitat

Suitability:
- This soil is suitable for wild herbaceous plants and hardwood trees.

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

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the slope

Interpretive Groups

Land capability classification: VIe

871B—Lenzburg silt loam, 1 to 7 percent slopes, stony

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Crests and slopes of cast overburden
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately slow
Parent material: Cast overburden from surface mining
Runoff: Medium
Available water capacity: High

Depth to the seasonal high water table: 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 4 inches—dark grayish brown, calcareous silt loam

Subsurface layer:
4 to 8 inches—mixed yellowish brown, dark brown, dark yellowish brown, and gray, calcareous channery silt loam

Substratum:
8 to 22 inches—mixed dark brown, yellowish brown, and gray, calcareous channery silt loam
22 to 39 inches—mixed dark yellowish brown, grayish brown, and yellowish brown, calcareous channery silt loam
39 to 60 inches—mixed yellowish brown and light brownish gray, calcareous channery silt loam

Inclusions

Contrasting inclusions:
• Ponds

Similar inclusions:
• Field and construction roads
• Strongly sloping areas

Use and Management

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

871D—Lenzburg silty clay loam, 7 to 20 percent slopes, stony

Composition

Lenzburg and similar soils: 100 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Side slopes in surface mined areas
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately slow
Parent material: Cast overburden from surface mining
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: Moderate

Typical Profile

Surface layer:
0 to 4 inches—mixed dark grayish brown and yellowish brown, calcareous silty clay loam

Subsurface layer:
4 to 11 inches—mixed yellowish brown and light brownish gray, calcareous channery silt loam

Substratum:
11 to 19 inches—mixed yellowish brown and light brownish gray, calcareous channery silt loam
19 to 32 inches—mixed brown and dark brown, calcareous very channery silt loam
32 to 60 inches—mixed yellowish brown, strong brown, light brownish gray, and dark brown, calcareous channery silt loam

Inclusions

Similar inclusions:
• Field and construction roads
• Strongly sloping areas
• Ponded areas

Use and Management

Pasture and hay

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

Management measures:
• Deferred grazing helps to prevent overgrazing and thus minimizes surface compaction, excessive runoff, and the hazard of erosion.
• Tilling on the contour when a seedbed is prepared or the pasture is renovated helps to control erosion.
• Except for weed control, grazing or clipping should be avoided until the plants 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: Moderate
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.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: VIe

871G—Lenzburg silty clay loam, 20 to 70 percent slopes, stony

Composition

Lenzburg and similar soils: 100 percent

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Very steep side slopes of cast overburden
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Moderately slow
Parent material: Cast overburden from surface mining
Runoff: Rapid
Available water capacity: High
Depth to the seasonal high water table: More than 6 feet
Organic matter content: Low
Erosion hazard: Severe
Shrink-swell potential: Moderate
Potential for frost action: Moderate

Typical Profile

Surface layer:
0 to 5 inches—dark grayish brown, calcareous silty clay loam

Subsurface layer:
5 to 10 inches—mixed yellowish brown and dark brown, calcareous channery silt loam

Substratum:
10 to 37 inches—mixed yellowish brown and light brownish gray, calcareous channery silt loam
37 to 60 inches—mixed yellowish brown and light brownish gray, calcareous channery silt loam

Inclusions

Similar inclusions:
• Field and construction roads
• Strongly sloping areas
• Ponded areas

Use and Management

Woodland

Suitability: Poor
Management measures:
• Establishing logging roads and skid trails on the contour and seeding bare areas to grass or a grass-legume mixture reduce the hazard of erosion.
• 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.
• The use of machinery is limited to periods when the soil is firm enough to support the equipment.

Wildlife habitat

Suitability:
• This soil is suitable for wild herbaceous plants, hardwood trees, and coniferous plants.
Management measures:
• The habitat should be protected from fire and from grazing by livestock.

Dwellings

Suitability: Generally unsuited because of the slope

Septic tank absorption fields

Suitability: Generally unsuited because of the slope

Interpretive Groups

Land capability classification: VIIe

872B—Rapatee silt loam, 1 to 7 percent slopes

Composition

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

Setting

Landscape: Uplands
Landform: Till plains
Landform position: Ridges and side slopes on reclaimed mine land
Major use: Pasture

Soil Properties and Qualities

Drainage class: Well drained
Permeability: Slow
Parent material: Reclaimed surface-mine overburden (loess topsoil on cast shale)
Runoff: Medium
Available water capacity: Moderate
Depth to the seasonal high water table: 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 6 inches—mixed very dark grayish brown and very dark gray silt loam

Substratum:
6 to 11 inches—mixed very dark gray, very dark grayish brown, dark brown, and very dark brown silty clay loam
11 to 24 inches—dark yellowish brown, brown, and dark gray silty clay loam
24 to 60 inches—dark brown, yellowish brown, and dark gray silty clay loam

Inclusions

Contrasting inclusions:
• Undisturbed areas of the somewhat poorly drained Ipava and moderately well drained Tama soils

Similar inclusions:
• Mined soils that have not been reclaimed

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting helps to control erosion.
• Contour farming, stripcropping, or terraces reduce the hazard of erosion.
• Returning crop residue to the soil and adding green manure crops or animal manure help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alfalfa
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Dwellings

Suitability: Moderate
Management measures:
• Extending the footings below the subsoil or reinforcing the foundations helps to prevent the structural damage caused by shrinking and swelling.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Septic tank absorption fields

Suitability: Poor
Management measures:
• Increasing the size of the filter field or replacing the soil with more permeable material helps to overcome the restricted permeability.
• Onsite investigation is needed, and designs should meet local and State guidelines.

Interpretive Groups

Land capability classification: IIe

3107—Sawmill silty clay loam, frequently flooded

Composition

Sawmill and similar soils: 92 to 98 percent
Contrasting inclusions: 2 to 8 percent

Setting

Landscape: Flood plains
Landform: The lower positions on flood plains
Landform position: Bottom land
Slope range: 0 to 2 percent
Flooding: Frequent, for brief periods
Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained
Permeability: Moderate
Parent material: Alluvium
Runoff: Slow
Available water capacity: Very high
Seasonal high water table: At the surface to 2 feet below the surface
Organic matter content: High
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 8 inches—black silty clay loam

Subsurface layer:
8 to 16 inches—black silty clay loam
16 to 33 inches—very dark gray, mottled silty clay loam

Subsoil:
33 to 40 inches—dark grayish brown, mottled silty clay loam
40 to 60 inches—grayish brown, mottled silty clay loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Lawson and Radford soils, which contain less clay in all or part of the solum than the Sawmill soil
• Soils that are calcareous in all or part of the solum

Similar inclusions:
• Soils that have less clay in the surface layer and subsoil
• Soils that have a thicker surface layer

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Maintaining existing drainage systems reduces wetness.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, returning crop residue to the soil, and adding green manure crops or animal manure help to maintain productivity, improve tilth, and minimize compaction.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.
• Maintaining the drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.

Wildlife habitat

Management measures:
• Wetland plants and shallow water areas, which enhance wetland wildlife habitat, can be easily established in 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 because of frequent flooding

Septic tank absorption fields

Suitability: Generally unsuited because of frequent flooding

Interpretive Groups

Land capability classification: IIIw

3107+—Sawmill silt loam, overwash, frequently flooded

Composition

Sawmill and similar soils: 92 to 98 percent
Contrasting inclusions: 2 to 8 percent

Setting

Landscape: Flood plains
Landform: The lower positions on flood plains
Landform position: Bottom land
Slope range: 0 to 2 percent
Flooding: Frequent, for brief periods
Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained
Permeability: Moderate
Parent material: Alluvium
Runoff: Slow
Available water capacity: Very high
Seasonal high water table: At the surface to 2 feet below the surface
Organic matter content: High
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 6 inches—very dark grayish brown silt loam

Subsurface layer:
6 to 13 inches—very dark grayish brown silt loam
13 to 39 inches—black silty clay loam

Subsoil:
39 to 52 inches—olive gray, mottled silty clay loam

Substratum:
52 to 60 inches—olive gray, mottled silty clay loam

Inclusions

Contrasting inclusions:
• The somewhat poorly drained Lawson and Radford soils, which contain less clay in all or part of the solum than the Sawmill soil
• Soils that are calcareous in all or part of the solum

Similar inclusions:
• Soils that have more clay in the surface layer
• Soils that have a thicker surface layer

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Maintaining existing drainage systems reduces wetness.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, and returning crop residue to the soil help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining the drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Wildlife habitat

Management measures:
• Wetland plants and shallow water areas, which enhance wetland wildlife habitat, can be easily established in 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 because of flooding

Septic tank absorption fields

Suitability: Generally unsuited because of flooding

Interpretive Groups

Land capability classification: IIIw

3451—Lawson silt loam, frequently flooded

Composition

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

Setting

Landscape: Flood plains
Landform: The higher positions on flood plains
Landform position: Bottom land
Slope range: 0 to 2 percent
Flooding: Frequent, for brief periods
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderate
Parent material: Alluvium
Runoff: Slow
Available water capacity: Very high
Depth to the seasonal high water table: 1 to 3 feet
Organic matter content: High
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 13 inches—black silt loam

Subsurface layer:
13 to 26 inches—black silt loam
26 to 32 inches—mixed very dark grayish brown and dark yellowish brown silt loam

Substratum:
32 to 48 inches—mixed dark grayish brown and yellowish brown silty clay loam
48 to 60 inches—mixed dark grayish brown and yellowish brown, stratified sandy loam and silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Sawmill soils, which have a higher

content of clay in the upper part of the profile than the Lawson soil
• The moderately well drained Huntsville soils; in the slightly higher positions on the landscape

Similar inclusions:
• Soils that have a buried surface layer
• Soils that have a thinner surface layer
• Soils that have a sandy surface layer, solum, or substratum
• Soils that have a surface layer of silty clay loam

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining existing drainage systems reduces wetness.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, and returning crop residue to the soil help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining the drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Wildlife habitat

Management measures:
• Wetland plants and shallow water areas, which enhance wetland wildlife habitat, can be easily established in 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 because of frequent flooding

Septic tank absorption fields

Suitability: Generally unsuited because of frequent flooding

Interpretive Groups

Land capability classification: IIIw

8074—Radford silt loam, occasionally flooded

Composition

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

Setting

Landscape: Flood plains
Landform: The higher positions on flood plains
Landform position: Bottom land
Slope range: 0 to 2 percent
Flooding: Occasional, for brief periods
Major use: Cropland

Soil Properties and Qualities

Drainage class: Somewhat poorly drained
Permeability: Moderate
Parent material: Silty alluvium
Runoff: Slow
Available water capacity: Very high
Depth to the seasonal high water table: 1 to 3 feet
Organic matter content: Moderate
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 5 inches—very dark gray silt loam

Subsurface layer:
5 to 11 inches—black silt loam

Substratum:
11 to 30 inches—very dark gray silt loam that has dark grayish brown strata

Buried soil:
30 to 45 inches—black silty clay loam
45 to 60 inches—very dark gray silty clay loam

Inclusions

Contrasting inclusions:
• The poorly drained Sawmill soils, which contain more clay in the surface layer than the Radford soil
• Areas of soils that are calcareous

Similar inclusions:
• Soils that have a buried soil at a depth of more than 40 inches

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Maintaining existing drainage systems reduces wetness.

• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, and returning crop residue to the soil help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.
• Maintaining the drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.

Wildlife habitat

Management measures:
• Wetland plants and shallow water areas, which enhance wetland wildlife habitat, can be easily established in 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 because of flooding

Septic tank absorption fields

Suitability: Generally unsuited because of flooding

Interpretive Groups

Land capability classification: IIw

8076—Otter silt loam, occasionally flooded

Composition

Otter and similar soils: 95 to 100 percent
Contrasting inclusions: 0 to 5 percent

Setting

Landscape: Flood plains
Landform: The lower positions on flood plains
Landform position: Bottom land
Slope range: 0 to 2 percent
Flooding: Occasional, for brief periods
Major use: Cropland

Soil Properties and Qualities

Drainage class: Poorly drained
Permeability: Moderate
Parent material: Alluvium
Runoff: Slow
Available water capacity: Very high
Seasonal high water table: 0.5 foot above to 2.0 feet below the surface
Organic matter content: High
Shrink-swell potential: Low
Potential for frost action: High

Typical Profile

Surface layer:
0 to 9 inches—very dark brown silt loam

Subsurface layer:
9 to 21 inches—very dark brown silt loam
21 to 29 inches—very dark brown silt loam that has thin strata of grayish brown
29 to 36 inches—black, mottled silt loam
36 to 46 inches—black silt loam

Substratum:
46 to 60 inches—dark grayish brown, mottled loam

Inclusions

Contrasting inclusions:
• Areas of soils that are calcareous

Similar inclusions:
• Soils that have mollic colors to a depth of more than 60 inches
• Soils that have silt loam overwash material on the surface
• Soils that have a seasonal high water table at a depth of more than 2 feet
• Soils that have a surface layer of silty clay loam or loam

Use and Management

Cropland

Suitability: Moderate
Management measures:
• Maintaining existing drainage systems reduces wetness.
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, and returning crop residue to the soil improve tilth and minimize compaction.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Maintaining the drainage system helps to lower the water table.
• Deferring grazing when the soil is too wet minimizes surface compaction and the deterioration of tilth.
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Wildlife habitat

Management measures:
• Wetland plants and shallow water areas, which enhance wetland wildlife habitat, can be easily established in 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 because of flooding

Septic tank absorption fields

Suitability: Generally unsuited because of flooding

Interpretive Groups

Land capability classification: IIw

8077—Huntsville silt loam, occasionally flooded

Composition

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

Setting

Landscape: Flood plains
Landform: The higher positions on flood plains
Landform position: Bottom land
Slope range: 0 to 2 percent
Flooding: Occasional, for brief periods
Major use: Cropland

Soil Properties and Qualities

Drainage class: Moderately well drained
Permeability: Moderate
Parent material: Alluvium
Runoff: Slow
Available water capacity: Very high
Depth to the seasonal high water table: 4 to 6 feet
Organic matter content: Moderate
Shrink-swell potential: Moderate
Potential for frost action: High

Typical Profile

Surface layer:
0 to 10 inches—black silt loam

Subsurface layer:
10 to 39 inches—black silt loam
39 to 54 inches—very dark grayish brown, mottled silt loam

Substratum:
54 to 60 inches—brown and dark brown silt loam

Inclusions

Contrasting inclusions:
• The poorly drained Sawmill soils, which are frequently flooded; on the lower parts of the flood plain
• The somewhat poorly drained Lawson soils, which have a seasonal high water table within a depth of 4 feet

Similar inclusions:
• Soils that contain more sand throughout
• Soils that have a high content of lime throughout
• Soils that have thin strata of very fine sandy loam to fine sand below a depth of 24 inches

Use and Management

Cropland

Suitability: Well suited
Management measures:
• Applying a system of conservation tillage that leaves crop residue on the surface after planting, including forage crops in the rotation, and returning crop residue to the soil help to maintain productivity and tilth.

Pasture and hay

Suitable species: Bromegrass, orchardgrass, tall fescue, and alsike clover
Management measures:
• Proper stocking rates, rotation grazing, and deferred grazing help to keep the pasture in good condition.

Wildlife habitat

Management measures:
• 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 because of flooding

Septic tank absorption fields

Suitability: Generally unsuited because of flooding

Interpretive Groups

Land capability classification: IIw

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. In Stark County, most of the naturally wet soils have been adequately drained.

Use and Management of the Soils

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

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

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

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in 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.

In 1987, about 165,858 acres in Stark County was used for crops, 9,877 acres was used for pasture, and 3,960 acres was used for woodland. The rest of the acreage was used for roads or other built-up areas *(10)*.

The soils in Stark County have good potential for continued crop production, particularly if the latest crop production technology is applied. This soil survey can greatly facilitate the application of such technology. The main concerns in managing the cropland and pastureland in the county are erosion, soil blowing, wetness, droughtiness, and soil tilth.

The hazard of water erosion is a major concern on about 56 percent of the cropland and pastureland in the county. Erosion is a hazard in areas where the slope is more than 2 percent. Also, as the length of the slope increases, the hazard of water erosion becomes more severe.

Sheet erosion, or loss of the surface layer, is damaging for several reasons. The content of organic matter and the level of natural fertility are lowered as the surface layer is lost and part of the subsoil is incorporated into the plow layer. As a result, soil productivity is reduced. Erosion also impairs tilth in the surface layer and reduces the rate of water infiltration. Erosion is especially damaging on soils that have a clay content in excess of about 30 percent in the surface layer. These soils have poor tilth if worked when wet and tend to form a crust after hard rains. Preparing a good seedbed on these soils is difficult because of the cloddiness, and surface crusting increases the runoff rate.

Erosion on farmland also results in the sedimentation of streams, rivers, ponds, or road ditches. Controlling

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

A good management system maintains or improves natural fertility, removes excess water, reduces the hazards of water erosion and soil blowing, maintains good tilth, and increases the rate of water infiltration. A cropping system that keeps plant cover or crop residue on the surface for extended periods during the year helps to control erosion and maintains soil productivity. Including grasses and legumes in the crop rotation minimizes crusting, improves tilth, and provides nutrients for the following crop.

Contour farming, contour stripcropping, terraces, or diversions help to control runoff and erosion. These practices are most effective on soils that have uniform and regular slopes, such as Tama and Rozetta soils. Soils on short slopes in areas of irregular topography, such as Hickory soils, can benefit greatly from a crop rotation that provides adequate plant cover.

Conservation tillage systems, such as chisel plowing, no-till farming, and ridge planting, help to control water erosion and runoff and increase the rate of water infiltration. Chisel plowing is suitable on most of the tillable soils in the county. No-till farming is most successful on well drained soils, such as Saybrook and Fayette soils. On poorly drained soils, such as Sable soils, the wet conditions delay planting and hinder seed germination. Ridge planting is useful on most of the nearly level soils in the county. In areas of poorly drained soils, such as Drummer, Sable, and Sawmill soils, ridge planting helps the soils to warm earlier in spring.

Soil blowing is a hazard during part of the winter and in early spring. The soils that are most susceptible to soil blowing are Drummer, Elburn, Ipava, Muscatine, and Sable soils that have been fall plowed. Establishing field windbreaks, using a system of conservation tillage, and maintaining the plant cover help to control soil blowing and minimize crop damage caused by the moving soil particles. In areas used for row crops, the use of conservation tillage systems that leave crop residue on the surface after planting is increasing in Stark County. Conservation tillage is effective in controlling erosion on sloping soils and can be used on most of the soils in the county.

Grassed waterways help to carry excess surface water safely downslope to the nearest creek, stream, or other watercourse (fig. 12). Grassed waterways generally are used in conjunction with subsurface tile drains and with other conservation practices, such as terraces, diversions, conservation tillage systems, and contour farming.

Crop rotations that include small grain, grasses, and legumes reduce the hazard of water erosion on soils that are sloping to steep, such as Fayette and Hickory soils. These rotation systems increase the content of organic matter, the level of nutrients in the soil, and the ability of the soil to retain moisture. They also improve soil tilth. Changing the soil environment with crop rotations also helps to control some kinds of weeds and insects.

More detailed information about controlling water erosion and soil blowing on each kind of soil is provided in the "Technical Guide," which is available in local offices of the Natural Resources Conservation Service.

Drainage systems have been installed in many of the somewhat poorly drained and poorly drained soils in the county. Drummer, Harpster, Sable, and Sawmill soils are examples of poorly drained soils. The somewhat poorly drained soils, such as Elburn, Flanagan, Ipava, and Muscatine soils, are wet enough in some years to delay planting.

Information about the drainage system suitable for each kind of soil is provided in the "Technical Guide," which is available in local offices of the Natural Resources Conservation Service.

The natural fertility level of the soils in Stark County ranges from low to high. Hickory soils have low natural fertility, and Sable soils have high natural fertility. On most of the soils in the county, plants respond well to nitrogen, phosphorus, and potassium fertilizers. The soils range from acidic to calcareous. Fayette and Rozetta soils are acidic and need applications of ground limestone to raise the pH for optimum crop growth. Harpster soils are calcareous and do not require applications of lime. On all soils, the kind and amount of lime and fertilizer to be applied should be based on the results of soil tests, the needs of the crop, and the expected level of yields. The Cooperative Extension Service can help in determining the proper applications of lime and fertilizer.

Soil tilth is an important factor in the germination of seeds, in the amount of runoff, and in the rate of water infiltration. Generally, soils that have good tilth are granular and porous.

In Stark County, most of the soils used for crops have a surface layer of silt loam or silty clay loam. Some of these soils have a lower content of organic matter than other soils. Generally, the structure of soils that have low organic matter content is weak, and intensive rainfall causes a crust to form on the surface. The crust is hard when dry and is nearly impervious to water. Once the crust forms, the infiltration rate decreases and the runoff rate increases. Leaving crop residue on the surface or regularly adding manure or other organic material improves soil structure and minimizes crusting.

The main field crops grown in Stark County are corn

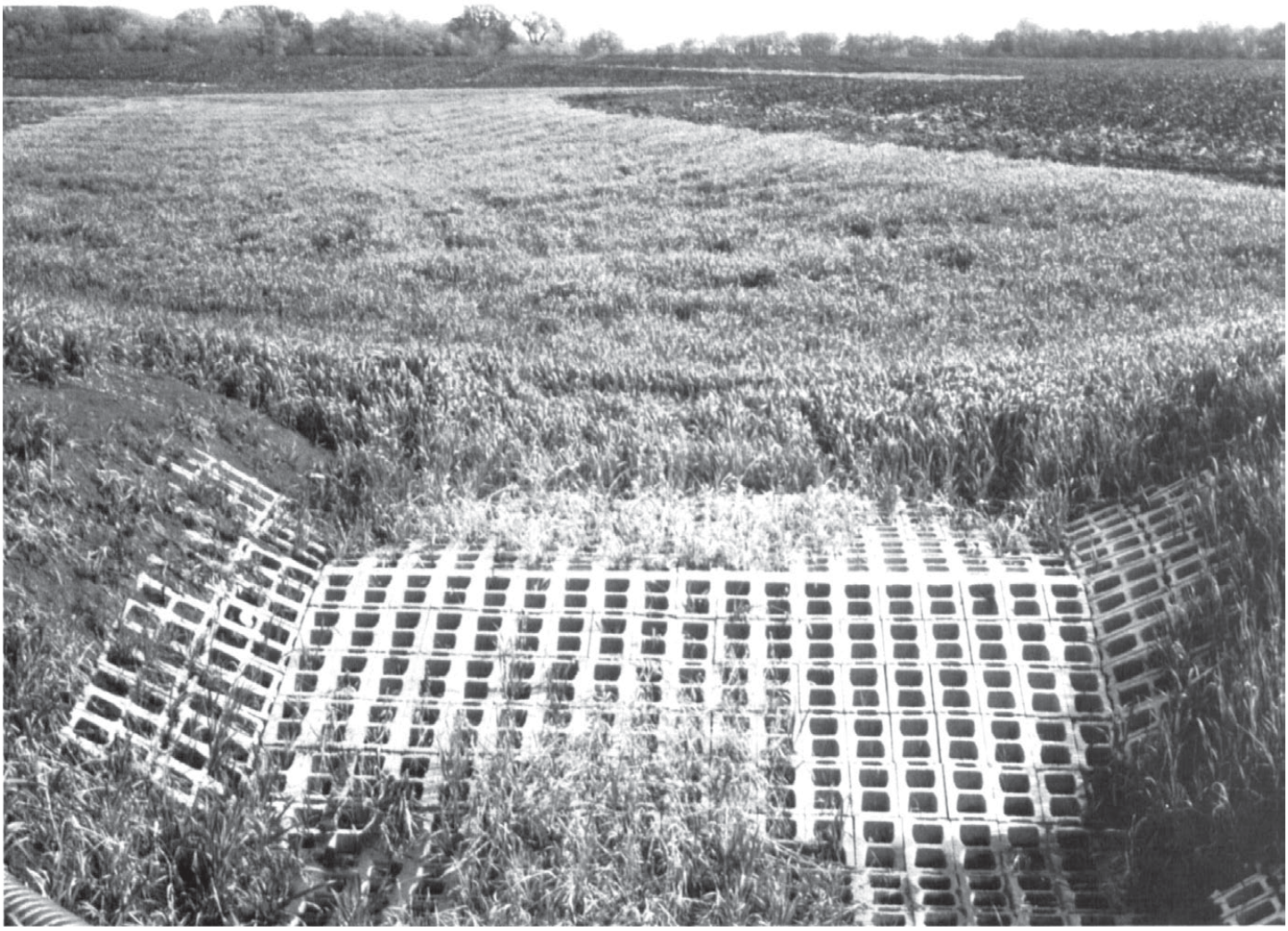

Figure 12.—Grassed waterways and block chutes can remove excess surface water and help to prevent the formation of gullies.

and soybeans. Small grain and forage crops are also grown. Using these crops more extensively on nearly all of the cropland would reduce the hazard of erosion and improve natural soil fertility.

The latest information affecting crop production can be obtained from local offices of the Cooperative Extension Service and the Natural Resources Conservation Service.

Proper management of pasture and hayland prolongs the life of desirable forage species, maintains or improves the quality and quantity of forage, and helps to control erosion and runoff. The somewhat poorly drained to well drained soils, such as Fayette, Hickory, Muscatine, Rozetta, and Tama soils, are suited to alfalfa, red clover, orchardgrass, tall fescue, and bromegrass. The poorly drained soils, such as Harpster and Sable soils, are suited to alsike clover, ladino clover, and reed canarygrass. Rotation grazing provides protection for the desirable forage species. Deferring grazing in the spring until the soil is firm enough to withstand trampling by livestock helps to prevent soil compaction and promotes the growth of forage plants. Using proper stocking rates results in efficient utilization of forage and prevents overgrazing or undergrazing. Deferring grazing, especially of legumes, from September 15 to October 15 reduces the hazard of winterkill. Harvesting when the forage is at the proper stage of maturity results in the maximum quality of feed. Applications of lime and fertilizer may be needed, and measures that control competing weeds and brush are needed.

Information about establishing and renovating

pasture and hayland is provided in the "Technical Guide," which is available in local offices of the Natural Resources Conservation Service.

Yields per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 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. Available yield data from nearby counties and results of field trials and demonstrations are also considered *(3)*.

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 *(7)*. 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. 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 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 each map unit is given in the section "Detailed Soil Map Units" and in the yields table.

Woodland Management and Productivity

In 1987, about 2.1 percent of Stark County was woodland. The number of acres of woodland has declined steadily over the past 150 years. Most remaining woodland occurs along watercourses and includes the native species of oak, elm, ash, hickory, black walnut, and maple. The native sycamore, locust, cottonwood, and dogwood still grow on the bottom land and along slopes.

Much of the native timber has been cleared, and the land is used for row crops. Most of the remaining woodland occupies areas too wet, too steep, or too remote and isolated for cultivation. Each year, some areas are cleared and other land is replanted.

Clearing may result in a severe hazard of erosion in the steeper areas. The removal of the protective timber canopy and accumulated leaf litter leaves the soil surface susceptible to damage caused by the impact of raindrops and the erosive force of surface runoff. The hazard of erosion is very severe if these areas are used as farmland. As a result, many of these areas are best suited to timber.

Harvesting on private land is generally in areas of steep or very steep Elco, Hickory, and Marseilles soils or in areas of wet soils on flood plains, such as Lawson and Sawmill soils, which have not been disturbed for a number of years. Selective cutting of white oak, hickory, ash, and walnut for sawlogs is the most common harvesting method.

Many of the existing stands can be improved by harvesting mature trees and trees of low value. Measures that protect the woodland from erosion, fire, and grazing are needed. Logging trails and access roads are commonly established on steep soils. Shaping and seeding these trails and roads and applying fertilizer immediately after harvesting help to control erosion. Installing properly shaped and properly constructed water bars across the trails also helps to control erosion. Interplanting is needed for maximum woodland production. Control or removal of competing vegetation, such as low-value trees, is needed if seedlings are planted. A grass cover is needed between rows of seedlings planted on bare, sloping land.

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. 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

The main recreational facilities in the county are water based. The Allendale Conservation Club has developed several strip-mine fishing lakes and a private camp area. Numerous farm ponds and the Spoon River and its tributaries also provide sport fishing opportunities.

The Rock Island bike trail extends from Toulon to the Peoria County line. There are currently no public camping facilities in Stark County. Two Boy Scout camps are located near the towns of Bradford and Modena.

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 by 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 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

Intensive agriculture over the past 150 years has radically reduced the amount of wildlife habitat in Stark County. Association 3, which is described under the heading "General Soil Map Units," has the largest remaining areas of habitat for woodland wildlife species, such as whitetail deer, squirrels, and songbirds. Areas of cropland in associations 1, 2, 4, 5, 6, 7, and 8 provide food and cover for many types of openland wildlife, such as cottontail rabbit, raccoon, bobwhite quail, and mourning dove. Wet areas in association 4 provide habitat for waterfowl and for beavers and muskrats. Some privately owned ponds throughout the county provide habitat for game fish, such as bass, bluegill, and crappie.

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, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, 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 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, wheatgrass, and grama.

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

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, wild rice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are 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, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, and deer.

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

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. 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 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 can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground-water pollution. Ease of excavation and revegetation 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 both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

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

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover

for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over 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 or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

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 *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

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

Rock fragments larger than 10 inches in diameter and 3 to 10 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 ovendry 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 (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 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

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, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 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 the 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.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(8)*. 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 18 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 underlying material 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" *(9)*. Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" *(8)*. 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."

Alvin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid

Landscape: Uplands
Landform: Outwash plains
Landform position: Side slopes
Parent material: Windblown or water-deposited, loamy and sandy sediments
Slope range: 8 to 30 percent

Taxonomic class: Coarse-loamy, mixed, mesic Typic Hapludalfs

Typical Pedon

Alvin sandy loam, 15 to 30 percent slopes, 600 feet east and 1,740 feet north of the southwest corner of sec. 32, T. 14 N., R. 7 E.

A—0 to 8 inches; mixed dark yellowish brown (10YR 4/4) and dark brown (10YR 3/3) sandy loam, light yellowish brown (10YR 6/4) dry; moderate medium granular structure; friable; medium acid; abrupt smooth boundary.

Bt1—8 to 22 inches; yellowish brown (10YR 5/4) sandy loam; moderate medium subangular blocky structure; friable; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; gradual wavy boundary.

Bt2—22 to 38 inches; yellowish brown (10YR 5/4) sandy loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common faint dark yellowish brown (10YR 4/4) clay films on faces of peds; medium acid; gradual wavy boundary.

E&Bt—38 to 60 inches; yellowish brown (10YR 5/6) sandy loam (Bt) and sand (E); weak medium subangular blocky structure (Bt); single grain (E); very friable (Bt); loose (E); strongly acid.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches

A horizon:
Value—3 or 4
Chroma—2 to 4

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—4 to 6
Texture—sandy loam or sandy clay loam

E&Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 6
Texture—thin layers of loam, sandy loam, loamy sand, or sand

Assumption Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper part; moderately slow in the next part; slow in the lower part
Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Parent material: Loess and glacial till
Slope range: 5 to 18 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Argiudolls

Taxadjunct feature: The Assumption soils in this survey area have a thinner dark surface layer than is defined as the range for the series. As a result, these soils are classified as fine-silty, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Assumption silt loam, 5 to 10 percent slopes, eroded, 264 feet south and 90 feet west of the northeast corner of sec. 13, T. 13 N., R. 5 E.

Ap—0 to 6 inches; dark brown (10YR 3/3) and brown (10YR 4/3) silt loam, brown (10YR 5/3) dry; moderate medium granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—6 to 14 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; many faint brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—14 to 29 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; abrupt smooth boundary.

2Bt3—29 to 36 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few medium prominent dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few fine roots; few prominent (10YR 5/3) clay films on faces of peds; few distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; about 15 percent sand; slightly acid; clear smooth boundary.

3Bt4—36 to 50 inches; dark grayish brown (2.5Y 4/2) clay loam; common medium prominent brown (7.5YR 4/4) mottles; strong medium prismatic structure; firm; many distinct brown (10YR 4/3) clay films on faces of peds; many distinct dark brown (10YR 3/3) organic coatings on faces of peds; few medium soft accumulations of iron and manganese oxide; about 25 percent sand; common pebbles;

slightly acid; clear smooth boundary.
3Bt5—50 to 60 inches; light olive brown (2.5Y 5/4) clay loam; many coarse distinct light olive brown (2.5Y 5/6) mottles; strong medium prismatic structure; firm; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; about 25 percent sand; common pebbles; slightly acid.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 6 to 9 inches
Thickness of the loess: 20 to 40 inches

Ap horizon:
Value—2 or 3
Chroma—1 to 3
Texture—silt loam or silty clay loam

Bt horizon:
Value—4 or 5
Chroma—3 to 6
Texture—silt loam or silty clay loam

2Bt horizon:
Hue—2.5Y or 10YR
Value—4 or 5
Chroma—2 to 4

3Bt horizon:
Hue—7.5YR, 2.5Y, 5Y, or 10YR
Value—3 to 6
Chroma—1 to 6
Texture—clay loam, clay, or silty clay

Aurelius Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate
Landscape: Uplands
Landform: Outwash plains
Landform position: Depressions
Parent material: Shallow organic deposits over marl that is underlain by loamy material
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, carbonatic, mesic Histic Humaquepts

Typical Pedon

Aurelius muck, 1,400 feet east and 1,100 feet north of the southwest corner of sec. 22, T. 12 N., R. 7 E.

Oap—0 to 8 inches; black (10YR 2/1) sapric material, dark gray (10YR 4/1) dry; weak fine granular structure; friable; many fine roots; violent effervescence; moderately alkaline; abrupt smooth boundary.
2Cg1—8 to 20 inches; light brownish gray (2.5Y 6/2) marl; 1-inch strata of sapric material at depths of 10, 14, and 20 inches; weak medium prismatic structure; very friable; common prominent black (10YR 2/1) organic coatings on faces of peds; many snail-shell fragments; violent effervescence; mildly alkaline; abrupt wavy boundary.
2Cg2—20 to 33 inches; light brownish gray (2.5Y 6/2) marl; 1-inch strata of sapric material at depths of 24 and 32 inches; weak medium prismatic structure; very friable; few prominent very dark gray (10YR 3/1) organic coatings on faces of peds; many snail-shell fragments; violent effervescence; mildly alkaline; abrupt wavy boundary.
3Oa—33 to 37 inches; black (N 2/0) sapric material; massive; very friable; slight effervescence; mildly alkaline; abrupt wavy boundary.
4Cg—37 to 60 inches; dark gray (5Y 4/1) silt loam; massive; friable; few snail-shell fragments; slight effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 16 inches
Depth to bedrock: More than 60 inches

Oa horizon:
Hue—10YR, 2.5Y, 5Y, or neutral
Chroma—0 to 2
Texture—sapric material or marl

2Cg horizon:
Hue—5YR to 5G
Value—2 to 4

3Oa horizon:
Hue—2.5YR to neutral
Value—5 to 8
Chroma—0 to 2

4Cg horizon:
Hue—10YR to neutral
Value—4 to 6
Chroma—0 or 1
Texture—sandy loam, silt loam, loam, or clay loam

Camden Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Terraces
Landform: Stream terraces
Landscape position: Side slopes and ridgetops
Parent material: Loess and outwash
Slope range: 5 to 18 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Hapludalfs

Typical Pedon

Camden silt loam, 5 to 10 percent slopes, eroded, 770 feet east and 1,760 feet north of the southwest corner of sec. 32, T. 14 N., R. 7 E.

Ap—0 to 4 inches; brown (10YR 4/3) and dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; moderate fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—4 to 7 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine angular blocky structure; friable; many fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—7 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium angular blocky structure; friable; common fine roots; many faint dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt3—24 to 27 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium angular blocky structure; friable; common fine roots; many distinct dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt4—27 to 36 inches; dark yellowish brown (10YR 4/4) sandy clay loam; weak medium prismatic structure parting to moderate medium angular blocky; friable; few fine roots; many faint dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt5—36 to 51 inches; yellowish brown (10YR 5/4) clay loam; moderate medium prismatic structure; friable; few fine roots; common faint dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2BC—51 to 60 inches; yellowish brown (10YR 5/4), stratified loam, sandy clay loam, and silt loam; weak medium prismatic structure; friable; few fine roots; common faint dark brown (10YR 4/3) clay films on faces of peds; neutral.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: 20 to 40 inches

A horizon:
Value—4 or 5
Chroma—2 or 3

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 to 6
Texture—silty clay loam or silt loam

2Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 to 6
Texture—clay loam, loam, or sandy clay loam

Casco Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part; very rapid in the lower part
Landscape: Terraces
Landform: Stream terraces
Landform position: Side slopes
Parent material: Loamy material over calcareous sand and gravel
Slope range: 10 to 60 percent

Taxonomic class: Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs

Typical Pedon

Casco clay loam, 10 to 18 percent slopes, severely eroded, 1,320 feet north and 960 feet west of the center of sec. 4, T. 13 N., R. 7 E.

Ap—0 to 4 inches; brown (10YR 4/3) clay loam, pale brown (10YR 6/3) dry; weak fine granular and weak fine subangular blocky structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

Bt1—4 to 8 inches; brown (7.5YR 4/4) clay loam; moderate medium angular blocky structure; friable; common fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; neutral; clear smooth boundary.

Bt2—8 to 16 inches; brown (7.5YR 4/4) gravelly sandy clay loam; firm; few fine roots; many distinct dark brown (7.5YR 3/2) clay films on faces of peds; 25 percent gravel; neutral; clear smooth boundary.

2C—16 to 60 inches; brown (7.5YR 4/4), stratified sand and gravel; single grain; loose; strong effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 10 to 20 inches
Depth to bedrock: More than 60 inches

A horizon:
Hue—10YR or 7.5YR
Value—3 to 5
Chroma—2 or 3

Bt horizon:
Hue—10YR, 7.5YR, or 5YR
Value—3 to 5
Chroma—3 or 4

Texture—sandy clay loam, loam, clay loam, or the gravelly analogs of these textures

2C horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 or 4
Texture—sand and gravel

Catlin Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Uplands
Landform: Glacial till plains and moraines
Landform position: Ridgetops and side slopes
Parent material: Loess and glacial till
Slope range: 2 to 10 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Argiudolls

Taxadjunct feature: Catlin silt loam, 2 to 5 percent slopes, eroded, and Catlin silt loam, 5 to 10 percent slopes, eroded, have a thinner dark surface layer than is defined as the range for the series. As a result, they are classified as fine-silty, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Catlin silt loam, 2 to 5 percent slopes, 980 feet west and 2,400 feet north of the southeast corner of sec. 35, T. 14 N., R. 7 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; many fine and few medium roots; slightly acid; abrupt smooth boundary.

AB—6 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine angular blocky structure; friable; many fine and few medium roots; slightly acid; abrupt smooth boundary.

Bt1—12 to 15 inches; brown (10YR 4/3) silty clay loam; moderate fine angular blocky structure; friable; many fine and few medium roots; many faint dark brown (10YR 3/3) clay films on faces of peds; many faint very dark brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt2—15 to 20 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine angular blocky structure; friable; many fine roots; many faint brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—20 to 28 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; friable; common fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt4—28 to 34 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; friable; few fine roots; many faint brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

Bt5—34 to 42 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few fine roots; many faint brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

2BC—42 to 45 inches; brown (7.5YR 5/4) loam; weak medium prismatic structure; friable; few fine roots; neutral; clear smooth boundary.

2C—45 to 60 inches; brown (7.5YR 5/4) loam; massive; friable; strong effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 40 to 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 20 inches
Thickness of the loess: 40 to 60 inches

Ap or A horizon:
Value—2 or 3
Chroma—2 or 3

Bt horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—3 or 4

2B horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—4 to 6
Texture—loam or clay loam

2C horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—4 to 6
Texture—loam or clay loam

Clarksdale Series

Depth class: Very deep
Drainage class: Somewhat poorly drained

Permeability: Moderately slow
Landscape: Uplands
Landform: Till plains
Landform position: Wide ridges and summits
Parent material: Loess
Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Udollic Ochraqualfs

Typical Pedon

Clarksdale silt loam, 0 to 2 percent slopes, 2,140 feet west and 800 feet south of the northeast corner of sec. 27, T. 13 N., R. 6 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine roots; slightly acid; abrupt smooth boundary.

E—9 to 16 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; mainly weak medium platy structure, some moderate medium angular blocky; friable; common fine roots; many distinct light gray (10YR 7/2) silt coatings on faces of peds; slightly acid; clear smooth boundary.

BE—16 to 19 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate fine angular blocky structure; friable; common fine roots; many distinct light gray (10YR 6/2 dry) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—19 to 26 inches; grayish brown (2.5Y 5/2) and brown (10YR 5/3) silty clay loam; common coarse prominent strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; friable; common fine roots; many faint dark grayish brown (2.5Y 4/2) and many distinct very dark grayish brown (10YR 3/2) clay films on faces of peds; strongly acid; clear smooth boundary.

Bt2—26 to 31 inches; brown (10YR 5/3) and grayish brown (2.5Y 5/2) silty clay loam; many coarse prominent strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; friable; common fine roots; many distinct dark grayish brown (2.5Y 4/2) and very dark grayish brown (10YR 3/2) clay films on faces of peds; strongly acid; clear smooth boundary.

Btg1—31 to 37 inches; light brownish gray (2.5Y 6/2) silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; weak medium prismatic structure parting to weak medium angular blocky; friable; common fine roots; common prominent brown (10YR 4/3) and very dark grayish brown (10YR 3/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Btg2—37 to 48 inches; light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6) silty clay loam; weak medium prismatic structure; friable; few fine roots; common distinct brown (10YR 4/3) and very dark grayish brown (10YR 3/2) clay films on faces of peds; neutral; clear smooth boundary.

BCg—48 to 60 inches; light brownish gray (2.5Y 6/2) and strong brown (7.5YR 5/6) silt loam; massive; friable; few prominent dark brown (10YR 3/3) clay films in linings; neutral.

Range in Characteristics

Depth to carbonates: More than 40 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: More than 60 inches

Ap horizon:
Value—2 or 3
Chroma—1 or 2

E and BE horizons:
Value—4 or 5
Chroma—1 or 2

Bt horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 to 3
Texture—silty clay loam or silty clay

C horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—1 or 2
Texture—silty clay loam or silt loam

Dakota Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part; rapid in the lower part
Landscape: Terraces
Landform: Outwash plains
Landform position: Side slopes
Parent material: Loamy outwash over sandy outwash
Slope range: 5 to 10 percent

Taxonomic class: Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls

Taxadjunct feature: The Dakota soils in this survey area have a thinner dark surface layer than is defined as the range for the series. As a result, these soils are classified as fine-loamy over sandy or sandy-skeletal, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Dakota silt loam, 5 to 10 percent slopes, eroded, 1,680

feet south and 2,080 feet west of the northeast corner of sec. 22, T. 14 N., R. 7 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) and dark yellowish brown silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

Bt1—6 to 15 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium angular blocky structure; friable; common fine roots; many faint dark brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—15 to 20 inches; dark brown (7.5YR 4/4) sandy clay loam; moderate medium prismatic structure parting to moderate medium angular blocky; friable; common fine roots; many distinct dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt3—20 to 24 inches; dark brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; very friable; common fine roots; sand grains bridged with clay in many places; neutral; clear smooth boundary.

2BC—24 to 32 inches; dark brown (7.5YR 4/4) loamy sand; weak medium subangular blocky structure; very friable; few fine roots; neutral; clear smooth boundary.

2C1—32 to 54 inches; dark brown (7.5YR 4/4) sand; very friable; neutral; clear wavy boundary.

2C2—54 to 60 inches; dark yellowish brown (10YR 4/6) gravelly sand; very friable; mildly alkaline.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 6 to 9 inches
Depth to loamy sand and sand: 20 to 40 inches

A horizon:
Hue—10YR or 7.5YR
Value—2 or 3
Chroma—1 to 3

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 5
Texture—loam, sandy clay loam, or clay loam

2Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 5
Texture—sandy loam or loamy sand

2C horizon:
Hue—10YR or 7.5YR
Value—4 to 7
Chroma—2 to 6
Texture—sand or gravelly sand

Denny Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landscape: Uplands
Landform: Till plains
Landscape position: Depressions
Parent material: Loess
Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Mollic Albaqualfs

Typical Pedon

Denny silt loam, 920 feet east and 1,220 feet south of the center of sec. 18, T. 13 N., R. 6 E.

Ap—0 to 5 inches; very dark gray (10YR 3/1) silt loam, grayish brown (10YR 5/2) dry; weak medium granular structure; friable; many very fine roots; medium acid; abrupt smooth boundary.

A—5 to 9 inches; black (10YR 2/1) silt loam, gray (10YR 5/1) dry; weak medium granular structure; friable; many very fine roots; medium acid; abrupt smooth boundary.

Eg—9 to 17 inches; grayish brown (10YR 5/2) silt loam, light gray (10YR 7/1) dry; moderate medium platy structure; friable; few very fine roots; medium acid; clear smooth boundary.

Btg1—17 to 20 inches; dark gray (10YR 4/1) silty clay loam; few fine prominent dark yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; friable; few very fine roots; many distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; medium acid; abrupt smooth boundary.

Btg2—20 to 35 inches; gray (5Y 5/1) silty clay loam; common fine prominent dark yellowish brown (10YR 4/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many prominent (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Btg3—35 to 46 inches; gray (5Y 6/1) silty clay loam; common fine prominent yellowish brown (10YR 5/8) and common medium prominent gray (10YR 6/1) mottles; moderate medium prismatic structure; friable; few distinct dark grayish brown (10YR 3/1) organic coatings; slightly acid; clear smooth boundary.

BCg—46 to 60 inches; gray (5Y 6/1) silt loam; many medium yellowish brown (10YR 5/8) mottles; moderate medium prismatic structure; friable; few prominent very dark gray (10YR 3/1) organic coatings in root channels; common medium soft dark accumulations of iron oxide; neutral.

Range in Characteristics

Depth to bedrock: More than 60 inches
Depth to carbonates: More than 60 inches
Thickness of the loess: More than 60 inches

Ap horizon:
Value—2 or 3
Chroma—1 or 2

E horizon:
Value—4 or 5
Chroma—1 or 2

Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam or silty clay

Downs Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Parent material: Loess
Slope range: 2 to 10 percent

Taxonomic class: Fine-silty, mixed, mesic Mollic Hapludalfs

Typical Pedon

Downs silt loam, 2 to 5 percent slopes, 360 feet south and 2,600 feet east of the center of sec. 27, T. 14 N., R. 6 E.

Ap—0 to 8 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

BE—8 to 14 inches; dark yellowish brown (10YR 4/4) silt loam; moderate fine angular blocky structure; friable; common fine roots; common faint dark brown (10YR 3/3) organic coatings on faces of peds; common distinct light gray (10YR 7/1) silt coatings on faces of peds; neutral; clear smooth boundary.

Bt1—14 to 24 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium angular blocky structure; friable; common fine roots; many faint brown (10YR 4/3) clay films on faces of peds; common distinct light gray (10YR 7/1 dry) silt coatings on faces of peds; slightly acid; clear smooth boundary.

Bt2—24 to 34 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; friable; common fine roots; many faint brown (10YR 4/3) clay films on faces of peds; common faint very pale brown (10YR 7/3 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

BC—34 to 45 inches; yellowish brown (10YR 5/4) silt loam; common fine distinct light brownish gray (10YR 6/2) and common fine distinct yellowish brown (10YR 5/6) mottles; weak medium prismatic structure parting to weak medium subangular blocky; friable; common fine roots; common faint brown (10YR 4/3) clay films on faces of peds; common faint very pale brown (10YR 7/3 dry) silt coatings on faces of peds; many fine soft dark accumulations of iron and manganese oxide; medium acid; clear smooth boundary.

C—45 to 60 inches; yellowish brown (10YR 5/4) silt loam; common fine faint pale brown (10YR 6/3) and common fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; many fine soft dark accumulations of iron and manganese oxide; slightly acid.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: More than 60 inches

Ap horizon:
Value—2 or 3
Chroma—1 or 2

BE horizon:
Value—4 or 5
Chroma—2 or 3

Bt horizon:
Value—4 or 5
Chroma—3 to 6

C horizon:
Value—5 or 6
Chroma—3 or 4

Drummer Series

Depth class: Very deep
Drainage class: Poorly drained

Permeability: Moderate
Landscape: Uplands
Landform: Outwash plains
Landform position: Flats and depressions
Parent material: Loess and outwash
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Haplaquolls

Typical Pedon

Drummer silty clay loam, 1,580 feet east and 1,840 feet north of the southwest corner of sec. 15, T. 12 N., R. 7 E.

Ap—0 to 10 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine granular structure; friable; common very fine roots; medium acid; abrupt smooth boundary.

A—10 to 14 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate medium granular structure; friable; common very fine roots; slightly acid; clear smooth boundary.

Btg1—14 to 19 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few medium prominent yellowish brown (10YR 5/6) mottles; moderate medium subangular blocky structure; friable; common very fine roots; many prominent black (10YR 2/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Btg2—19 to 28 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few medium prominent yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; friable; few very fine roots; few distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds; black (10YR 2/1) krotovina; neutral; clear smooth boundary.

Btg3—28 to 46 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; few prominent very dark grayish brown (10YR 3/2) organic coatings on faces of peds; neutral; clear smooth boundary.

Bg1—46 to 53 inches; grayish brown (2.5Y 5/2) silt loam; common fine faint light brownish gray (2.5Y 6/2) and many medium prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; friable; few very fine roots; few prominent dark brown (10YR 3/3) organic coatings on faces of peds; neutral; clear wavy boundary.

2Bg2—53 to 60 inches; grayish brown (2.5Y 5/2) sandy loam that has strata of loam; many medium prominent yellowish brown (10YR 5/6) mottles; weak medium prismatic structure; few very fine roots; few pebbles; neutral.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the loess: 40 to 60 inches

A horizon:
Hue—10YR, 2.5Y, or neutral
Value—2 or 3
Chroma—0 to 2

Btg horizon:
Hue—5Y or 2.5Y
Value—3 to 5
Chroma—1 or 2

2Btg horizon:
Hue—5Y or 2.5Y
Value—4 or 5
Chroma—1 or 2
Texture—silt loam, loam, sandy loam, clay loam, or sandy clay loam

Elburn Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landscape: Uplands
Landform: Outwash plains
Landscape position: Wide summits and ridgetops
Parent material: Loess over outwash
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Aquic Argiudolls

Typical Pedon

Elburn silt loam, 0 to 2 percent slopes, 228 feet west and 1,040 feet south of the northeast corner of sec. 15, T. 12 N., R. 7 E.

Ap—0 to 8 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; weak medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

A—8 to 14 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; 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) and brown (10YR 5/3) silty clay loam; moderate fine and medium angular blocky structure; friable; few very fine roots; few fine soft dark accumulations of iron

and manganese oxide; medium acid; clear smooth boundary.

Bt1—18 to 23 inches; brown (10YR 5/3) silty clay loam; few fine prominent yellowish brown (10YR 5/6) and few fine faint grayish brown (10YR 4/2) mottles; moderate medium subangular blocky structure; friable; few very fine roots; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; many distinct very dark gray (10YR 3/1) organic coatings in root channels and on faces of peds; few fine soft dark accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt2—23 to 32 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) and few fine faint grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; few faint dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct very dark gray (10YR 3/1) organic coatings on faces of peds; medium acid; clear smooth boundary.

Btg—32 to 51 inches; dark grayish brown (10YR 4/2) silt loam; many fine distinct dark yellowish brown (10YR 4/6) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; friable; few very fine roots; few faint dark brown (10YR 3/3) clay films in linings; neutral; abrupt wavy boundary.

2Bt—51 to 60 inches; yellowish brown (10YR 5/4) loam that has strata of sandy loam; few fine distinct yellowish brown (10YR 5/6) and common fine distinct dark grayish brown (10YR 4/2) mottles; weak coarse prismatic structure; friable; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; neutral.

Range in Characteristics

Depth to carbonates: 45 to 70 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 12 to 18 inches
Thickness of the loess: 40 to 60 inches

Ap and A horizons:
Value—2 or 3
Chroma—1 or 2

Bt horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 or 3

2Bt horizon:
Hue—2.5Y or 10YR
Value—5 or 6
Chroma—2 to 4
Texture—silt loam, loam, sandy loam, or clay loam

Elco Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper part; moderately slow in the next part; slow in the lower part
Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Parent material: Loess and glacial till
Slope range: 5 to 25 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Hapludalfs

Typical Pedon

Elco silt loam, 18 to 25 percent slopes, eroded, 1,100 feet north and 620 feet west of the southeast corner of sec. 4, T. 14 N., R. 5 E.

Ap—0 to 5 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium granular structure; friable; many very fine roots; medium acid; clear smooth boundary.

Bt1—5 to 15 inches; dark yellowish brown (10YR 4/6) silty clay loam; moderate medium subangular blocky structure; friable; many very fine roots; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few distinct very pale brown (10YR 7/3) silt coatings on faces of peds; slightly acid; clear smooth boundary.

Bt2—15 to 24 inches; dark yellowish brown (10YR 4/6) silty clay loam; moderate medium prismatic structure parting to moderate medium angular blocky; friable; many very fine roots; many distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; few distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; many medium soft dark accumulations of iron and manganese oxide; medium acid; abrupt smooth boundary.

2Bt3—24 to 34 inches; dark yellowish brown (10YR 4/4) silty clay loam; few medium distinct grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; common very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; few distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; less than 2 percent pebbles; medium acid; gradual smooth boundary.

3Bt4—34 to 51 inches; dark yellowish brown (10YR 4/4) clay loam; common medium distinct grayish brown (10YR 5/2) and dark yellowish brown (10YR 4/6) mottles; moderate medium prismatic structure; friable; few very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; few distinct very pale brown (10YR 7/3 dry) silt coatings on faces of

peds; common medium soft dark accumulations of iron oxide; less than 2 percent pebbles; slightly acid; clear smooth boundary.

3Bt5—51 to 60 inches; brown (10YR 4/3) clay loam; common medium faint grayish brown (10YR 5/2) and common medium distinct dark yellowish brown (10YR 4/6) mottles; moderate medium angular blocky structure; firm; few very fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; 3 percent pebbles; slightly acid.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: 20 to 40 inches

Ap horizon:
Value—3 to 5
Chroma—2 to 4

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 to 6

2Bt horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 6
Chroma—1 to 4
Texture—silty clay loam, clay loam, or silt loam

3Bt horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 6
Texture—silty clay loam, clay loam, or silty clay

Elkhart Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Parent material: Loess
Slope range: 5 to 10 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Argiudolls

Taxadjunct feature: The Elkhart soils in this survey area have a thinner dark surface layer than is defined as the range for the series. As a result, these soils are classified as fine-silty, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Elkhart silt loam, 5 to 10 percent slopes, eroded, 1,060 feet west and 486 feet north of the center of sec. 6, T. 12 N., R. 6 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) and brown (10YR 4/3) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium granular structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

Bt1—9 to 16 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; many faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt2—16 to 21 inches; brown (10YR 4/3) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; few faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt3—21 to 27 inches; brown (10YR 4/3) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; common fine roots; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; abrupt smooth boundary.

Bk—27 to 42 inches; yellowish brown (10YR 5/4) silt loam; few fine faint light pale brown (10YR 6/3) and few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; few coarse light-colored concretions of calcium carbonate; slight effervescence; mildly alkaline; abrupt smooth boundary.

C1—42 to 47 inches; pale brown (10YR 6/3) and strong brown (7.5YR 5/6) silt loam; massive; friable; slight effervescence; mildly alkaline; abrupt smooth boundary.

C2—47 to 57 inches; light brownish gray (10YR 6/2) silt loam; common fine prominent strong brown (7.5YR 5/6) mottles; massive; friable; slight effervescence; mildly alkaline; abrupt smooth boundary.

C3—57 to 60 inches; mottled light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) silt loam; massive; friable; slight effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 20 to 40 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 6 to 9 inches
Thickness of the loess: More than 60 inches

Ap horizon:
Value—2 or 3
Chroma—2 or 3
Texture—silt loam or silty clay loam

Bt horizon:
Value—4 or 5
Chroma—3 or 4

C horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 4
Texture—silt loam or silt

Fayette Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Parent material: Loess
Slope range: 10 to 18 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Hapludalfs

Typical Pedon

Fayette silt loam, 10 to 18 percent slopes, eroded, 1,400 feet south and 348 feet west of the northeast corner of sec. 17, T. 12 N., R. 6 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) and dark yellowish brown (10YR 4/4) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many very fine roots; neutral; abrupt smooth boundary.

Bt1—6 to 13 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; common very fine roots; common faint brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—13 to 27 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common very fine roots; common faint brown (10YR 4/3) clay films and few distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt3—27 to 37 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; common very fine roots; many faint dark yellowish brown (10YR 4/4) clay films and common distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; medium acid; gradual smooth boundary.

Bt4—37 to 48 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure parting to moderate medium angular blocky; friable; common very fine roots; 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; slightly acid; clear smooth boundary.

BC—48 to 60 inches; yellowish brown (10YR 5/6) silt loam; weak medium prismatic structure parting to moderate medium angular blocky; friable; common very fine roots; common distinct dark yellowish brown (10YR 4/4) clay films and common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; slightly acid.

Range in Characteristics

Depth to carbonates: More than 40 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: More than 60 inches

Ap horizon:
Value—4 or 5
Chroma—2 or 3
Texture—silt loam or silty clay loam

Bt horizon:
Value—4 or 5
Chroma—3 to 6

BC horizon:
Value—4 or 5
Chroma—4 to 6
Texture—silt loam or silty clay loam

Flanagan Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Landscape: Uplands
Landform: Till plains
Landform position: Wide ridges and summits
Parent material: Loess over glacial till
Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Aquic Argiudolls

Taxadjunct feature: The Flanagan soils in this survey area have a lower average clay content in the argillic horizon than is defined as the range for the series. As a result, these soils are classified as fine-silty, mixed, mesic Aquic Argiudolls.

Typical Pedon

Flanagan silt loam, 0 to 2 percent slopes, 2,100 feet south and 260 west of the center of sec. 24, T. 14 N., R. 7 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A—8 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common fine roots; neutral; clear smooth boundary.

Bt1—12 to 24 inches; yellowish brown (10YR 5/4) silty clay loam; common fine distinct dark grayish brown (10YR 4/2) and common fine prominent strong brown (7.5YR 5/6) mottles; moderate medium angular blocky structure; friable; few fine roots; many faint brown (10YR 4/3) clay films on faces of peds; few fine soft accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bt2—24 to 36 inches; yellowish brown (10YR 5/4) silty clay loam; many fine prominent grayish brown (2.5Y 5/2) and strong brown (7.5Y 5/6) mottles; weak medium prismatic structure parting to moderate medium angular blocky; friable; few fine roots; many distinct grayish brown (10YR 5/2) clay films on faces of peds; common fine soft dark accumulations of iron and manganese oxide; neutral; clear smooth boundary.

Bt3—36 to 44 inches; yellowish brown (10YR 5/4) silt loam; many fine prominent strong brown (7.5YR 5/6) and many medium prominent grayish brown (2.5Y 5/2) mottles; moderate medium prismatic structure; friable; few fine roots; few distinct grayish brown (10YR 5/2) clay films on faces of peds; many fine soft dark accumulations of iron and manganese oxide; neutral; clear wavy boundary.

2Bt4—44 to 47 inches; brown (7.5YR 5/4) clay loam; few fine distinct light brownish gray (10YR 6/2) mottles; weak medium prismatic structure; firm; few distinct brown (7.5YR 4/2) clay films on faces of peds; slight effervescence; mildly alkaline; clear smooth boundary.

2C—47 to 60 inches; brown (7.5YR 5/4) loam; firm; strong effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 44 to 58 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 11 to 18 inches
Thickness of the loess: 40 to 60 inches

Ap and A horizons:
Value—2 or 3
Chroma—1 or 2

Bt horizon:
Hue—10YR or 2.5YR
Value—4 or 5
Chroma—2 to 6

2Bt horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—1 to 6
Texture—loam or clay loam

2C horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—loam or clay loam

Harpster Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Broad summits and depressions
Parent material: Loess and glacial drift
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mesic Typic Calciaquolls

Typical Pedon

Harpster silty clay loam, 1,210 feet east and 39 feet south of the center of sec. 29, T. 12 N., R. 7 E.

Apk—0 to 6 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium granular structure; friable; many fine roots; many snail-shell fragments; violent effervescence; moderately alkaline; abrupt smooth boundary.

Ak—6 to 11 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium subangular blocky structure; friable; many fine roots; many snail-shell fragments; violent effervescence; moderately alkaline; clear smooth boundary.

AB—11 to 17 inches; mixed black (2.5Y 2/0) and dark gray (5Y 4/1) silty clay loam, dark gray (2.5Y 4/0) dry; moderate medium subangular blocky structure; friable; many fine roots; few fine soft accumulations and stains of iron and manganese oxide; common snail-shell fragments; slight effervescence; moderately alkaline; clear smooth boundary.

Btg1—17 to 24 inches; dark gray (5Y 4/1) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common fine roots; common prominent black (2.5Y

2/0) krotovinas; common faint dark gray (5Y 4/1) clay films on faces of peds; few fine light-colored concretions of calcium carbonate; many fine soft dark accumulations and stains of iron and manganese oxide; slight effervescence; moderately alkaline; clear smooth boundary.

Btg2—24 to 36 inches; mixed dark gray (5Y 4/1) and brownish yellow (10YR 6/8) silty clay loam; weak medium prismatic structure parting to moderate medium subangular blocky; friable; common fine roots; common faint dark gray (5Y 4/1) clay films on faces of peds; few fine light-colored concretions of calcium carbonate; slight effervescence; mildly alkaline; clear smooth boundary.

Btg3—36 to 42 inches; gray (5Y 5/1) silty clay loam; many fine prominent brownish yellow (10YR 6/8) mottles; moderate medium subangular blocky structure; friable; common fine roots; common faint gray (5Y 5/1) clay films on faces of peds; few fine light-colored concretions of calcium carbonate; slight effervescence; mildly alkaline; clear smooth boundary.

BCg—42 to 46 inches; dark gray (5Y 4/1) silty clay loam; few medium prominent yellowish brown (10YR 5/8) mottles; weak medium subangular blocky structure; friable; common fine roots; few fine light-colored concretions of calcium carbonate; slight effervescence; mildly alkaline; clear smooth boundary.

Cg1—46 to 51 inches; dark gray (5Y 4/1) silty clay loam; common coarse prominent yellowish brown (10YR 5/8) mottles; massive; friable; few fine light-colored concretions of calcium carbonate; slight effervescence; mildly alkaline; clear smooth boundary.

2Cg2—51 to 60 inches; dark gray (5Y 4/1) clay loam; massive; friable; about 5 percent gravel; violent effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 16 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the loess: 40 to 60 inches

Apk or Ak horizon:
Hue—10YR or neutral
Value—2 or 3
Chroma—0 or 1

Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 or 5
Chroma—1 or 2

Cg horizon:
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2

Hennepin Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Parent material: Glacial till
Slope range: 30 to 60 percent

Taxonomic class: Fine-loamy, mixed, mesic Typic Eutrochrepts

Typical Pedon

Hennepin loam, in an area of Hennepin-Casco complex, 30 to 60 percent slopes, 560 feet north and 540 feet west of the southeast corner of sec. 36, T. 14 N., R. 6 E.

A—0 to 4 inches; brown (7.5YR 4/2) loam, yellowish brown (10YR 5/4) dry; moderate fine granular structure; friable; many fine roots; 5 percent gravel; mildly alkaline; slight effervescence; clear smooth boundary.

Bw1—4 to 15 inches; brown (7.5YR 4/4) loam; moderate fine angular blocky structure; friable; common fine roots; common distinct brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; strong effervescence; mildly alkaline; clear smooth boundary.

Bw2—15 to 19 inches; brown (7.5YR 4/4) loam; moderate fine angular blocky structure; firm; common fine and few medium roots; common distinct brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; strong effervescence; mildly alkaline; clear smooth boundary.

C—19 to 60 inches; brown (7.5YR 5/4) loam; massive; firm; few fine roots; 10 percent gravel; strong effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 15 inches
Depth to bedrock: More than 60 inches

A horizon:
Hue—10YR or 7.5YR
Value—3 or 4
Chroma—1 or 2

Bw horizon:
Hue—10YR or 7.5YR
Value—4 or 5

Chroma—3 or 4
Texture—loam, sandy loam, or clay loam

C horizon:
Hue—10YR or 7.5YR
Value—5 or 6
Chroma—2 to 4
Texture—loam, sandy loam, or clay loam

Hickory Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landscape position: Side slopes
Parent material: Glacial till or loess and glacial till
Slope range: 10 to 50 percent

Taxonomic class: Fine-loamy, mixed, mesic Typic Hapludalfs

Typical Pedon

Hickory silt loam, 18 to 30 percent slopes, 1,950 feet south and 530 feet east of the center of sec. 13, T. 13 N., R. 5 E.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; many very fine roots; neutral; abrupt smooth boundary.

E—3 to 7 inches; brown (10YR 4/3) silt loam; weak medium platy structure parting to weak medium subangular blocky; friable; few medium and many fine roots; common faint very dark grayish brown (10YR 3/2) organic coatings and common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; strongly acid; clear smooth boundary.

Bt1—7 to 12 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; common fine roots; many medium faint brown (10YR 4/3) clay films and common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; less than 2 percent pebbles; medium acid; clear smooth boundary.

2Bt2—12 to 24 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; firm; common fine roots; many medium faint brown (10YR 4/3) clay films and common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; less than 5 percent pebbles; medium acid; clear smooth boundary.

2Bt3—24 to 39 inches; dark yellowish brown (10YR 4/6) clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; firm; few fine roots; common medium distinct brown (10YR 4/3) clay films and few distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; less than 5 percent pebbles; medium acid; clear smooth boundary.

2BC—39 to 50 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct light yellowish brown (10YR 6/4) mottles; weak medium prismatic structure; friable; few fine roots; common distinct dark yellowish brown (10YR 4/4) clay films on faces of peds; less than 10 percent pebbles; slightly acid; clear smooth boundary.

2C—50 to 60 inches; yellowish brown (10YR 5/6) clay loam; common medium distinct light yellowish brown (10YR 6/4) mottles; massive; friable; less than 10 percent pebbles; slightly acid.

Range in Characteristics

Depth to carbonates: 40 to 72 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: 0 to 20 inches

A or Ap horizon:
Value—3 to 5
Chroma—2 or 3
Texture—silt loam or clay loam

Bt or 2Bt horizon:
Hue—2.5Y, 10YR, or 7.5YR
Value—4 to 6
Chroma—4 to 6
Texture—silty clay loam or clay loam

2C horizon:
Hue—2.5Y or 10YR
Value—5 or 6
Texture—clay loam or loam

Huntsville Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Flood plains
Landform: The higher positions on the flood plains
Landform position: Bottom land
Parent material: Alluvium
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Cumulic Hapludolls

Typical Pedon

Huntsville silt loam, occasionally flooded, 400 feet west and 1,000 feet south of the northeast corner of sec. 26, T. 13 N., R. 6 E.

Ap—0 to 10 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; many fine and few medium roots; neutral; abrupt smooth boundary.
A1—10 to 19 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium angular blocky structure; friable; many fine roots; neutral; clear smooth boundary.
A2—19 to 28 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate medium angular blocky structure; friable; many fine roots; neutral; clear smooth boundary.
A3—28 to 39 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate medium prismatic structure parting to moderate medium angular blocky; friable; many fine roots; neutral; clear smooth boundary.
A4—39 to 54 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; common fine faint brown (10YR 4/3) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few fine roots; neutral; clear smooth boundary.
C—54 to 60 inches; dark brown (10YR 3/3) and brown (10YR 5/3) silt loam; massive; friable; neutral.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 24 to 54 inches

A horizon:
Value—2 or 3
Chroma—1 to 3

C horizon:
Value—3 to 5
Chroma—3 or 4
Texture—silt loam or loam

Ipava Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landscape: Uplands
Landform: Till plains
Landform position: Wide ridges and summits
Parent material: Loess
Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Aquic Argiudolls

Typical Pedon

Ipava silt loam, 0 to 2 percent slopes, 800 feet south and 200 feet east of the northwest corner of sec. 9, T. 13 N., R. 6 E.

Ap—0 to 8 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.
A—8 to 12 inches; black (10YR 2/1) silt loam, very dark gray (10YR 3/1) dry; moderate fine angular blocky structure; friable; common very fine roots; slightly acid; clear smooth boundary.
AB—12 to 17 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine subangular blocky structure; friable; common very fine roots; slightly acid; clear smooth boundary.
Bt—17 to 24 inches; brown (10YR 5/3) silty clay loam; few fine prominent strong brown (7.5YR 5/6) and common medium distinct grayish brown (2.5Y 5/2) mottles; moderate medium subangular blocky structure; friable; common very fine roots; common faint dark grayish brown (10YR 4/2) clay films on faces of peds; common distinct black (10YR 2/1) organic coatings on faces of peds; medium acid; clear smooth boundary.
Btg1—24 to 28 inches; grayish brown (2.5Y 5/2) silty clay loam; few medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few distinct black (10YR 2/1) organic coatings on faces of peds; medium acid; clear smooth boundary.
Btg2—28 to 41 inches; grayish brown (2.5Y 5/2) silty clay loam; common medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; medium acid; clear smooth boundary.
BCg—41 to 50 inches; grayish brown (2.5Y 5/2) silt loam; many medium prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; friable; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; clear smooth boundary.
Bkg—50 to 60 inches; mottled grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/6) silt loam; massive; friable; few fine and medium light-colored concretions of calcium carbonate; few distinct dark grayish brown (10YR 4/2) clay films lining pores; slight effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: More than 40 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the loess: More than 60 inches

Ap and A horizons:
Value—2 or 3
Chroma—1 or 2

Bt and Btg horizons:
Value—4 to 6
Chroma—2 to 4
Texture—silty clay loam or silty clay; subhorizon of silt loam in the lower part in some pedons
Content of clay—35 to 40 percent in the upper part

Bkg or Cg horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—1 to 4

Keomah Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landscape: Uplands
Landform: Till plains
Landform position: Wide ridgetops and summits
Parent material: Loess
Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Aeric Ochraqualfs

Typical Pedon

Keomah silt loam, 0 to 2 percent slopes, 390 feet west and 258 feet north of the southeast corner of sec. 24, T. 14 N., R. 6 E.

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium granular structure; friable; common fine roots; few prominent dark stains of iron and manganese oxide; neutral; abrupt smooth boundary.

E—9 to 14 inches; grayish brown (10YR 5/2) silt loam; few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium platy structure; friable; common fine roots; many distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; few prominent dark stains of iron and manganese oxide; neutral; clear smooth boundary.

BE—14 to 18 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine prominent strong brown (7.5YR 5/6) and grayish brown (2.5Y 5/2) mottles; moderate medium angular blocky structure; friable; common fine roots; many distinct light gray (10YR 6/2 dry) silt coatings on faces of peds; few prominent dark stains of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt—18 to 27 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine prominent strong brown (7.5YR 5/6) and common fine prominent grayish brown (2.5Y 5/2) mottles; moderate medium angular blocky structure; friable; common fine roots; many distinct dark grayish brown (10YR 4/2) clay films and light gray (10YR 7/2 dry) silt coatings on faces of peds; few prominent dark stains of iron and manganese oxide; strongly acid; clear smooth boundary.

Btg1—27 to 31 inches; grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6) silty clay loam; common fine prominent strong brown (7.5YR 5/8) mottles; moderate medium angular blocky structure; friable; common fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few prominent dark stains of iron and manganese oxide; strongly acid; clear smooth boundary.

Btg2—31 to 36 inches; grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6) silty clay loam; common fine prominent strong brown (7.5YR 5/8) mottles; moderate medium angular blocky structure; friable; common fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few prominent dark stains of iron and manganese oxide; strongly acid; clear smooth boundary.

BCg—36 to 45 inches; grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6) silt loam; weak medium prismatic structure; friable; few fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few prominent dark stains of iron and manganese oxide; medium acid; clear smooth boundary.

Cg—45 to 60 inches; grayish brown (2.5Y 5/2) and strong brown (7.5YR 5/6) silt loam; massive; friable; few prominent dark stains of iron and manganese oxide; slightly acid.

Range in Characteristics

Depth to carbonates: More than 40 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: More than 60 inches

Ap horizon:
Value—4 or 5
Chroma—1 or 2

E horizon:
Value—4 or 5
Chroma—1 or 2

Bt or Btg horizon:
Value—4 or 5
Chroma—2 to 4
Texture—silty clay loam or silty clay

Cg horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 or 3

La Rose Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Parent material: Glacial till
Slope range: 5 to 10 percent

Taxonomic class: Fine-loamy, mixed, mesic Typic Argiudolls

Typical Pedon

La Rose silt loam, 5 to 10 percent slopes, eroded, 860 feet west and 1,080 feet south of the center of sec. 25, T. 13 N., R. 7 E.

Ap—0 to 8 inches; dark brown (10YR 3/3) and dark yellowish brown (10YR 4/4) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; many fine and few medium roots; neutral; abrupt smooth boundary.

Bt1—8 to 13 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine subangular blocky structure; friable; common fine and few medium roots; common faint brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

Bt2—13 to 18 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium subangular blocky structure; friable; few fine and few medium roots; common faint brown (10YR 4/3) clay films on faces of peds; neutral; clear smooth boundary.

C1—18 to 36 inches; brown (7.5YR 5/4) loam; massive; friable; few fine and few medium roots; strong effervescence; mildly alkaline; clear smooth boundary.

C2—36 to 60 inches; brown (7.5YR 5/4) loam; massive; friable; strong effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 10 to 24 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 7 to 9 inches
Thickness of the loess: 0 to 10 inches

Ap horizon:
Value—2 or 3
Chroma—2 or 3

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 or 4

C horizon:
Hue—7.5YR or 10YR
Value—4 to 6
Chroma—3 or 4

Lawson Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landscape: Flood plains
Landform: The higher positions on the flood plains
Landform position: Bottom land
Parent material: Alluvium
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Cumulic Hapludolls

Typical Pedon

Lawson silt loam, frequently flooded, 1,480 feet west and 186 feet north of the southeast corner of sec. 24, T. 12 N., R. 5 E.

Ap—0 to 13 inches; black (10YR 2/1) silt loam, very dark grayish brown (10YR 3/2) dry; weak fine angular blocky structure; friable; common fine roots; neutral; abrupt smooth boundary.

A1—13 to 26 inches; black (10YR 2/1) silt loam, very dark grayish brown (10YR 3/2) dry; moderate fine subangular blocky structure; friable; common fine roots; neutral; clear smooth boundary.

A2—26 to 32 inches; mixed very dark grayish brown (10YR 3/2) and dark yellowish brown (10YR 4/4) silt loam, grayish brown (10YR 5/2) dry; moderate fine subangular blocky structure; friable; common fine roots; neutral; clear smooth boundary.

C1—32 to 48 inches; mixed dark grayish brown (2.5Y 4/2) and yellowish brown (10YR 5/6) silty clay loam; weak medium prismatic structure; friable; few fine roots; neutral; clear smooth boundary.

C2—48 to 60 inches; mixed dark grayish brown (2.5Y 4/2) and yellowish brown (10YR 5/6), stratified sandy loam and silt loam; massive; friable; neutral.

Range in Characteristics

Depth to carbonates: More than 60 inches

Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 24 to 36 inches
Ap horizon:
Value—2 or 3
Chroma—1 or 2
A horizon:
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or silty clay loam
C horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 or 3
Texture—silt loam, loam, or sandy loam

Lenzburg Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landscape: Uplands
Landform: Till plains
Landform position: Crests and slopes of cast overburden
Parent material: Cast overburden from surface mining
Slope range: 1 to 60 percent

Taxonomic class: Fine-loamy, mixed (calcareous), mesic Typic Udorthents

Typical Pedon

Lenzburg silty clay loam, 7 to 20 percent slopes, stony, 1,840 feet east and 720 feet south of the northwest corner of sec. 10, T. 13 N., R. 6 E.

A—0 to 4 inches; mixed dark grayish brown (10YR 4/2) and yellowish brown (10YR 5/4) silty clay loam, light brownish gray (10YR 6/2) dry; weak fine granular structure; friable; many very fine roots; about 5 percent coarse fragments of till pebbles and channers of siltstone and limestone; exposed stones on 1 to 2 percent of the surface; slight effervescence; mildly alkaline; clear wavy boundary.

AC—4 to 11 inches; mixed yellowish brown (10YR 5/6) and light brownish gray (10YR 6/2) silt loam; moderate thin platy structure; friable; common very fine roots; about 10 percent coarse fragments of till pebbles and channers and flagstones of siltstone, shale, and sandstone; few very dark gray (10YR 3/1) and dark brown (10YR 3/3) soil fragments; slight effervescence; mildly alkaline; clear wavy boundary.

C1—11 to 19 inches; mixed yellowish brown (10YR 5/4) and light brownish gray (10YR 6/2) silt loam; massive; friable; common very fine roots; about 5 percent coarse fragments of till pebbles and channers and flagstones of shale; few very dark gray (10YR 3/1) and very dark grayish brown (10YR 3/2) soil fragments; slight effervescence; mildly alkaline; abrupt wavy boundary.

C2—19 to 32 inches; mixed brown (10YR 5/3 and 7.5YR 5/4) and dark brown (7.5YR 4/2) cobbly silt loam; massive; friable; few very fine roots; about 35 percent coarse fragments of till pebbles and channers of shale, coal, siltstone, and sandstone; slight effervescence; neutral; clear wavy boundary.

C3—32 to 60 inches; mixed yellowish brown (10YR 5/4), strong brown (7.5YR 5/6), light brownish gray (10YR 6/2), and dark brown (7.5YR 4/2) gravelly silt loam; massive; friable; few very fine roots; about 25 percent coarse fragments of till pebbles and channers of shale and siltstone; slight effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 0 to 10 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: Variable
A horizon:
Hue—10YR, 2.5Y, or 5Y
Value—3 to 5
Chroma—1 to 4
Texture—silt loam, silty clay loam, or loam
Content of rock fragments—5 to 25 percent, by volume
C horizon:
Hue—10YR, 7.5YR, or 2.5Y
Value—2 to 6
Chroma—1 to 6
Texture—silt loam, silty clay loam, clay loam, or the cobbly, channery, or gravelly analogs of these textures

Lisbon Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Landscape: Uplands
Landform: Till plains and moraines
Landform position: Broad ridgetops and summits
Parent material: Loess and glacial till
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Aquic Argiudolls

Typical Pedon

Lisbon silt loam, 0 to 2 percent slopes, 420 feet north

and 1,200 feet west of the southeast corner of sec. 33, T. 12 N., R. 7 E.

Ap—0 to 7 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; common very fine and fine and few medium roots; medium acid; abrupt smooth boundary.

A—7 to 11 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; common fine roots; slightly acid; clear smooth boundary.

AB—11 to 14 inches; very dark grayish brown (10YR 3/2) silty clay loam, grayish brown (10YR 5/2) dry; moderate fine angular blocky structure; friable; common fine roots; common faint black (10YR 2/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—14 to 28 inches; brown (10YR 4/3) silty clay loam; few medium faint grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; friable; common fine roots; many faint very dark grayish brown (10YR 3/2) organic coatings and many faint dark grayish brown (10YR 4/2) clay films on faces of peds; few fine and medium soft dark accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

2Bt2—28 to 31 inches; brown (7.5YR 4/4) clay loam; few medium distinct strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common medium prominent dark grayish brown (5Y 4/2) clay films on faces on peds; few fine soft accumulations of iron and manganese oxide; common till pebbles; neutral; clear smooth boundary.

2C—31 to 60 inches; brown (7.5YR 5/4) loam; few medium faint strong brown (7.5YR 5/8) mottles; massive; firm; few fine soft accumulations of iron and manganese oxide; common till pebbles; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to carbonates: 20 to 40 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 18 inches
Thickness of the loess: 20 to 40 inches

Ap horizon:
Value—2 or 3
Chroma—1 to 3

Bt horizon:
Hue—10YR, 7.5YR, or 2.5Y
Value—4 to 6
Chroma—2 to 6

2Bt horizon:
Hue—10YR, 7.5YR, or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—silty clay loam, silt loam, loam, or clay loam

2C horizon:
Hue—10YR, 7.5YR, or 2.5Y
Value—4 to 6
Chroma—2 to 6
Texture—silt loam or loam

Marseilles Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate in the upper part; slow in the lower part
Landscape: Uplands
Landform: Truncated till plains
Landform position: Side slopes
Parent material: Loess and shale
Slope range: 5 to 60 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Hapludalfs

Typical Pedon

Marseilles silt loam, 18 to 30 percent slopes, 270 feet east and 1,200 feet south of the northwest corner of sec. 2, T. 13 N., R. 5 E.

A—0 to 3 inches; dark grayish brown (10YR 4/2) silt loam, grayish brown (10YR 5/2) dry; moderate very fine granular structure; friable; many very fine and few medium roots; slightly acid; clear smooth boundary.

E—3 to 7 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate medium platy structure; friable; few medium roots; medium acid; abrupt smooth boundary.

Bt1—7 to 20 inches; light olive brown (2.5Y 5/4) silty clay loam; moderate fine angular blocky structure; friable; few medium roots; many distinct brown (10YR 4/3) clay films on faces of peds; 2 to 5 percent sandstone rock fragments; strongly acid; clear smooth boundary.

Bt2—20 to 28 inches; mixed grayish brown (2.5Y 5/2) and light olive brown (2.5Y 5/4) silty clay loam; moderate medium angular blocky structure; firm; few medium roots; many distinct brown (10YR 4/3) clay films on faces of peds; 2 to 5 percent sandstone rock fragments; very strongly acid; clear smooth boundary.

2Bt3—28 to 34 inches; grayish brown (2.5Y 5/2) clay

loam; moderate medium prismatic structure parting to moderate medium angular blocky; firm; few medium roots; many distinct brown (10YR 4/3) clay films on faces of peds; 2 to 5 percent sandstone rock fragments; strongly acid; abrupt smooth boundary.

2Cr—34 to 60 inches; light olive brown (2.5Y 5/4), soft shale; few medium distinct grayish brown (2.5Y 5/2) mottles; shale fragments; few medium roots along cracks; strongly acid.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to soft bedrock: 20 to 40 inches
Thickness of the loess: 10 to 30 inches

A or Ap horizon:
Value—2 to 4
Chroma—2 or 3

E horizon:
Value—4 or 5
Chroma—2 or 3

2Bt horizon:
Hue—7.5YR, 10YR, or 2.5Y
Value—4 or 5
Chroma—2 to 4

2Cr horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 4

Massbach Series

Depth class: Deep
Drainage class: Moderately well drained
Permeability: Moderate in the upper part; slow in the lower part
Landscape: Uplands
Landform: Truncated till plains
Landform position: Ridgetops and side slopes
Parent material: Loess and shale
Slope range: 2 to 5 percent

Taxonomic class: Fine-silty, mixed, mesic Mollic Hapludalfs

Typical Pedon

Massbach silt loam, 2 to 5 percent slopes, 1,800 feet south and 1,460 feet east of the northwest corner of sec. 15, T. 14 N., R. 7 E.

Ap—0 to 7 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many very fine roots; neutral; clear smooth boundary.

BE—7 to 11 inches; brown (10YR 5/3) silt loam; moderate medium angular blocky structure; friable; common fine roots; common faint brown (10YR 4/3) clay films on faces of peds; few faint light gray (10YR 7/2 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt1—11 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium angular blocky structure; friable; common fine roots; many faint brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—17 to 33 inches; brown (10YR 5/3) silty clay loam; common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium and coarse angular blocky structure; friable; few fine roots; many faint brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt3—33 to 47 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct light brownish gray (10YR 6/2) and yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; friable; few fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt4—47 to 55 inches; yellowish brown (10YR 5/4) sandy clay loam; many medium distinct yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; friable; common faint brown (10YR 4/3) clay films on faces of peds; neutral; abrupt smooth boundary.

2Cr—55 to 60 inches; olive gray (5Y 4/2), soft shale; weak medium prismatic structure; firm; few siltstone fragments; neutral.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to soft bedrock: 40 to 60 inches
Thickness of the loess: 30 to 50 inches

Ap horizon:
Value—2 or 3
Chroma—1 or 2

Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 or 4

2Bt horizon:
Hue—10YR or 2.5Y
Value—4 or 5
Chroma—2 to 4
Texture—sandy loam, loam, or sandy clay loam

2Cr horizon:
Hue—2.5Y, 5Y, or 10YR
Value—4 or 5
Chroma—2 or 3

Miami Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part; slow in the lower part
Landscape: Uplands
Landform: Till plains
Landscape position: Side slopes
Parent material: Loess and glacial till
Slope range: 10 to 30 percent

Taxonomic class: Fine-loamy, mixed, mesic Typic Hapludalfs

Typical Pedon

Miami silt loam, 18 to 30 percent slopes, 1,600 feet north and 500 feet east of the southwest corner of sec. 3, T. 14 N., R. 6 E.

A—0 to 3 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine and very fine granular structure; friable; many fine roots; about 20 percent sand; neutral; clear smooth boundary.

E—3 to 6 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; weak medium platy structure parting to moderate very fine and fine angular blocky; friable; many fine roots; about 20 percent sand; slightly acid; clear smooth boundary.

2Bt1—6 to 15 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine and very fine angular blocky structure; firm; common fine roots; many faint brown (10YR 4/3) clay films on faces of peds; 2 percent gravel; strongly acid; clear smooth boundary.

2Bt2—15 to 26 inches; dark yellowish brown (10YR 4/4) clay loam; moderate fine angular blocky structure; firm; common fine and few medium roots; many faint brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; strongly acid; clear smooth boundary.

2C—26 to 60 inches; yellowish brown (10YR 5/4) loam; massive; firm; few fine roots; 5 percent gravel; strong effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 20 to 40 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: Less than 18 inches

A or Ap horizon:
Value—3 to 5
Chroma—2 or 3
Texture—silt loam or clay loam

Bt or 2Bt horizon:
Hue—2.5Y, 10YR, or 7.5YR
Value—4 to 6
Chroma—4 to 6
Texture—clay loam or silty clay loam

2C horizon:
Hue—2.5Y, 10YR, or 7.5YR
Value—5 or 6
Chroma—3 or 4

Mona Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow in the upper part; slow in the lower part
Landform: Side slopes
Landscape position: Uplands
Parent material: Thin loess, outwash, and lacustrine sediments
Slope range: 5 to 18 percent

Taxonomic class: Fine-loamy, mixed, mesic Typic Argiudolls

Taxadjunct feature: The Mona soils in this survey area have a thinner dark surface layer than is defined as the range for the series. As a result, these soils are classified as fine-loamy, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Mona silt loam, 5 to 10 percent slopes, eroded, 39 feet north and 183 feet east of the southwest corner of sec. 10, T. 14 N., R. 7 E.

Ap—0 to 8 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

Bt1—8 to 13 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium angular blocky structure; friable; common fine roots; many distinct dark brown (10YR 4/3) and few distinct dark brown (10YR 3/3) clay films on faces of peds; medium acid; clear smooth boundary.

2Bt2—13 to 24 inches; dark yellowish brown (10YR 4/4) clay loam; moderate medium angular blocky structure; friable; common fine roots; many faint dark brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt3—24 to 30 inches; dark yellowish brown (10YR 4/4) sandy clay loam; few distinct dark grayish brown (10YR 4/2) mottles; moderate medium angular blocky structure; friable; common fine roots; many faint dark brown (10YR 4/3) clay films on faces of peds; slightly acid; abrupt smooth boundary.

3BC—30 to 37 inches; brown (7.5YR 5/4) silty clay;

moderate medium prismatic structure; firm; few fine roots; many faint dark brown (7.5YR 4/4) clay films on faces of peds; neutral; clear smooth boundary.

3C—37 to 60 inches; brown (7.5YR 5/4) silty clay; weak coarse prismatic structure; firm; few fine roots; many faint dark brown (7.5YR 4/4) clay films on faces of peds; strong effervescence; mildly alkaline.

Range in Characteristics

Depth to lacustrine materials: 30 to 50 inches
Depth to carbonates: 30 to 50 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 6 to 9 inches
Thickness of the loess: 0 to 15 inches

A horizon:
Value—2 or 3
Chroma—1 or 2
Texture—silt loam or clay loam

Bt or 2Bt horizon:
Value—4 to 6
Chroma—3 or 4

3BC horizon:
Hue—10YR, 7.5YR, or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—silty clay or clay

3C horizon:
Hue—10YR, 7.5YR, or 2.5Y
Value—4 to 6
Chroma—2 to 4
Texture—silty clay or clay

Muscatine Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Wide ridges and summits
Parent material: Loess
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Aquic Hapludolls

Taxadjunct feature: The Muscatine soils in this survey area have an argillic horizon, which is not definitive for the series. As a result, these soils are classified as fine-silty, mixed, mesic Aquic Argiudolls.

Typical Pedon

Muscatine silt loam, 0 to 2 percent slopes, 400 feet west and 2,460 feet north of the southeast corner of sec. 11, T. 14 N., R. 6 E.

Ap—0 to 9 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A—9 to 17 inches; very dark grayish brown (10YR 3/2) silt loam, gray (10YR 5/1) dry; moderate fine granular structure; friable; common fine roots; neutral; clear smooth boundary.

Bt1—17 to 21 inches; brown (10YR 4/3) silty clay loam; few fine distinct grayish brown (10YR 5/2) and few fine distinct yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; friable; common fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; many faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; medium acid; clear smooth boundary.

Bt2—21 to 26 inches; brown (10YR 4/3) silty clay loam; few fine faint grayish brown (10YR 5/2) and common fine distinct yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; friable; common fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt3—26 to 36 inches; brown (10YR 4/3) silty clay loam; common fine distinct grayish brown (10YR 5/2) and few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; common very fine roots; many faint dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark concretions of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt4—36 to 45 inches; grayish brown (2.5Y 5/2) and brown (10YR 4/4) silty clay loam; few fine prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure; friable; few very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark concretions of iron and manganese oxide; neutral; clear smooth boundary.

BC—45 to 50 inches; grayish brown (2.5Y 5/2) and yellowish brown (10YR 5/4) silt loam; weak medium prismatic structure; friable; few very fine roots; few distinct dark grayish brown (10YR 4/2) clay films on faces of peds; few fine dark concretions of iron and manganese oxide; neutral; clear smooth boundary.

Cg—50 to 60 inches; light brownish gray (2.5Y 6/2) silt loam; common medium prominent strong brown (7.5YR 5/6) mottles; massive; friable; few medium light-colored concretions of calcium carbonate; slight effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 48 to more than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the loess: More than 60 inches

Ap and A horizons:
Value—2 or 3
Chroma—1 or 2

Bt horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—2 to 4
Content of clay—30 to 35 percent

C horizon:
Hue—2.5Y or 5Y
Value—5 or 6
Chroma—2 to 4

Osceola Series

Depth class: Deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landscape: Uplands
Landform: Truncated till plains
Landform position: Wide ridges and summits
Parent material: Loess and shale
Slope range: 0 to 2 percent

Taxonomic class: Fine, mixed, mesic Udollic Ochraqualfs

Typical Pedon

Osceola silt loam, 0 to 2 percent slopes, 1,221 feet west and 314 feet north of the southeast corner of sec. 32, T. 12 N., R. 7 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

E—9 to 15 inches; grayish brown (10YR 5/2) silt loam; few fine prominent brown (7.5YR 4/4) mottles; moderate medium platy structure; friable; few fine roots; few distinct white (10YR 8/1 dry) silt coatings on faces of peds; slightly acid; abrupt smooth boundary.

Btg1—15 to 22 inches; dark grayish brown (10YR 5/2) silty clay; many fine prominent brown (7.5YR 4/4) and few fine faint brown (10YR 4/3) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many faint dark gray (10YR 4/1) clay films and few faint very dark grayish brown (10YR 3/2) organic coatings on faces of peds; few prominent dark stains of iron and manganese oxide; slightly acid; clear smooth boundary.

Btg2—22 to 33 inches; light brownish gray (2.5Y 6/2) silty clay loam; many fine prominent strong brown (7.5YR 4/6) and dark yellowish brown (10YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many faint grayish brown (2.5Y 5/2) clay films on faces of peds; common prominent dark stains of iron and manganese oxide; slightly acid; clear smooth boundary.

Btg3—33 to 41 inches; light brownish gray (2.5Y 6/2) silty clay loam; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many faint grayish brown (2.5Y 5/2) clay films on faces of peds; few distinct dark stains of iron and manganese oxide; about 15 percent sand; slightly acid; clear smooth boundary.

2Btg4—41 to 47 inches; grayish brown (2.5Y 5/2) and brown (7.5YR 4/4) sandy clay loam; moderate medium prismatic structure; friable; few fine roots; common distinct dark grayish brown (2.5Y 4/2) clay films on faces of peds; few prominent dark stains of iron and manganese oxide; slightly acid; abrupt smooth boundary.

3Btg5—47 to 52 inches; gray (5Y 5/1) silty clay; common fine prominent light yellowish brown (2.5Y 6/4) and yellowish brown (10YR 5/6) mottles; moderate medium angular blocky structure; firm; few fine roots; few faint dark gray (5Y 4/1) clay films on faces of peds; 5 percent shale fragments; slightly acid; clear wavy boundary.

3Cr—52 to 60 inches; gray (5Y 5/1), soft shale; many medium prominent yellowish brown (10YR 5/6) and light yellowish brown (2.5Y 6/4) mottles; massive; firm; slightly acid.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to soft bedrock: 40 to 60 inches
Thickness of the loess: 20 to 45 inches

Ap horizon:
Value—2 or 3
Chroma—1 or 2

E horizon:
Value—4 or 5
Chroma—1 or 2

Bt horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 to 3
Texture—silty clay loam or silty clay

2Bt horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—2 to 6
Texture—sandy loam, sandy clay loam, or loamy sand

3Bt horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 or 6
Chroma—1 to 4
Texture—silty clay loam, silty clay, or silt loam

3Cr horizon:
Hue—10YR, 2.5Y, or 5Y
Value—5 or 6
Chroma—1 to 4

Otter Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate
Landscape: Flood plains
Landform: The lower positions on the flood plains
Landscape position: Bottom land
Parent material: Alluvium
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Cumulic Haplaquolls

Typical Pedon

Otter silt loam, occasionally flooded, 180 feet west and 200 feet north of the southeast corner of sec. 3, T. 14 N., R. 7 E.

Ap—0 to 9 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A1—9 to 21 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine angular blocky structure; friable; common fine roots; mildly alkaline; clear smooth boundary.

A2—21 to 29 inches; very dark brown (10YR 2/2) silt loam that has thin strata of grayish brown (10YR 5/2) silt loam; dark grayish brown (10YR 4/2) dry; weak thick platy structure parting to moderate fine angular blocky; friable; common fine roots; mildly alkaline; clear smooth boundary.

A3—29 to 36 inches; black (10YR 2/1) silt loam, dark grayish brown (10YR 4/2) dry; common medium distinct dark grayish brown (2.5Y 4/2) and few fine prominent dark brown (7.5YR 4/4) mottles; moderate medium angular blocky structure; friable; few fine roots; mildly alkaline; clear smooth boundary.

A4—36 to 46 inches; black (N 2/0) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium angular blocky structure; friable; few fine roots; mildly alkaline; clear smooth boundary.

Cg—46 to 60 inches; dark grayish brown (2.5Y 4/2) loam; few fine prominent dark brown (7.5YR 4/4) mottles; friable; few medium dark accumulations of iron and manganese oxide; mildly alkaline.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 24 to 50 inches

Ap horizon:
Hue—10YR, 7.5YR, or neutral
Value—2 or 3
Chroma—0 to 2

A horizon:
Hue—10YR, 7.5YR, or neutral
Value—2 or 3
Chroma—0 to 2
Texture—silt loam, loam, or silty clay loam

Cg horizon:
Hue—10YR, 2.5Y, 5Y, or neutral
Value—2 to 6
Chroma—0 to 4
Texture—silt loam, loam, or silty clay loam

Plano Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Uplands
Landform: Outwash plains
Landform position: Ridgetops and side slopes
Parent material: Loess and outwash
Slope range: 0 to 5 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Argiudolls

Taxadjunct feature: Plano silt loam, 2 to 5 percent slopes, eroded, has a thinner dark surface layer than is defined as the range for the series. As a result, this soil is classified as fine-silty, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Plano silt loam, 0 to 2 percent slopes, 1,200 feet south and 1,920 feet east of the northwest corner of sec. 13, T. 12 N., R. 7 E.

Ap—0 to 9 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many very fine roots; slightly acid; abrupt smooth boundary.
A—9 to 14 inches; dark brown (10YR 3/3) silt loam, brown (10YR 5/3) dry; moderate fine granular structure; friable; many very fine roots; slightly acid; clear smooth boundary.
Bt1—14 to 19 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; common very fine roots; many faint dark brown (10YR 3/3) clay films on faces of peds; slightly acid; clear smooth boundary.
Bt2—19 to 31 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium subangular blocky structure; friable; common very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.
Bt3—31 to 43 inches; dark yellowish brown (10YR 4/4) silty clay loam; few fine faint yellowish brown (10YR 5/4) mottles; moderate medium prismatic structure parting to moderate medium subangular blocky; friable; few very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; common distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; slightly acid; clear smooth boundary.
Bt4—43 to 49 inches; dark yellowish brown (10YR 4/4) silt loam; moderate medium prismatic structure; friable; few very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; few distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; slightly acid; clear smooth boundary.
2Bt5—49 to 53 inches; dark yellowish brown (10YR 4/4) clay loam; weak medium prismatic structure; friable; few very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; 5 percent gravel; neutral; clear smooth boundary.
2Bt6—53 to 60 inches; brown (7.5YR 4/4) sandy loam; weak medium subangular blocky structure; very friable; many distinct dark yellowish brown (10YR 3/4) clay film bridges between sand grains; 5 percent gravel; neutral.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the loess: 40 to 60 inches

Ap and A horizons:
Value—2 or 3
Chroma—1 to 3

Bt horizon:
Value—4 or 5
Chroma—3 or 4

2Bt horizon:
Hue—7.5YR or 10YR
Value—4 or 5
Chroma—3 or 4
Texture—silt loam, loam, sandy loam, clay loam, or sandy clay loam; stratified in some pedons

Proctor Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Uplands
Landform: Terraces
Landform position: Ridgetops and side slopes
Parent material: Loess and outwash
Slope range: 2 to 10 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Argiudolls

Taxadjunct feature: Proctor silt loam, 5 to 10 percent slopes, eroded, has a thinner dark surface layer than is defined as the range for the series. As a result, this soil is classified as fine-silty, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Proctor silt loam, 2 to 5 percent slopes, 2,360 feet east and 1,240 feet north of the southwest corner of sec. 33, T. 12 N., R. 7 E.

Ap—0 to 8 inches; very dark brown (10YR 2/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; common very fine roots; medium acid; abrupt smooth boundary.
A—8 to 12 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate medium granular structure; friable; common very fine roots; slightly acid; clear smooth boundary.
Bt1—12 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium angular blocky structure; friable; common very fine roots; many distinct very dark grayish brown (10YR 3/2) organic coatings and many faint brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.
Bt2—16 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium angular blocky structure; friable; common very fine roots; many faint brown (10YR 4/3) clay films on faces on peds; slightly acid; clear smooth boundary.
Bt3—23 to 29 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium prismatic structure parting to moderate medium angular blocky; friable; common very fine roots; many faint

brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt4—29 to 35 inches; dark yellowish brown (10YR 4/4) sandy clay loam; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2BC—35 to 60 inches; dark yellowish brown (10YR 4/4), stratified sandy loam and loamy sand; weak medium prismatic structure; very friable; slightly acid.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the loess: 20 to 40 inches

Ap and A horizons:
Value—2 or 3
Chroma—1 to 3

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 to 6

2Bt or 2BC horizon:
Hue—2.5Y, 10YR, or 7.5YR
Value—4 to 6
Chroma—3 to 6
Texture—clay loam, silty clay loam, silt loam, loam, sandy loam, or sandy clay loam

Radford Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landscape: Flood plains
Landform: The higher positions on the flood plains
Landform position: Bottom land
Parent material: Alluvium
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Fluvaquentic Hapludolls

Typical Pedon

Radford silt loam, occasionally flooded, 252 feet west and 2,200 feet north of the southeast corner of sec. 6, T. 13 N., R. 5 E.

Ap—0 to 5 inches; very dark gray (10YR 3/1) silt loam, gray (10YR 5/1) dry; weak fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

A—5 to 11 inches; black (10YR 2/1) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common fine roots; neutral; clear smooth boundary.

C—11 to 30 inches; very dark gray (10YR 3/1) silt loam that has common thin strata of dark grayish brown (10YR 4/2); massive; friable; common fine roots; neutral; clear smooth boundary.

Ab1—30 to 45 inches; black (N 2/0) silty clay loam; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few fine roots; neutral; clear smooth boundary.

Ab2—45 to 60 inches; very dark gray (10YR 3/1) silty clay loam; weak medium prismatic structure parting to weak medium angular blocky; friable; few fine roots; neutral.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 20 inches

Ap and A horizons:
Value—2 or 3
Chroma—1 or 2

C horizon:
Hue—10YR or 2.5Y
Value—3 to 5
Chroma—1 to 3
Texture—silt loam; subhorizons of loam or sandy loam in the lower part

Ab horizon:
Hue—10YR or neutral
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam or silt loam

Rapatee Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes on reclaimed mine land
Parent material: Reclaimed surface-mine overburden (loess topsoil on cast shale)
Slope range: 1 to 7 percent

Taxonomic class: Fine-silty, mixed, nonacid, mesic Typic Udorthents

Typical Pedon

Rapatee silt loam, 1 to 7 percent slopes, 504 feet east

and 1,420 feet south of the northwest corner of sec. 11, T. 14 N., R. 6 E.

Ap—0 to 6 inches; mixed very dark grayish brown (10YR 3/2) and very dark gray (10YR 3/1) silt loam, dark grayish brown (10YR 4/2) and dark gray (10YR 4/1) dry; weak fine granular structure; friable; many fine roots; neutral; clear smooth boundary.

C1—6 to 11 inches; mixed very dark gray (10YR 3/1), very dark grayish brown (10YR 3/2), dark brown (10YR 4/3), and very dark brown (10YR 3/3) silt loam; massive; firm; common fine roots; neutral; abrupt smooth boundary.

C2—11 to 24 inches; dark yellowish brown (10YR 4/4), brown (10YR 5/3), and dark gray (10YR 4/1) silty clay loam; massive; firm; common fine roots; common cobbles and channers of shale, sandstone, and siltstone; few medium soft dark accumulations of iron and manganese oxide; strong effervescence; moderately alkaline; clear smooth boundary.

C3—24 to 60 inches; dark brown (10YR 4/3), yellowish brown (10YR 5/4 and 5/6), and dark gray (10YR 4/1) silty clay loam; massive; firm; few fine roots; common cobbles and channers of shale, sandstone, and siltstone; few stones; few medium soft dark accumulations of iron and manganese oxide; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to carbonates: 10 to more than 60 inches
Depth to bedrock: More than 60 inches
Thickness of replaced topsoil: 10 to 18 inches

Ap horizon:
Value—2 or 3
Chroma—1 to 3
Content of rock fragments—0 to 15 percent

C1 horizon:
Value—2 or 3
Chroma—1 to 3
Texture—silt loam or silty clay loam
Content of rock fragments—0 to 15 percent

C2 and C3 horizons:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 to 8
Texture—loam, silt loam, or silty clay loam
Content of rock fragments—0 to 30 percent

Rozetta Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Parent material: Loess
Slope range: 2 to 10 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Hapludalfs

Typical Pedon

Rozetta silt loam, 2 to 5 percent slopes, 1,220 feet south and 336 feet east of the center of sec. 4, T. 14 N., R. 6 E.

Ap—0 to 9 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium granular structure; friable; many very fine roots; neutral; abrupt smooth boundary.

Bt1—9 to 20 inches; yellowish brown (10YR 5/4) silty clay loam; moderate fine angular blocky structure; friable; common very fine roots; many faint brown (10YR 4/3) clay films and few faint very pale brown (10YR 7/3 dry) silt coatings on faces of peds; slightly acid; clear smooth boundary.

Bt2—20 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; friable; common very fine roots; many faint brown (10YR 4/3) clay films and few distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt3—28 to 38 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and common medium prominent light brownish gray (2.5Y 6/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; common very fine roots; common faint brown (10YR 4/3) clay films and few distinct very pale brown (10YR 7/3 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt4—38 to 49 inches; yellowish brown (10YR 5/4) silty clay loam; few fine distinct yellowish brown (10YR 5/6) and many medium prominent light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure; friable; few very fine roots; few faint brown (10YR 4/3) clay films and few faint very pale brown (10YR 7/3 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

BC—49 to 60 inches; yellowish brown (10YR 5/4) silt loam; few fine distinct yellowish brown (10YR 5/6) and few medium prominent light brownish gray (2.5Y 6/2) mottles; weak medium prismatic structure; friable; few faint brown (10YR 4/3) clay films on faces of peds; medium acid.

Range in Characteristics

Depth to carbonates: More than 60 inches

Depth to bedrock: More than 60 inches
Thickness of the loess: More than 60 inches

Ap or A horizon:
Value—3 or 4
Chroma—2 or 3

Bt horizon:
Hue—10YR or 7.5YR
Value—4 to 6
Chroma—3 to 6

Sable Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Broad summits and depressions
Parent material: Loess
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Haplaquolls

Typical Pedon

Sable silty clay loam, 2,460 feet south and 286 feet west of the northeast corner of sec. 17, T. 13 N., R. 6 E.

Ap—0 to 7 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; weak coarse granular structure; friable; many very fine roots; slightly acid; abrupt smooth boundary.

A—7 to 16 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; weak very fine granular structure; friable; many very fine roots; neutral; clear smooth boundary.

Btg1—16 to 20 inches; dark grayish brown (2.5Y 4/2) silty clay loam; few fine prominent light brown (7.5YR 6/4) mottles; moderate fine angular blocky structure; friable; many very fine roots; common distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many prominent black (10YR 2/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Btg2—20 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent strong brown (7.5YR 5/6) mottles; moderate fine angular blocky structure; friable; common very fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; common prominent black (10YR 2/1) organic coatings on faces of peds; few medium rounded dark concretions of iron and manganese oxide; black (N 2/0) krotovina; slightly acid; clear smooth boundary.

Btg3—25 to 35 inches; light brownish gray (2.5Y 6/2) silty clay loam; common medium prominent strong brown (7.5YR 4/6) mottles; weak medium prismatic structure parting to moderate fine subangular blocky; friable; few very fine roots; many prominent dark grayish brown (10YR 4/2) clay films on faces of peds; common prominent very dark gray (10YR 3/1) organic coatings on faces of peds; black (N 2/0) krotovina; slightly acid; clear smooth boundary.

BCg—35 to 45 inches; light olive gray (5Y 6/2) silty clay loam; many medium prominent strong brown (7.5YR 4/6) mottles; moderate medium prismatic structure parting to moderate fine subangular blocky; friable; few prominent dark grayish brown (10YR 4/2) clay films on faces of peds; neutral; gradual smooth boundary.

Cg—45 to 60 inches; light olive gray (5Y 6/2) silty clay loam; many medium prominent strong brown (7.5YR 4/6) mottles; massive; friable; few medium rounded dark concretions of iron and manganese oxide; slight effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: More than 40 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the loess: More than 60 inches

Ap and A horizons:
Hue—10YR or neutral
Value—2 or 3
Chroma—0 or 1
Texture—silty clay loam or silt loam

Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2

Cg horizon:
Hue—2.5Y or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam or silt loam

Sawmill Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate
Landscape: Flood plains
Landform: The lower positions on the flood plains
Landform position: Bottom land
Parent material: Alluvium
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Cumulic Haplaquolls

Typical Pedon

Sawmill silt loam, overwash, frequently flooded, 1,104 feet south and 444 feet west of the northeast corner of sec. 6, T. 12 N., R. 7 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; weak medium subangular blocky structure; friable; many fine roots; neutral; clear smooth boundary.

A1—6 to 13 inches; very dark grayish brown (10YR 3/2) silt loam, dark grayish brown (10YR 4/2) dry; moderate medium angular blocky structure; friable; many fine roots; slightly acid; abrupt smooth boundary.

A2—13 to 17 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine angular blocky structure; friable; common fine roots; common distinct light brownish gray (10YR 6/2 dry) silt coatings on faces of peds; slightly acid; abrupt smooth boundary.

A3—17 to 22 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate fine angular blocky structure; friable; common fine roots; slightly acid; clear smooth boundary.

A4—22 to 28 inches; black (N 2/0) silty clay loam, very dark gray (10YR 3/1) dry; moderate fine angular blocky structure; friable; common fine roots; slightly acid; clear smooth boundary.

A5—28 to 39 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium angular blocky structure; friable; common fine roots; slightly acid; clear smooth boundary.

Btg—39 to 52 inches; olive gray (5Y 5/2) silty clay loam; common fine prominent strong brown (10YR 5/6) mottles; moderate medium angular blocky structure; friable; common fine roots; many distinct dark gray (10YR 4/1) clay films on faces of peds; neutral; clear smooth boundary.

Cg—52 to 60 inches; olive gray (5Y 5/2) silty clay loam; common fine prominent strong brown (10YR 5/6) mottles; massive; friable; few fine roots; common medium soft dark accumulations of manganese oxide; mildly alkaline.

Range in Characteristics

Depth to carbonates: More than 48 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 24 to 36 inches
Thickness of overwash material: 0 to 19 inches

Ap and A horizons:
Hue—10YR, 2.5Y, or neutral
Value—2 or 3
Chroma—0 to 2
Texture—silt loam or silty clay loam

Btg horizon:
Hue—10YR, 2.5Y, 5Y, or neutral
Value—4 or 5
Chroma—0 to 2
Texture—silty clay loam or clay loam

Cg horizon:
Texture—silty clay loam or clay loam that has thin strata of loam or sandy loam in some pedons

Saybrook Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Parent material: Loess and glacial till
Slope range: 2 to 10 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Argiudolls

Taxadjunct feature: The Saybrook soils in this survey area have a thinner dark surface layer than is defined as the range for the series. As a result, these soils are classified as fine-silty, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Saybrook silt loam, 2 to 5 percent slopes, eroded, 1,380 feet east and 1,780 feet south of the northwest corner of sec. 26, T. 14 N., R. 7 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) and dark yellowish brown (10YR 4/4) silt loam, dark grayish brown (10YR 4/2) dry; moderate fine granular structure; friable; many fine roots; medium acid; abrupt smooth boundary.

Bt1—9 to 14 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine angular blocky structure; friable; few fine roots; common distinct very dark grayish brown (10YR 3/2) organic coatings and many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—14 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium angular blocky structure; friable; few fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2Bt3—25 to 32 inches; brown (7.5YR 5/4) clay loam; moderate medium prismatic structure; friable; few

fine roots; many distinct brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

2BC—32 to 37 inches; brown (7.5YR 5/4) clay loam; weak medium subangular blocky structure; friable; few distinct brown (10YR 4/3) clay films in root channels; neutral; clear smooth boundary.

2C—37 to 60 inches; brown (7.5YR 5/4) loam; massive; friable; strong effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 24 to 40 inches
Thickness of the mollic epipedon: 6 to 9 inches
Thickness of the loess: 20 to 40 inches

Ap or A horizon:
Value—2 or 3
Chroma—2 or 3

Bt horizon:
Value—4 or 5
Chroma—3 or 4

2Bt horizon:
Hue—10YR or 7.5YR
Value—4 or 5
Chroma—3 or 4
Texture—clay loam, loam, or silt loam

2C horizon:
Hue—10YR or 7.5YR
Value—5 or 6
Chroma—3 or 4
Texture—loam or silt loam

St. Charles Series

Depth class: Very deep
Drainage class: Well drained and moderately well drained
Permeability: Moderate
Landscape: Terraces
Landform: Stream terraces
Landscape position: Ridgetops and side slopes
Parent material: Loess and outwash
Slope range: 0 to 5 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Hapludalfs

Typical Pedon

St. Charles silt loam, 2 to 5 percent slopes, 2,800 feet east and 1,840 feet north of the southwest corner of sec. 14, T. 12 N., R. 6 E.

Ap—0 to 6 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; weak fine granular structure; friable; many very fine roots; neutral; abrupt smooth boundary.

E—6 to 10 inches; brown (10YR 4/3) silt loam, light yellowish brown (10YR 6/4) dry; weak medium platy structure; friable; common very fine roots; common distinct white (10YR 8/1 dry) silt coatings on faces of peds; slightly acid; abrupt smooth boundary.

Bt1—10 to 16 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium subangular blocky structure; friable; common very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; common distinct white (10YR 8/1 dry) silt coatings on faces of peds; slightly acid; clear smooth boundary.

Bt2—16 to 28 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium angular blocky structure; friable; common very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; common distinct white (10YR 8/1 dry) silt coatings on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; slightly acid; clear smooth boundary.

Bt3—28 to 38 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure; friable; common very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; many distinct white (10YR 8/1 dry) silt coatings on faces of peds; few distinct very dark gray (10YR 3/1) organic coatings on faces of peds; strongly acid; clear smooth boundary.

Bt4—38 to 53 inches; yellowish brown (10YR 5/4) silty clay loam; moderate medium prismatic structure; friable; few very fine roots; common faint brown (10YR 4/3) clay films on faces of peds; strongly acid; clear wavy boundary.

2Bt5—53 to 60 inches; dark yellowish brown (10YR 4/4) sandy loam that has strata of loam; weak medium prismatic structure; friable; strongly acid.

Range in Characteristics

Depth to carbonates: More than 60 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: 40 to 60 inches

Ap horizon:
Value—3 or 4
Chroma—1 to 3

E horizon:
Value—4 to 6
Chroma—2 or 3

Bt horizon:
Value—4 or 5
Chroma—3 or 4

2Bt horizon:
Value—4 to 6

Chroma—3 to 6
Texture—sandy loam, loam, or clay loam

Sunbury Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate in the upper part; moderately slow in the lower part
Landscape: Uplands
Landform: Till plains
Landform position: Wide ridgetops and summits
Parent material: Loess and till
Slope range: 0 to 2 percent

Taxonomic class: Fine, montmorillonitic, mesic Aquollic Hapludalfs

Typical Pedon

Sunbury silt loam, 0 to 2 percent slopes, 100 feet east and 1,200 feet south of the northwest corner of sec. 9, T. 12 N., R. 7 E.

Ap—0 to 9 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; many fine roots; neutral; abrupt smooth boundary.

E—9 to 13 inches; brown (10YR 5/3) silt loam; moderate medium platy structure; friable; few fine roots; many distinct white (10YR 8/1 dry) silt coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—13 to 19 inches; brown (10YR 5/3) silty clay loam; few medium prominent strong brown (7.5YR 5/6) and common medium faint grayish brown (10YR 5/2) mottles; weak medium angular blocky structure; friable; common fine roots; many faint dark grayish brown (10YR 4/2) clay films and many distinct white (10YR 8/1 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt2—19 to 23 inches; brown (10YR 5/3) silty clay loam; many fine prominent strong brown (7.5YR 4/6) and common medium faint light brownish gray (10YR 6/2) mottles; moderate medium angular blocky structure; friable; common fine roots; many faint grayish brown (10YR 5/2) clay films and common distinct white (10YR 8/1 dry) silt coatings on faces of peds; medium acid; clear smooth boundary.

Bt3—23 to 41 inches; brown (10YR 5/3) silty clay loam; many coarse faint light brownish gray (10YR 6/2) and many medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; common fine roots; many faint grayish brown (10YR 5/2) clay films, common distinct very dark gray (10YR 3/1) organic coatings, and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; many prominent dark stains of iron and manganese oxide; slightly acid; clear smooth boundary.

Bt4—41 to 52 inches; brown (10YR 5/3) silty clay loam; many coarse faint light brownish gray (10YR 6/2) and many medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure; friable; common fine roots; many faint grayish brown (10YR 5/2) clay films and few distinct white (10YR 8/1 dry) silt coatings on faces of peds; many prominent dark stains of iron and manganese oxide; slightly acid; abrupt smooth boundary.

2Bt5—52 to 60 inches; yellowish brown (10YR 5/4) clay loam; few medium prominent strong brown (7.5YR 5/6) mottles; moderate medium prismatic structure; firm; few fine roots; many distinct dark grayish brown (10YR 4/2) clay films on faces of peds; many prominent dark stains of iron and manganese oxide; less than 5 percent till pebbles and shale coarse fragments; neutral.

Range in Characteristics

Depth to carbonates: More than 55 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: 30 to 50 inches

Ap horizon:
Value—2 or 3
Chroma—1 or 2

E or EB horizon:
Value—4 or 5
Chroma—2 or 3

Bt horizon:
Hue—10YR or 2.5Y
Chroma—2 to 4
Value—4 to 6
Texture—silty clay loam or silty clay

2Bt horizon:
Hue—10YR or 2.5Y
Value—5 or 6
Chroma—4 to 6
Texture—clay loam or loam

Sylvan Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Side slopes
Parent material: Calcareous loess
Slope range: 5 to 30 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Hapludalfs

Typical Pedon

Sylvan silt loam, 18 to 30 percent slopes, 1,960 feet east and 160 feet north of the southwest corner of sec. 21, T. 14 N., R. 7 E.

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate very fine granular structure; friable; many fine and few medium roots; neutral; clear smooth boundary.

E—6 to 11 inches; brown (10YR 4/3) silt loam, pale brown (10YR 6/3) dry; moderate medium platy structure; friable; common fine and few medium roots; common distinct light gray (10YR 7/2 dry) silt coatings on faces of peds; slightly acid; clear smooth boundary.

Bt1—11 to 16 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine angular blocky structure; friable; common fine and few medium roots; many faint brown (10YR 4/3) clay films on faces of peds; medium acid; clear smooth boundary.

Bt2—16 to 23 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate medium angular blocky structure; friable; few fine and few medium roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

BC—23 to 26 inches; dark yellowish brown (10YR 4/4) silt loam; weak medium angular blocky structure; friable; few medium roots; few faint brown (10YR 4/3) clay films on faces of peds; slight effervescence; mildly alkaline; clear smooth boundary.

C1—26 to 44 inches; yellowish brown (10YR 5/4) silt loam; many medium distinct light brownish gray (10YR 6/2) and few fine distinct yellowish brown (10YR 5/6) mottles; massive; friable; few medium roots; strong effervescence; mildly alkaline; clear smooth boundary.

C2—44 to 60 inches; yellowish brown (10YR 5/4) and light brownish gray (10YR 6/2) silt loam; few fine prominent strong brown (7.5YR 5/6) mottles; massive; friable; strong effervescence; mildly alkaline.

Range in Characteristics

Depth to carbonates: 22 to 40 inches
Depth to bedrock: More than 60 inches
Thickness of the loess: More than 60 inches

Ap horizon:
Value—4 or 5
Chroma—2 to 4
Texture—silt loam or silty clay loam

Bt horizon:
Value—4 or 5
Chroma—4 to 6
Texture—silt loam or silty clay loam

C horizon:
Value—4 to 6
Chroma—2 to 6

Tama Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderate
Landscape: Uplands
Landform: Till plains
Landform position: Ridgetops and side slopes
Parent material: Loess
Slope range: 0 to 10 percent

Taxonomic class: Fine-silty, mixed, mesic Typic Argiudolls

Taxadjunct feature: Tama silt loam, 2 to 5 percent slopes, eroded, Tama silt loam, 5 to 10 percent slopes, eroded, and Tama silty clay loam, 5 to 10 percent slopes, severely eroded, have a thinner dark surface layer than is defined as the range for the series. As a result, they are classified as fine-silty, mixed, mesic Mollic Hapludalfs.

Typical Pedon

Tama silt loam, 2 to 5 percent slopes, 2,240 feet south and 220 feet east of the northwest corner of sec. 20, T. 13 N., R. 5 E.

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common very fine roots; slightly acid; abrupt smooth boundary.

A—6 to 11 inches; very dark grayish brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common very fine roots; slightly acid; clear smooth boundary.

Bt1—11 to 17 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; common very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt2—17 to 25 inches; dark yellowish brown (10YR 4/4) silty clay loam; moderate fine subangular blocky structure; friable; common very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; common distinct very dark grayish brown (10YR 3/2) organic coatings on faces of peds in the upper part; slightly acid; clear smooth boundary.

Bt3—25 to 34 inches; dark yellowish brown (10YR 4/4)

silty clay loam; few medium faint yellowish brown (10YR 5/4) mottles in the lower part; moderate medium subangular blocky structure; friable; common very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt4—34 to 47 inches; yellowish brown (10YR 5/4) silty clay loam; common medium distinct brown (7.5YR 4/4) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; few medium soft accumulations of iron oxide; slightly acid; clear smooth boundary.

Bt5—47 to 56 inches; yellowish brown (10YR 5/4) silty clay loam; many medium distinct brown (7.5YR 4/4) and few medium distinct grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; few very fine roots; many faint brown (10YR 4/3) clay films on faces of peds; slightly acid; clear smooth boundary.

BC—56 to 60 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct brown (7.5YR 4/4) and many distinct grayish brown (10YR 5/2) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; friable; common faint brown (10YR 4/3) clay films on faces of peds; slightly acid.

Range in Characteristics

Depth to carbonates: More than 48 inches
Depth to bedrock: More than 60 inches
Thickness of the mollic epipedon: 10 to 24 inches
Thickness of the loess: More than 60 inches

Ap or A horizon:
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
Texture—silt loam or silty clay loam

C horizon:
Value—4 or 5
Chroma—2 to 6

Thorp Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow in the upper part; moderately rapid in the lower part
Landscape: Uplands
Landform: Outwash plains
Landscape position: Depressions
Parent material: Loess and outwash
Slope range: 0 to 2 percent

Taxonomic class: Fine-silty, mixed, mesic Argiaquic Argialbolls

Typical Pedon

Thorp silt loam, 100 feet north and 300 feet west of the center of sec. 4, T. 14 N., R. 7 E.

Ap—0 to 11 inches; very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; moderate fine granular structure; friable; common fine roots; neutral; abrupt smooth boundary.

Eg—11 to 15 inches; dark grayish brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; common fine distinct yellowish brown (10YR 5/6) mottles; weak medium platy structure parting to moderate medium granular; friable; few fine roots; neutral; abrupt smooth boundary.

Btg1—15 to 20 inches; grayish brown (2.5Y 5/2) silty clay loam; common fine prominent yellowish brown (10YR 5/6) mottles; moderate fine angular blocky structure; firm; common fine roots; many prominent very dark gray (10YR 3/1) clay films on faces of peds; slightly acid; clear smooth boundary.

Btg2—20 to 37 inches; grayish brown (2.5Y 5/2) silty clay loam; many fine prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure parting to moderate medium angular blocky; firm; common fine roots; many faint dark grayish brown (2.5Y 4/2) clay films on faces of peds; few fine soft dark accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

Btg3—37 to 45 inches; grayish brown (2.5Y 5/2) silty clay loam; many medium prominent yellowish brown (10YR 5/6) mottles; moderate medium prismatic structure; firm; few fine roots; few faint dark grayish brown (2.5Y 4/2) clay films on faces of peds; few fine soft dark accumulations of iron and manganese oxide; slightly acid; clear smooth boundary.

2Btg4—45 to 60 inches; grayish brown (10YR 5/2) sandy loam; few fine distinct yellowish brown (10YR 5/4) mottles; weak medium subangular blocky structure; firm; many distinct dark grayish brown (2.5Y 4/2) clay bridges between sand grains; neutral.

Range in Characteristics

Depth to carbonates: More than 40 inches
Depth to bedrock: More than 60 inches

Thickness of the mollic epipedon: 10 to 14 inches
Thickness of the loess: 40 to 54 inches

A horizon:
Value—2 or 3
Chroma—1 or 2

E horizon:
Hue—10YR or 2.5Y
Value—4 to 6
Chroma—1 or 2

Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—1 or 2
Texture—silty clay loam or silt loam

2Btg horizon:
Hue—10YR, 2.5Y, or 5Y
Value—4 to 6
Chroma—0 to 8
Texture—sandy loam, sandy clay loam, loam, or clay loam

Formation of the Soils

Soil forms through processes that act on deposited or accumulated geologic material. The soil characteristics at any given point are determined by the physical and mineralogical composition of the parent material; the climate under which the soil material accumulated and has existed since accumulation; the plant and animal life on and in the soil; the relief, or lay of the land; and the length of time that the forces of soil formation have acted on the parent material *(4)*.

Climate and plant and animal life are the active factors of soil formation. They act directly on the parent material either in place or after relocation by water, glaciers, or wind and slowly change it into a natural body that has genetically related horizons. Relief can modify the effects of climate and plant and animal life through its influence on natural drainage, runoff, erosion, plant cover, and soil temperature. The parent material affects the kind of soil profile that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for the transformation of parent material into a soil that has differentiated horizons. Generally, a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless the effects of the other factors are understood.

Parent Material

Parent material is the unconsolidated geologic material in which soils formed. It affects the chemical and mineralogical composition of the soil and, to a large extent, the rate at which soil-forming processes take place. The soils in Stark County formed in a variety of parent materials, including loess, alluvium, glacial till, material weathered from bedrock, and glacial outwash.

Loess, or wind-deposited silty material, is the most extensive parent material in the survey area. The major source of this loess is the Illinois and Mississippi River Valleys, although some smaller streams also may have been sources. These sediments were exposed to the wind when rivers swollen with glacial meltwater from the Wisconsinan glaciers dried seasonally and as the glaciers retreated. In many cases the loess was transported over a distance of many miles.

The loess covered the Illinoian till in the western part of the county and the Wisconsinan till and outwash in the eastern part with depths ranging to 9 feet. Soils that formed entirely in loess in the upper 5 feet make up about 55 percent of the survey area. Most of the upland soils in the western part of the county formed in loess. Examples are Muscatine, Sable, Rozetta, and Tama soils.

Alluvial sediments were deposited mainly during periods of stream overflow. They make up about 5 percent of the survey area. The alluvial deposits are throughout the county, but the major deposits are along the Spoon River and Indian Creek. The width of the areas ranges from less than ⅛ mile along minor streams and the smaller drainageways to nearly 1 mile along major streams. The sediments generally are silty. In many areas the soils have a buried horizon of darker soil material. A few places have deposits of sand on the surface. Lawson, Sawmill, Radford, and Huntsville soils are examples of soils that formed in alluvium.

Glacial till is material laid down directly by glaciers with a minimum of water action. It consists of particles of different sizes mixed together. The small pebbles in glacial till generally have distinct edges and corners, indicating that they have not been subject to intense abrasion and washing by water. The glacial till in western Stark County was deposited during the Illinoian Stage *(6)*. It is generally loam or clay loam. Soils that formed in this material generally are on strongly sloping to very steep side slopes. They make up about 2 percent of the survey area. Hickory soils are examples.

In some areas a very firm layer high in content of clay is in the upper few feet of the Illinoian till. This layer is a paleosol, which formed during the Sangamonian stage, between the Illinoian and Wisconsinan stages *(6)*. During the Sangamonian stage, the glacial till was the surface deposit. It was subject to soil-forming processes. During the Wisconsinan stage, the glacial till was buried by loess

deposits. Assumption and Elco soils formed in a paleosol of till under a thin layer of loess.

The glacial till in eastern Stark County was deposited during the Wisconsinan stage *(6)*. It is generally loam or clay loam. Soils that formed in this material generally are on sloping to steep side slopes. They make up about 1 percent of the survey area. La Rose and Miami soils are examples.

Much of the Wisconsinan till also occurs under a mantle of loess about 3 to 5 feet thick in the eastern part of the county. Soils that formed in these materials are in nearly level and gently sloping areas. They make up about 15 percent of the county. They include Catlin and Flanagan soils.

In other areas the thin mantle of loess is underlain by glacial outwash. In a few areas the outwash is exposed at the surface. About 12 percent of the survey area is made up of these soils in nearly level to steep areas. Elburn, Plano, Camden, Drummer, and St. Charles soils are examples.

Pennsylvanian-age bedrock underlies most of the unconsolidated deposits throughout the county.

Material weathered from this shale bedrock dominates the strongly sloping to very steep areas adjacent to many streams and drainageways in the western part of the county. Marseilles soils formed in this material.

Plant and Animal Life

Soils are greatly affected by the type of vegetation under which they formed. The chief contribution of the vegetation and biological processes to soil formation is the addition of organic matter and nitrogen to the soil. The kind of organic material in the soil depends primarily on the kinds of native plants that grew on the soil. The remains of these plants accumulated on the surface, decayed, and eventually became organic matter or humus. The roots of the plants added organic matter as they decayed. They also provided channels for the downward movement of water through the soil.

The native vegetation in the survey area was mainly tall prairie grasses and deciduous hardwood trees. The tall prairie grasses covered about 77 percent of the area. Their many fine, fibrous roots added large amounts of organic matter to the soil as they decayed. Soils that formed under prairie vegetation, therefore, have a thick, black or dark brown surface layer. The prairie soils in the county are generally on broad upland summits between streams. Muscatine, Sable, Ipava, and Tama soils formed under prairie vegetation.

Much of the land along watercourses was originally covered with timber. This land made up about 30 percent of the survey area. The deciduous hardwood trees contributed organic matter to the soil, mainly in the form of leaf litter. The root systems were less fibrous than those of grasses and generally were not concentrated near the surface. Therefore, soils that formed under woodland vegetation have a surface soil that is thinner and lighter colored than that of soils that formed under prairie grasses. Rozetta, Hickory, Fayette, and Marseilles soils formed under woodland vegetation.

Although plants have been the major living organisms affecting soil formation, micro-organisms, earthworms, insects, and large burrowing animals that live in or on the soil have also affected soil formation. Bacteria and fungi help to break down and decompose dead plants and animals and transform them into humus. Burrowing animals, such as earthworms, cicadas, and ground squirrels, help to incorporate the humus into the soil. Humus is very important in the development of soil structure and good tilth. Human activities, such as clearing forests, surface mining, cultivating, and applying fertilizer, also affect soil formation.

Climate

Stark County has a temperate, humid, midcontinental climate. The climate is essentially uniform throughout the county. Climatic differences are too small to have caused any obvious differences among the soils, except where its effect is modified locally by relief.

Climate affects soil formation through its effects on weathering, plant and animal life, and erosion. Water from rains and melting snow seeps slowly downward through the soil and causes physical and chemical changes. As the water moves downward, clay is moved from the surface layer to the subsoil, where it accumulates. The water dissolves minerals and moves them downward through the soil. This leaching has removed free lime from the upper layers of most of the soils in Stark County. The temperature of the soil is also important. Rainfall on frozen soil does not facilitate soil formation if it runs off the surface. Many of the processes of soil formation are halted or slowed when the soil is frozen.

Climate also influences the kind and extent of plant and animal life. The climate in Stark County has favored tall prairie grasses and deciduous hardwood forests. It also has favored the decomposition of plants and animals, which are incorporated into the soil.

Heavy rains are harmful if they fall on soils that are bare of vegetation. Early spring rains can also cause extensive erosion when the soil is partially frozen. The freezing restricts the rate of water infiltration and thus increases the runoff rate.

Relief

Some differences in soils are the result of relief, or local changes in elevation. Soil drainage, runoff, and the degree of erosion or deposition are all affected by the relief of an area. As slope increases, the rate of runoff and the hazard of erosion increase and the rate of soil formation decreases. Depth to the water table can influence the kind of soil that forms in an area. A water table in a sloping soil generally is at a greater depth than one in a nearly level or depressional soil, even though both soils formed in similar kinds of parent material.

Time

The evaluation of time as a factor in soil formation is difficult because of the combined effects of the other soil-forming factors. Generally, the longer the soil is subject to a soil-forming factor, the more strongly developed it is. However, an apparently young, slightly weathered soil and an apparently old, strongly weathered soil may develop in the same period of time depending on the other factors of soil formation. Soils also form more rapidly in materials containing low amounts of carbonates than in materials containing greater amounts.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

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, K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bench terrace. A raised, level or nearly level strip of earth constructed on or nearly on the contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or "chain," of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil. A soil that is, by volume, more than 15 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches along the longest axis. A single piece is called a channer.

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 (flagstone) 15 to 38 centimeters (6 to 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.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

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.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

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.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Esker (geology). A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

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 ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, or clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 38 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant not a grass or a sedge.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

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.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 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.

Lacustrine deposit (geology). Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

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).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Munsell notation. A designation of color by degrees of three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

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.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
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.

Rippable. Bedrock or hardpan can be excavated using

a single-tooth ripping attachment mounted on a tractor with a 200-300 drawbar horsepower rating.

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.

Saprolite (soil science). Unconsolidated residual material underlying the soil and grading to hard bedrock below.

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 underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and 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.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

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.

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.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Sloughed till. Water-saturated till that has flowed slowly downhill from its original place of deposit by glacial ice. It may rest on other till, on glacial outwash, or on a glaciolacustrine deposit.

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 underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter 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 grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from soil blowing and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Any surface soil horizon (A, E, AB, or EB) below the surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from about 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Surface soil. The A, E, AB, and EB horizons. It includes all subdivisions of these horizons.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay.* The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). A layer of otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material

rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

(Recorded in the period 1951-80 at Princeville, Illinois)

Month	Temperature						Precipitation				
				2 years in 10 will have--				2 years in 10 will have--			
	Average daily maximum	Average daily minimum	Average	Maximum temperature higher than--	Minimum temperature lower than--	Average number of growing degree days*	Average	Less than--	More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January	28.7	11.8	20.3	56	-18	0	1.39	0.52	2.11	3	5.9
February	34.7	16.9	25.8	62	-13	1	1.15	.52	1.69	3	4.2
March	48.1	28.9	38.5	77	3	30	2.60	1.26	3.76	5	4.3
April	63.0	40.8	51.9	85	22	145	3.88	2.33	5.28	6	.9
May	73.4	50.3	61.9	91	30	371	3.81	2.30	5.17	7	.0
June	82.3	59.7	71.0	94	42	624	3.97	2.08	5.63	6	.0
July	84.9	62.9	73.9	97	47	723	4.04	2.42	5.49	6	.0
August	83.1	61.4	72.3	94	45	676	3.25	1.52	4.75	5	.0
September	76.8	53.3	65.0	92	34	440	3.61	1.65	5.52	5	.0
October	64.9	43.1	54.0	86	22	187	2.76	1.01	4.22	5	.2
November	49.7	31.9	40.8	75	5	34	1.84	1.05	2.55	4	2.5
December	35.7	20.2	27.9	64	-12	3	1.80	.68	2.73	3	6.0
Yearly:											
Average	60.4	40.1	50.3	---	---	---	---	---	---	---	---
Extreme	102	-22	---	98	-18	---	---	---	---	---	---
Total	---	---	---	---	---	3,234	34.10	28.16	39.34	58	24.0

* 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 1951-80 at Princeville, Illinois)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 17	Apr. 26	May 11
2 years in 10 later than--	Apr. 11	Apr. 21	May 5
5 years in 10 later than--	Mar. 29	Apr. 12	Apr. 23
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 18	Oct. 8	Oct. 1
2 years in 10 earlier than--	Oct. 24	Oct. 13	Oct. 6
5 years in 10 earlier than--	Nov. 4	Oct. 24	Oct. 16

TABLE 3.--GROWING SEASON

(Recorded in the period 1951-80 at Princeville, 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	184	169	152
8 years in 10	193	176	160
5 years in 10	210	192	175
2 years in 10	227	207	190
1 year in 10	236	214	198

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Acres	Percent
8D2	Hickory silt loam, 10 to 18 percent slopes, eroded	1,060	0.6
8D3	Hickory clay loam, 10 to 18 percent slopes, severely eroded	775	0.4
8F	Hickory silt loam, 18 to 30 percent slopes	1,760	1.0
8G	Hickory loam, 30 to 50 percent slopes	215	0.1
17A	Keomah silt loam, 0 to 2 percent slopes	1,865	1.0
19C3	Sylvan silty clay loam, 5 to 10 percent slopes, severely eroded	1,075	0.6
19D3	Sylvan silty clay loam, 10 to 18 percent slopes, severely eroded	2,355	1.3
19F	Sylvan silt loam, 18 to 30 percent slopes	785	0.4
27D3	Miami clay loam, 10 to 18 percent slopes, severely eroded	240	0.1
27F	Miami silt loam, 18 to 30 percent slopes	380	0.2
36A	Tama silt loam, 0 to 2 percent slopes	720	0.4
36B	Tama silt loam, 2 to 5 percent slopes	23,900	13.0
36B2	Tama silt loam, 2 to 5 percent slopes, eroded	4,340	2.4
36C2	Tama silt loam, 5 to 10 percent slopes, eroded	7,700	4.2
36C3	Tama silty clay loam, 5 to 10 percent slopes, severely eroded	410	0.2
41A	Muscatine silt loam, 0 to 2 percent slopes	5,290	2.9
43A	Ipava silt loam, 0 to 2 percent slopes	25,500	13.9
45	Denny silt loam	160	0.1
59A	Lisbon silt loam, 0 to 2 percent slopes	100	0.1
60C2	La Rose silt loam, 5 to 10 percent slopes, eroded	460	0.2
67	Harpster silty clay loam	1,000	0.5
68	Sable silty clay loam	1,750	1.0
68+	Sable silt loam, overwash	260	0.1
119C2	Elco silt loam, 5 to 10 percent slopes, eroded	265	0.1
119D2	Elco silt loam, 10 to 18 percent slopes, eroded	890	0.5
119D3	Elco silty clay loam, 10 to 18 percent slopes, severely eroded	615	0.3
119F2	Elco silt loam, 18 to 25 percent slopes, eroded	405	0.2
131D	Alvin sandy loam, 8 to 15 percent slopes	355	0.2
131F	Alvin sandy loam, 15 to 30 percent slopes	180	0.1
134C2	Camden silt loam, 5 to 10 percent slopes, eroded	1,810	1.0
134D2	Camden silt loam, 10 to 18 percent slopes, eroded	260	0.1
145B2	Saybrook silt loam, 2 to 5 percent slopes, eroded	830	0.5
145C2	Saybrook silt loam, 5 to 10 percent slopes, eroded	2,250	1.2
148B	Proctor silt loam, 2 to 5 percent slopes	605	0.3
148C2	Proctor silt loam, 5 to 10 percent slopes, eroded	650	0.4
152	Drummer silty clay loam	4,560	2.5
154A	Flanagan silt loam, 0 to 2 percent slopes	4,610	2.5
171B	Catlin silt loam, 2 to 5 percent slopes	5,890	3.2
171B2	Catlin silt loam, 2 to 5 percent slopes, eroded	2,475	1.3
171C2	Catlin silt loam, 5 to 10 percent slopes, eroded	1,230	0.7
198A	Elburn silt loam, 0 to 2 percent slopes	7,430	4.0
199A	Plano silt loam, 0 to 2 percent slopes	3,140	1.7
199B	Plano silt loam, 2 to 5 percent slopes	3,610	2.0
199B2	Plano silt loam, 2 to 5 percent slopes, eroded	1,410	0.8
206	Thorp silt loam	455	0.2
234A	Sunbury silt loam, 0 to 2 percent slopes	665	0.4
243A	St. Charles silt loam, 0 to 2 percent slopes	365	0.2
243B	St. Charles silt loam, 2 to 5 percent slopes	1,450	0.8
257A	Clarksdale silt loam, 0 to 2 percent slopes	885	0.5
259C2	Assumption silt loam, 5 to 10 percent slopes, eroded	640	0.3
259D2	Assumption silt loam, 10 to 18 percent slopes, eroded	1,060	0.6
259D3	Assumption silty clay loam, 10 to 18 percent slopes, severely eroded	435	0.2
279B	Rozetta silt loam, 2 to 5 percent slopes	4,700	2.6
279C2	Rozetta silt loam, 5 to 10 percent slopes, eroded	5,760	3.1
279C3	Rozetta silty clay loam, 5 to 10 percent slopes, severely eroded	405	0.2
280D2	Fayette silt loam, 10 to 18 percent slopes, eroded	1,550	0.8
319	Aurelius muck	260	0.1
323D3	Casco clay loam, 10 to 18 percent slopes, severely eroded	215	0.1
379C2	Dakota silt loam, 5 to 10 percent slopes, eroded	510	0.3
386B	Downs silt loam, 2 to 5 percent slopes	2,500	1.4
386C2	Downs silt loam, 5 to 10 percent slopes, eroded	2,490	1.4
448C2	Mona silt loam, 5 to 10 percent slopes, eroded	400	0.2
448D3	Mona clay loam, 10 to 18 percent slopes, severely eroded	375	0.2
549C2	Marseilles silt loam, 5 to 10 percent slopes, eroded	180	0.1
549D2	Marseilles silt loam, 10 to 18 percent slopes, eroded	365	0.2

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS--Continued

Map symbol	Soil name	Acres	Percent
549F	Marseilles silt loam, 18 to 30 percent slopes	570	0.3
549G	Marseilles silt loam, 30 to 60 percent slopes	285	0.2
567C2	Elkhart silt loam, 5 to 10 percent slopes, eroded	8,650	4.7
567C3	Elkhart silty clay loam, 5 to 10 percent slopes, severely eroded	800	0.4
709A	Osceola silt loam, 0 to 2 percent slopes	390	0.2
753B	Massbach silt loam, 2 to 5 percent slopes	450	0.2
820G	Hennepin-Casco complex, 30 to 60 percent slopes	230	0.1
871B	Lenzburg silt loam, 1 to 7 percent slopes, stony	465	0.3
871D	Lenzburg silty clay loam, 7 to 20 percent slopes, stony	1,300	0.7
871G	Lenzburg silty clay loam, 20 to 70 percent slopes, stony	925	0.5
872B	Rapatee silt loam, 1 to 7 percent slopes	100	0.1
3107	Sawmill silty clay loam, frequently flooded	125	0.1
3107+	Sawmill silt loam, overwash, frequently flooded	3,550	1.9
3451	Lawson silt loam, frequently flooded	7,500	4.1
8074	Radford silt loam, occasionally flooded	4,830	2.6
8076	Otter silt loam, occasionally flooded	460	0.2
8077	Huntsville silt loam, occasionally flooded	1,840	1.0
	Water	410	0.2
	Total	184,115	100.0

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
36A	Tama silt loam, 0 to 2 percent slopes
36B	Tama silt loam, 2 to 5 percent slopes
36B2	Tama silt loam, 2 to 5 percent slopes, eroded
41A	Muscatine silt loam, 0 to 2 percent slopes
43A	Ipava silt loam, 0 to 2 percent slopes
45	Denny silt loam
59A	Lisbon silt loam, 0 to 2 percent slopes
67	Harpster silty clay loam (where drained)
68	Sable silty clay loam (where drained)
68+	Sable silt loam, overwash (where drained)
145B2	Saybrook silt loam, 2 to 5 percent slopes, eroded
148B	Proctor silt loam, 2 to 5 percent slopes
152	Drummer silty clay loam (where drained)
154A	Flanagan silt loam, 0 to 2 percent slopes
171B	Catlin silt loam, 2 to 5 percent slopes
171B2	Catlin silt loam, 2 to 5 percent slopes, eroded
198A	Elburn silt loam, 0 to 2 percent slopes
199A	Plano silt loam, 0 to 2 percent slopes
199B	Plano silt loam, 2 to 5 percent slopes
199B2	Plano silt loam, 2 to 5 percent slopes, eroded
206	Thorp silt loam (where drained)
234A	Sunbury silt loam, 0 to 2 percent slopes
243A	St. Charles silt loam, 0 to 2 percent slopes
243B	St. Charles silt loam, 2 to 5 percent slopes
257A	Clarksdale silt loam, 0 to 2 percent slopes
279B	Rozetta silt loam, 2 to 5 percent slopes
386B	Downs silt loam, 2 to 5 percent slopes
709A	Osceola silt loam, 0 to 2 percent slopes
753B	Massbach silt loam, 2 to 5 percent slopes
872B	Rapatee silt loam, 1 to 7 percent slopes
3107	Sawmill silty clay loam, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
3107+	Sawmill silt loam, overwash, frequently flooded (where drained and either protected from flooding or not frequently flooded during the growing season)
3451	Lawson silt loam, frequently flooded
8074	Radford silt loam, occasionally flooded
8076	Otter silt loam, occasionally flooded (where drained)
8077	Huntsville silt loam, occasionally flooded

TABLE 6.--LAND CAPABILITY AND YIELDS PER ACRE OF CROPS AND PASTURE

(Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil)

Soil name and map symbol	Land capability	Corn	Soybeans	Winter wheat	Oats	Orchardgrass-alfalfa hay	Bromegrass-alfalfa
		Bu	Bu	Bu	Bu	Tons	AUM*
8D2---------- Hickory	IIIe	72	23	26	50	2.7	4.5
8D3---------- Hickory	IVe	---	---	---	---	2.5	4.1
8F---------- Hickory	VIe	---	---	---	---	2.4	4.0
8G---------- Hickory	VIIe	---	---	---	---	---	3.0
17A---------- Keomah	IIw	131	44	---	72	---	8.8
19C3---------- Sylvan	IVe	97	30	46	57	---	7.2
19D3---------- Sylvan	IVe	93	29	44	55	---	6.9
19F---------- Sylvan	VIe	---	---	---	---	---	6.2
27D3---------- Miami	VIe	---	---	---	---	---	---
27F---------- Miami	VIe	---	---	---	---	---	---
36A---------- Tama	I	155	46	62	89	---	9.8
36B---------- Tama	IIe	153	46	61	88	---	9.7
36B2---------- Tama	IIe	149	44	---	85	---	9.4
36C2---------- Tama	IIIe	146	43	---	84	---	9.2
36C3---------- Tama	IVe	135	40	---	77	---	8.5
41A---------- Muscatine	I	170	57	---	102	---	11.4
43A---------- Ipava	I	163	52	66	91	---	---
45---------- Denny	IIIw	113	37	47	62	---	---
59A---------- Lisbon	I	155	51	63	92	5.9	9.8

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*
60C2---------- La Rose	IIIe	116	39	49	70	4.5	7.5
67---------- Harpster	IIw	136	44	52	74	---	---
68, 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
119D3---------- Elco	IVe	93	---	39	53	3.7	6.1
119F2---------- Elco	VIe	---	---	---	---	3.7	6.1
131D---------- Alvin	IIIe	92	31	45	---	4.0	6.7
131F---------- Alvin	VIe	---	---	---	---	3.1	5.3
134C2---------- Camden	IIIe	117	37	52	68	4.7	7.8
134D2---------- Camden	IIIe	113	35	50	65	4.5	7.5
145B2---------- Saybrook	IIe	133	44	57	81	5.4	8.9
145C2---------- Saybrook	IIIe	131	43	56	79	5.3	8.7
148B---------- Proctor	IIe	143	44	58	87	5.4	9.1
148C2---------- Proctor	IIIe	135	41	55	83	5.2	8.6
152---------- Drummer	IIw	154	51	61	83	---	9.2
154A---------- Flanagan	I	162	52	67	92	6.1	10.2
171B---------- Catlin	IIe	149	46	60	86	5.7	9.6
171B2---------- Catlin	IIe	144	44	59	84	5.6	9.3
171C2---------- Catlin	IIIe	141	43	57	82	5.5	9.1

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*
198A---------- Elburn	I	161	50	63	94	6.1	10.2
199A---------- Plano	I	151	45	60	90	---	9.7
199B---------- Plano	IIe	150	45	59	89	---	9.6
199B2---------- Plano	IIe	145	43	58	86	---	9.3
206---------- Thorp	IIw	110	38	44	63	4.2	---
234A---------- Sunbury	I	149	45	62	84	---	8.1
243A---------- St. Charles	I	127	40	56	73	---	8.2
243B---------- St. Charles	IIe	126	39	55	72	---	8.1
257A---------- Clarksdale	I	140	43	57	79	---	---
259C2---------- Assumption	IIIe	120	37	52	72	4.7	7.8
259D2---------- Assumption	IIIe	116	35	51	70	4.6	7.6
259D3---------- Assumption	IVe	91	---	40	55	3.6	5.9
279B---------- Rozetta	IIe	130	40	53	72	5.1	8.6
279C2---------- Rozetta	IIIe	123	38	51	69	4.9	8.2
279C3---------- Rozetta	IVe	112	35	46	62	4.4	7.4
280D2---------- Fayette	IIIe	114	38	---	68	---	8.0
319---------- Aurelius	IIIw	90	30	---	---	---	---
323D3---------- Casco	VIe	---	---	---	---	---	---
379C2---------- Dakota	IIIe	95	31	---	55	---	---
386B---------- Downs	IIe	147	43	58	82	---	9.2

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*
386C2---------- Downs	IIIe	149	50	---	89	---	10.5
448C2---------- Mona	IIIe	108	35	48	70	4.2	7.1
448D3---------- Mona	VIe	---	---	---	---	3.2	6.2
549C2---------- Marseilles	IIIe	95	33	42	59	4.0	6.7
549D2---------- Marseilles	IVe	90	---	40	56	3.8	6.3
549F---------- Marseilles	VIIe	---	---	---	---	---	5.4
549G---------- Marseilles	VIIe	100	38	44	62	4.1	3.3
567C2---------- Elkhart	IIIe	128	38	51	71	4.9	8.2
567C3---------- Elkhart	IVe	115	---	46	64	4.4	7.4
709A---------- Osceola	IIw	110	35	44	62	4.4	---
753B---------- Massbach	IIe	105	35	46	69	4.4	7.2
820G---------- Hennepin-Casco	VIe	---	---	---	---	---	---
871B---------- Lenzburg	IIe	---	---	---	---	3.4	5.5
871D---------- Lenzburg	VIe	---	---	---	---	2.5	4.2
871G---------- Lenzburg	VIIe	---	---	---	---	---	3.8
872B---------- Rapatee	IIe	100	35	47	---	4.2	4.5
3107, 3107+----- Sawmill	IIIw	132	42	---	---	---	---
3451---------- Lawson	IIIw	120	39	---	72	---	---
8074---------- Radford	IIw	114	37	49	67	---	7.4

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*
8076---------- Otter	IIw	136	44	47	65	---	---
8077---------- Huntsville	IIw	106	34	45	60	4.1	6.8

* 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	Windthrow hazard	Common trees	Site index	Productivity class*	
8D2, 8D3-------- Hickory	5A	Slight	Slight	Slight	Slight	White oak---------- Northern red oak---- Black oak---------- Green ash---------- Bitternut hickory--- Yellow-poplar--------	85 85 --- --- --- 95	5 5 --- --- --- 7	White oak, yellow-poplar, eastern white pine, red pine, sugar maple, black walnut.
8F-------------- Hickory	5R	Moderate	Moderate	Slight	Slight	White oak---------- Northern red oak---- Black oak---------- Green ash---------- Bitternut hickory--- Yellow-poplar--------	85 85 --- --- --- 95	5 5 --- --- --- 7	White oak, yellow-poplar, eastern white pine, red pine, sugar maple, black walnut.
8G-------------- Hickory	5R	Severe	Severe	Slight	Slight	White oak---------- Northern red oak---- Black oak---------- Green ash---------- Bitternut hickory--- Yellow-poplar--------	85 85 --- --- --- 95	5 5 --- --- --- 7	White oak, yellow-poplar, eastern white pine, red pine, sugar maple, black walnut.
17A------------- Keomah	3A	Slight	Slight	Slight	Slight	White oak---------- Northern red oak----	65 70	3 4	Eastern white pine, white oak, red pine, northern red oak, black walnut, sugar maple.
19C3, 19D3------ Sylvan	6A	Slight	Slight	Slight	Slight	Yellow-poplar------- White oak---------- Northern red oak---- Black walnut--------	90 80 80 ---	6 4 4 ---	White oak, black walnut, northern red oak, green ash, eastern white pine, red pine, sugar maple.
19F------------- Sylvan	6R	Moderate	Moderate	Moderate	Slight	Yellow-poplar------- White oak---------- Northern red oak---- Black walnut--------	90 80 80 ---	6 4 4 ---	White oak, black walnut, northern red oak, green ash, eastern white pine, red pine, sugar maple.
27D3------------ Miami	5A	Slight	Slight	Slight	Slight	White oak---------- Yellow-poplar------- Sweetgum----------	90 98 76	5 7 5	Yellow-poplar, eastern white pine, red pine, white ash, 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	Windthrow hazard	Common trees	Site index	Productivity class*	
27F---------- Miami	5R	Moderate	Moderate	Slight	Slight	White oak----------	90	5	Yellow-poplar, eastern white pine, red pine, white ash, black walnut.
						Yellow-poplar-------	98	7	
						Sweetgum----------	76	5	
119C2, 119D2, 119D3---------- 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--------	---	---	
119F2---------- Elco	4R	Moderate	Moderate	Moderate	Slight	White oak----------	80	4	White oak, northern red oak, black walnut, green ash, eastern white pine, white ash.
						Northern red oak----	---	---	
						Black walnut--------	---	---	
131D---------- Alvin	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Green ash, black walnut, yellow-poplar, white oak, eastern white pine, American sycamore, sugar maple.
						Northern red oak----	80	4	
						Black walnut--------	---	---	
						Yellow-poplar-------	90	6	
131F---------- Alvin	4R	Moderate	Moderate	Slight	Slight	White oak----------	80	4	Green ash, black walnut, yellow-poplar, white oak, eastern white pine, American sycamore, sugar maple.
						Northern red oak----	80	4	
						Black walnut--------	---	---	
						Yellow-poplar-------	90	6	
134C2---------- Camden	7A	Slight	Slight	Slight	Slight	Yellow-poplar-------	95	7	Yellow-poplar, white oak, green ash, black walnut, eastern white pine, red pine, black locust, white ash.
						White oak----------	85	5	
						Northern red oak----	85	5	
						Sweetgum----------	80	6	
						Green ash----------	76	5	

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	Windthrow hazard	Common trees	Site index	Productivity class*	
134D2---------- Camden	7R	Moderate	Moderate	Slight	Slight	Yellow-poplar-------	95	7	Yellow-poplar, white oak, green ash, black walnut, eastern white pine, red pine, black locust, white ash.
						White oak----------	85	5	
						Northern red oak----	85	5	
						Sweetgum-----------	80	6	
						Green ash----------	76	5	
243A, 243B------ St. Charles	7A	Slight	Slight	Slight	Slight	Yellow-poplar-------	95	7	White oak, black walnut, sugar maple, eastern white pine, red pine.
						White oak----------	85	5	
						Northern red oak----	85	5	
						Sweetgum-----------	---	---	
						Green ash----------	---	---	
257A---------- Clarksdale	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Black walnut, American sycamore, yellow-poplar, white oak, green ash.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						Black walnut--------	---	---	
279B, 279C2----- Rozetta	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Eastern white pine, northern red oak, green ash, Scotch pine, yellow-poplar.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						Black walnut--------	---	---	
279C3---------- Rozetta	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Eastern white pine, northern red oak, green ash, yellow-poplar.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						Black walnut--------	---	---	
280D2---------- Fayette	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Northern red oak, yellow-poplar, eastern white pine, green ash.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						Black walnut--------	---	---	
323D3---------- Casco	4S	Slight	Slight	Moderate	Slight	White oak----------	70	4	Red pine.
						Red pine-----------	78	10	
						Eastern white pine--	85	14	
						Jack pine----------	68	7	
386B, 386C2----- Downs	4A	Slight	Slight	Slight	Slight	White oak----------	80	4	Northern red oak, yellow-poplar, eastern white pine, green ash.
						Northern red oak----	80	4	
						Yellow-poplar-------	90	6	
						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	Windthrow hazard	Common trees	Site index	Productivity class*	
549D2---------- Marseilles	3A	Slight	Slight	Slight	Slight	White oak----------	66	3	White oak, northern red oak, black oak, white ash, eastern white pine, Scotch pine, black walnut.
						Northern red oak----	66	3	
						Black oak----------	---	---	
						White ash----------	---	---	
549F---------- Marseilles	3R	Moderate	Moderate	Slight	Slight	White oak----------	66	3	White oak, northern red oak, black oak, white ash, eastern white pine, Scotch pine, black walnut.
						Northern red oak----	66	3	
						Black oak----------	---	---	
						White ash----------	---	---	
549G---------- Marseilles	3R	Severe	Severe	Slight	Slight	White oak----------	66	3	White oak, northern red oak, black oak, white ash, eastern white pine, Scotch pine, black walnut.
						Northern red oak----	66	3	
						Black oak----------	---	---	
						White ash----------	---	---	
709A---------- Osceola	4A	Slight	Slight	Slight	Slight	White oak----------	70	4	White oak, red pine, eastern white pine, green ash.
						Northern red oak----	70	4	
						Green ash----------	---	---	
						Bur oak----------	---	---	
753B---------- Massbach	4A	Slight	Slight	Slight	Slight	White oak----------	70	4	White oak, northern red oak, Scotch pine, white ash, bur oak, eastern white pine, red pine.
						Northern red oak----	---	---	
820G: Hennepin-------	5R	Severe	Severe	Slight	Slight	Northern red oak----	85	5	Northern red oak, white oak, green ash, black walnut, eastern white pine, red pine, eastern redcedar.
						White oak----------	---	---	
Casco----------	4R	Severe	Severe	Severe	Slight	White oak----------	70	4	Red pine.
						Red pine----------	78	10	
						Eastern white pine--	85	14	
						Jack pine----------	68	7	

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	Windthrow hazard	Common trees	Site index	Productivity class*	
871B, 871D---------- Lenzburg	5A	Slight	Slight	Slight	Slight	Sweetgum----------	76	5	Black walnut, eastern cottonwood, green ash, white ash.
						Black walnut--------	73	---	
						Eastern cottonwood--	---	---	
871G---------- Lenzburg	5R	Severe	Severe	Slight	Slight	Sweetgum----------	76	5	Black walnut, eastern cottonwood, green ash, white ash.
						Black walnut--------	73	---	
						Eastern cottonwood--	---	---	
872B---------- Rapatee	---	--------	--------	--------	--------	----------	---	---	Black walnut, green ash, white ash, eastern cottonwood, black locust, American sycamore, eastern white pine.
3107, 3107+----- Sawmill	5W	Slight	Moderate	Moderate	Moderate	Pin oak----------	90	5	American sycamore, black spruce, hackberry, European larch, green ash, pin oak, red maple, swamp white oak.
						Eastern cottonwood--	---	---	
						Sweetgum----------	---	---	
						Cherrybark oak------	---	---	
						American sycamore---	---	---	
3451---------- Lawson	2W	Slight	Moderate	Slight	Slight	Silver maple--------	70	2	White spruce, silver maple, white ash.
						White ash----------	---	---	
						Red maple----------	---	---	
8076---------- Otter	3W	Slight	Severe	Moderate	Moderate	Silver maple--------	94	3	Silver maple, black spruce, green ash, eastern hemlock, pin oak, eastern cottonwood, northern whitecedar.
8077---------- Huntsville	7A	Slight	Slight	Slight	Slight	Yellow-poplar-------	98	7	Eastern cottonwood, American sycamore, green ash, black walnut, red maple, sugar maple, hackberry.
						Eastern cottonwood--	110	11	
						American sycamore---	---	---	
						Cherrybark oak------	---	---	
						Sweetgum----------	---	---	
						Green ash----------	---	---	

* 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
8D2, 8D3, 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.
17A--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.
19C3, 19D3, 19F--Sylvan	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.
27D3, 27F--Miami	Amur honeysuckle, Amur privet, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
36A, 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, 36C2--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.
36C3--Tama	American cranberrybush, Amur privet, silky dogwood, Washington hawthorn, Amur honeysuckle.	Blue spruce, northern whitecedar, white fir.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
41A--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.
43A--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.
59A--Lisbon	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
60C2---------- La Rose	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
67---------- Harpster	Nannyberry viburnum, Washington hawthorn.	White spruce, northern whitecedar, eastern redcedar, green ash, Osage-orange.	Black willow----------	---
68, 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, 119D3, 119F2----- 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.
131D, 131F-------- Alvin	Amur privet, Washington hawthorn, Amur honeysuckle, American cranberrybush, silky dogwood.	Austrian pine, northern whitecedar, Osage-orange, eastern redcedar.	Eastern white pine, red pine, Norway spruce.	---
134C2, 134D2------ Camden	Amur honeysuckle, Amur privet, silky dogwood, American cranberrybush.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
145B2, 145C2------ Saybrook	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, northern whitecedar.	Norway spruce, Austrian pine, Washington hawthorn.	Eastern white pine, pin oak.
148B, 148C2------- Proctor	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Pin oak, eastern white pine.
152---------- Drummer	American cranberrybush, Amur honeysuckle, silky dogwood, Amur privet.	Norway spruce, Washington hawthorn, white fir, blue spruce, northern whitecedar, Austrian pine.	Eastern white pine----	Pin oak.
154A---------- Flanagan	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.
171B, 171B2, 171C2---------- Catlin	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.

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
198A---------- Elburn	Silky dogwood, Amur honeysuckle, Amur privet, American cranberrybush.	Austrian pine, white fir, northern whitecedar, Washington hawthorn, blue spruce.	Norway spruce---------	Eastern white pine, pin oak.
199A, 199B, 199B2- Plano	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir.	Austrian pine, Norway spruce.	Pin oak, eastern white pine.
206---------- Thorp	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.
234A---------- Sunbury	Silky dogwood, American cranberrybush, Amur honeysuckle, Amur privet.	Washington hawthorn, northern whitecedar, blue spruce, white fir, Austrian pine.	Norway spruce---------	Pin oak, eastern white pine.
243A, 243B-------- St. Charles	Amur honeysuckle, silky dogwood, Amur privet, American cranberrybush.	White fir, blue spruce, northern whitecedar, Washington hawthorn.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
257A---------- 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, 259D3---------- 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.
279B, 279C2, 279C3---------- 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---------- 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.
319---------- Aurelius	Silky dogwood, Amur honeysuckle, nannyberry viburnum, Amur privet.	Tall purple willow----	Black willow, golden willow.	Imperial Carolina poplar.
323D3---------- Casco	Eastern redcedar, lilac, radiant crabapple, autumn-olive, Washington hawthorn, Amur honeysuckle.	Eastern white pine, red pine, Austrian pine, jack pine.	---	---

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
379C2---------- Dakota	Eastern redcedar, radiant crabapple, Washington hawthorn, autumn-olive, Amur honeysuckle, lilac.	Eastern white pine, Austrian pine, red pine, jack pine.	---	---
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.
386C2---------- Downs	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.
448C2, 448D3------ Mona	Amur privet, Amur honeysuckle, American cranberrybush, silky dogwood.	White fir, blue spruce, Washington hawthorn, northern whitecedar.	Norway spruce, Austrian pine.	Eastern white pine, pin oak.
549C2, 549D2, 549F, 549G------- Marseilles	Lilac, Amur honeysuckle, autumn-olive, Washington hawthorn, eastern redcedar, radiant crabapple.	Eastern white pine, jack pine, red pine, Austrian pine.	---	---
567C2, 567C3------ Elkhart	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.
709A---------- Osceola	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.
753B---------- Massbach	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.
820G:				
Hennepin---------	Eastern redcedar, Osage-orange, Russian-olive, jack pine, Washington hawthorn, gray dogwood, silky dogwood, Amur privet, American cranberrybush.	Honeylocust, northern catalpa.	---	---
Casco----------	Eastern redcedar, lilac, radiant crabapple, autumn-olive, Washington hawthorn, Amur honeysuckle.	Eastern white pine, red pine, Austrian pine, jack pine.	---	---

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
871B, 871D, 871G. Lenzburg				
872B---------- Rapatee	Eastern redcedar, jack pine, Washington hawthorn, Osage-orange, Russian-olive.	Honeylocust, northern catalpa.	---	---
3107, 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.
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.
8074---------- 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.
8076---------- Otter	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.
8077---------- Huntsville	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
8D2, 8D3 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.
17A Keomah	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Slight	Slight.
19C3 Sylvan	Slight	Slight	Severe: slope.	Severe: erodes easily.	Slight.
19D3 Sylvan	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
19F Sylvan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
27D3 Miami	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
27F Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
36A Tama	Slight	Slight	Slight	Slight	Slight.
36B, 36B2 Tama	Slight	Slight	Moderate: slope.	Slight	Slight.
36C2 Tama	Slight	Slight	Severe: slope.	Slight	Slight.
36C3 Tama	Slight	Slight	Severe: slope.	Severe: erodes easily.	Slight.
41A Muscatine	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Slight	Slight.
43A Ipava	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
45 Denny	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
59A Lisbon	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
60C2 La Rose	Slight	Slight	Severe: slope.	Slight	Slight.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
67--- Harpster	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
68, 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, 119D3--- Elco	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
119F2--- Elco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.
131D--- Alvin	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight---	Moderate: slope.
131F--- Alvin	Severe: slope.	Severe: slope.	Severe: slope.	Moderate: slope.	Severe: slope.
134C2--- Camden	Slight---	Slight---	Severe: slope.	Severe: erodes easily.	Slight.
134D2--- Camden	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
145B2--- Saybrook	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
145C2--- Saybrook	Slight---	Slight---	Severe: slope.	Slight---	Slight.
148B--- Proctor	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
148C2--- Proctor	Slight---	Slight---	Severe: slope.	Slight---	Slight.
152--- Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
154A--- Flanagan	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
171B, 171B2--- Catlin	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
171C2--- Catlin	Slight---	Slight---	Severe: slope.	Slight---	Slight.
198A--- Elburn	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
199A--- Plano	Slight---	Slight---	Slight---	Slight---	Slight.
199B, 199B2--- Plano	Slight---	Slight---	Moderate: slope.	Slight---	Slight.
206--- Thorp	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
234A Sunbury	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.	Moderate: wetness.
243A St. Charles	Slight	Slight	Slight	Severe: erodes easily.	Slight.
243B St. Charles	Slight	Slight	Moderate: slope.	Severe: erodes easily.	Slight.
257A 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, 259D3 Assumption	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
279B Rozetta	Slight	Slight	Moderate: slope.	Slight	Slight.
279C2, 279C3 Rozetta	Slight	Slight	Severe: slope.	Slight	Slight.
280D2 Fayette	Moderate: slope.	Moderate: slope.	Severe: slope.	Severe: erodes easily.	Moderate: slope.
319 Aurelius	Severe: ponding, excess humus.	Severe: ponding, excess humus.	Severe: excess humus, ponding.	Severe: ponding, excess humus.	Severe: ponding, excess humus.
323D3 Casco	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight	Moderate: droughty, slope.
379C2 Dakota	Slight	Slight	Severe: slope.	Slight	Slight.
386B Downs	Slight	Slight	Moderate: slope.	Slight	Slight.
386C2 Downs	Slight	Slight	Severe: slope.	Slight	Slight.
448C2 Mona	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Slight	Slight.
448D3 Mona	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Slight	Moderate: slope.
549C2 Marseilles	Moderate: percs slowly.	Moderate: percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: depth to rock.
549D2 Marseilles	Moderate: slope, percs slowly.	Moderate: slope, percs slowly.	Severe: slope.	Severe: erodes easily.	Moderate: slope, depth to rock.
549F Marseilles	Severe: slope.	Severe: slope.	Severe: slope.	Severe: erodes easily.	Severe: slope.

TABLE 9.--RECREATIONAL DEVELOPMENT--Continued

Soil name and map symbol	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
549G---------- Marseilles	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope, erodes easily.	Severe: slope.
567C2, 567C3---------- Elkhart	Slight----------	Slight----------	Severe: slope.	Slight----------	Slight.
709A---------- Osceola	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.	Moderate: wetness.
753B---------- Massbach	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
820G:					
Hennepin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Casco----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
871B---------- Lenzburg	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight----------	Moderate: small stones.
871D---------- Lenzburg	Moderate: slope.	Moderate: slope.	Severe: slope.	Slight----------	Moderate: large stones.
871G---------- Lenzburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
872B---------- Rapatee	Moderate: percs slowly.	Moderate: percs slowly.	Moderate: slope, percs slowly.	Slight----------	Slight.
3107, 3107+---------- Sawmill	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.	Severe: wetness, flooding.
3451---------- Lawson	Severe: flooding, wetness.	Moderate: flooding, wetness.	Severe: wetness, flooding.	Moderate: wetness, flooding.	Severe: flooding.
8074---------- Radford	Severe: flooding, wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: wetness, flooding.
8076---------- Otter	Severe: flooding, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.
8077---------- Huntsville	Severe: flooding.	Slight----------	Moderate: flooding.	Slight----------	Moderate: 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 herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
8D2, 8D3---------- 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.
17A---------- Keomah	Good	Good	Fair	Fair	Fair	Fair	Fair	Good	Fair	Fair.
19C3, 19D3--------- Sylvan	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
19F---------- Sylvan	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
27D3, 27F---------- Miami	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
36A, 36B---------- Tama	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
36B2---------- Tama	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
36C2, 36C3--------- Tama	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
41A---------- Muscatine	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
43A---------- Ipava	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
45---------- Denny	Poor	Poor	Poor	Poor	Poor	Good	Good	Poor	Poor	Good.
59A---------- Lisbon	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
60C2---------- La Rose	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
67---------- Harpster	Fair	Fair	Good	Fair	Fair	Good	Fair	Fair	Fair	Fair.
68, 68+---------- Sable	Fair	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
119C2, 119D2, 119D3---------- Elco	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
119F2---------- Elco	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	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 herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
131D---------- Alvin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
131F---------- Alvin	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
134C2---------- Camden	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Poor.
134D2---------- Camden	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Poor.
145B2---------- Saybrook	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
145C2---------- Saybrook	Good	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
148B, 148C2-------- Proctor	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
152---------- Drummer	Fair	Good	Good	Fair	Fair	Good	Good	Good	Fair	Good.
154A---------- Flanagan	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
171B, 171B2-------- Catlin	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
171C2---------- Catlin	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
198A---------- Elburn	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
199A, 199B, 199B2-- Plano	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
206---------- Thorp	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good.
234A---------- Sunbury	Good	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
243A, 243B--------- St. Charles	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
257A---------- Clarksdale	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
259C2, 259D2, 259D3---------- Assumption	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
279B---------- Rozetta	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
279C2, 279C3------- Rozetta	Good	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 herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
280D2---------- Fayette	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
319---------- Aurelius	Fair	Fair	Poor	Poor	Poor	Good	Good	Fair	Poor	Good.
323D3---------- Casco	Poor	Poor	Fair	Poor	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
379C2---------- Dakota	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
386B---------- Downs	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
386C2---------- Downs	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
448C2, 448D3------- Mona	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
549C2---------- Marseilles	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
549D2---------- Marseilles	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.
567C2---------- Elkhart	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
567C3---------- Elkhart	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
709A---------- Osceola	Fair	Good	Good	Good	Fair	Fair	Fair	Good	Good	Poor.
753B---------- Massbach	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
820G:										
Hennepin----------	Very poor.	Poor	Good	Good	Fair	Very poor.	Very poor.	Poor	Good	Very poor.
Casco----------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
871B---------- Lenzburg	Poor	Fair	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.
871D---------- Lenzburg	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
871G---------- Lenzburg	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	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 herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
872B---------- Rapatee	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
3107, 3107+--------- Sawmill	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
3451---------- Lawson	Good	Good	Fair	Good	Good	Fair	Fair	Good	Good	Fair.
8074---------- Radford	Good	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.
8076---------- Otter	Good	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.
8077---------- Huntsville	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.

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
8D2, 8D3---------- 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.
17A---------- Keomah	Severe: wetness.	Severe: shrink-swell.	Severe: wetness.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Slight.
19C3---------- Sylvan	Slight---------	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
19D3---------- Sylvan	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
19F---------- Sylvan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
27D3---------- Miami	Moderate: dense layer, slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
27F---------- Miami	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
36A, 36B---------- Tama	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
36B2---------- Tama	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
36C2, 36C3-------- Tama	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
41A---------- Muscatine	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: wetness.	Moderate: wetness, shrink-swell.	Severe: low strength, frost action.	Slight.
43A---------- 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.
59A Lisbon	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
60C2 La Rose	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Moderate: shrink-swell, low strength.	Slight.
67 Harpster	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
68, 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, 119D3 Elco	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
119F2 Elco	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
131D Alvin	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope, frost action.	Moderate: slope.
131F Alvin	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
134C2 Camden	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
134D2 Camden	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
145B2 Saybrook	Slight	Slight	Slight	Slight	Severe: low strength, frost action.	Slight.
145C2 Saybrook	Slight	Slight	Slight	Moderate: slope.	Severe: low strength, frost action.	Slight.

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
148B---------- Proctor	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
148C2---------- Proctor	Severe: cutbanks cave.	Moderate: shrink-swell.	Slight---------	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
152---------- Drummer	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
154A---------- Flanagan	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
171B, 171B2------- Catlin	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
171C2---------- Catlin	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
198A---------- Elburn	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength, frost action.	Moderate: wetness.
199A, 199B, 199B2- Plano	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
206---------- Thorp	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: low strength, ponding, frost action.	Severe: ponding.
234A---------- Sunbury	Severe: wetness.	Severe: shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
243A---------- St. Charles	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
243B---------- St. Charles	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
257A---------- 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.

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
259D2, 259D3---Assumption	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Severe: shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
279B---Rozetta	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
279C2, 279C3---Rozetta	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
280D2---Fayette	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope.
319---Aurelius	Severe: cutbanks cave, ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding, frost action.	Severe: ponding, excess humus.
323D3---Casco	Severe: cutbanks cave.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: droughty, slope.
379C2---Dakota	Severe: cutbanks cave.	Slight	Slight	Moderate: slope.	Moderate: low strength, frost action.	Slight.
386B---Downs	Moderate: wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
386C2---Downs	Slight	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
448C2---Mona	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Slight.
448D3---Mona	Moderate: too clayey, wetness, slope.	Moderate: shrink-swell, slope.	Moderate: wetness, slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: slope.
549C2---Marseilles	Moderate: depth to rock, too clayey.	Moderate: shrink-swell.	Moderate: depth to rock, shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Moderate: depth to rock.
549D2---Marseilles	Moderate: depth to rock, too clayey, slope.	Moderate: shrink-swell, slope.	Moderate: depth to rock, slope, shrink-swell.	Severe: slope.	Severe: low strength, frost action.	Moderate: slope, depth to rock.
549F, 549G---Marseilles	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope, frost action.	Severe: slope.
567C2, 567C3---Elkhart	Slight	Moderate: shrink-swell.	Slight	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.

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
709A---------- Osceola	Severe: cutbanks cave, wetness.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: wetness, shrink-swell.	Severe: shrink-swell, low strength, frost action.	Moderate: wetness.
753B---------- Massbach	Moderate: too clayey, wetness.	Moderate: shrink-swell.	Moderate: wetness, shrink-swell.	Moderate: shrink-swell.	Severe: low strength, frost action.	Slight.
820G:						
Hennepin----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Casco----------	Severe: cutbanks cave, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
871B---------- Lenzburg	Slight---------	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength.	Moderate: small stones.
871D---------- Lenzburg	Moderate: slope.	Moderate: shrink-swell, slope.	Moderate: slope, shrink-swell.	Severe: slope.	Severe: low strength.	Moderate: large stones.
871G---------- Lenzburg	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: low strength, slope.	Severe: slope.
872B---------- Rapatee	Moderate: dense layer.	Moderate: shrink-swell.	Moderate: shrink-swell.	Moderate: shrink-swell, slope.	Severe: low strength, frost action.	Slight.
3107, 3107+------- Sawmill	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.	Severe: wetness, flooding.
3451---------- Lawson	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, frost action.	Severe: flooding.
8074---------- Radford	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, flooding, frost action.	Moderate: wetness, flooding.
8076---------- Otter	Severe: ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: low strength, ponding, flooding.	Severe: ponding.
8077---------- Huntsville	Moderate: wetness, flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: low strength, flooding, frost action.	Moderate: flooding.

TABLE 12.--SANITARY FACILITIES

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," 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	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
8D2, 8D3 Hickory	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
8F, 8G Hickory	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
17A Keomah	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
19C3 Sylvan	Slight	Severe: slope.	Slight	Slight	Good.
19D3 Sylvan	Moderate: slope.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
19F Sylvan	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
27D3 Miami	Severe: percs slowly.	Severe: slope.	Moderate: slope.	Moderate: slope.	Fair: slope.
27F Miami	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
36A Tama	Moderate: wetness, percs slowly.	Moderate: seepage, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
36B Tama	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
36B2 Tama	Slight	Moderate: seepage, slope.	Moderate: too clayey.	Slight	Fair: too clayey.
36C2, 36C3 Tama	Slight	Severe: slope.	Moderate: too clayey.	Slight	Fair: too clayey.
41A Muscatine	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
43A Ipava	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
45 Denny	Severe: ponding, percs slowly.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
59A---------- Lisbon	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.
60C2---------- La Rose	Moderate: percs slowly.	Severe: slope.	Slight----------	Slight----------	Good.
67---------- Harpster	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.
68, 68+---------- Sable	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: hard to pack, ponding.
119C2---------- Elco	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, too clayey.	Moderate: wetness.	Fair: too clayey, wetness.
119D2, 119D3-------- Elco	Severe: wetness, percs slowly.	Severe: slope, wetness.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Fair: too clayey, slope, wetness.
119F2---------- Elco	Severe: wetness, percs slowly, slope.	Severe: slope, wetness.	Severe: slope.	Severe: slope.	Poor: slope.
131D---------- Alvin	Moderate: slope.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage.
131F---------- Alvin	Severe: slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, slope.
134C2---------- Camden	Slight----------	Severe: slope.	Severe: seepage.	Slight----------	Fair: too clayey.
134D2---------- Camden	Moderate: slope.	Severe: slope.	Severe: seepage.	Moderate: slope.	Fair: too clayey, slope.
145B2---------- Saybrook	Severe: percs slowly.	Moderate: seepage, slope.	Slight----------	Slight----------	Good.
145C2---------- Saybrook	Severe: percs slowly.	Severe: slope.	Slight----------	Slight----------	Good.
148B---------- Proctor	Moderate: percs slowly.	Severe: seepage.	Severe: seepage, too sandy.	Slight----------	Poor: too sandy.
148C2---------- Proctor	Moderate: percs slowly.	Severe: seepage, slope.	Severe: seepage, too sandy.	Slight----------	Poor: too sandy.
152---------- Drummer	Severe: ponding.	Severe: ponding.	Severe: ponding.	Severe: ponding.	Poor: ponding.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
154A---------- Flanagan	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: hard to pack.
171B, 171B2--------- Catlin	Severe: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
171C2---------- Catlin	Severe: wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
198A---------- Elburn	Severe: wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Severe: wetness.	Poor: wetness.
199A, 199B, 199B2--- Plano	Slight----------	Severe: seepage.	Severe: seepage.	Slight----------	Fair: too clayey.
206---------- Thorp	Severe: ponding, percs slowly.	Severe: seepage, ponding.	Severe: seepage, ponding.	Severe: ponding.	Poor: ponding.
234A---------- Sunbury	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack.
243A---------- St. Charles	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Fair: too clayey, wetness.
243B---------- St. Charles	Slight----------	Moderate: seepage, slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
257A---------- Clarksdale	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
259C2---------- Assumption	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: too clayey.	Moderate: wetness.	Poor: too clayey.
259D2, 259D3-------- Assumption	Severe: wetness, percs slowly.	Severe: slope, wetness.	Severe: too clayey.	Moderate: wetness, slope.	Poor: too clayey.
279B---------- Rozetta	Moderate: wetness.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
279C2, 279C3-------- Rozetta	Moderate: wetness.	Severe: slope.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
280D2---------- Fayette	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, slope.
319---------- Aurelius	Severe: ponding.	Severe: excess humus, ponding.	Severe: ponding, too sandy.	Severe: ponding.	Poor: too sandy, ponding.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
323D3---------- Casco	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
379C2---------- Dakota	Severe: poor filter.	Severe: seepage, slope.	Severe: seepage, too sandy.	Severe: seepage.	Poor: seepage, too sandy, small stones.
386B---------- Downs	Moderate: wetness, percs slowly.	Moderate: seepage, slope, wetness.	Severe: wetness.	Moderate: wetness.	Fair: too clayey.
386C2---------- Downs	Moderate: percs slowly.	Severe: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey.
448C2---------- Mona	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, too clayey.	Moderate: wetness.	Poor: thin layer.
448D3---------- Mona	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness, slope, too clayey.	Moderate: wetness, slope.	Poor: thin layer.
549C2, 549D2-------- Marseilles	Severe: depth to rock, percs slowly.	Severe: depth to rock, slope.	Severe: depth to rock, too clayey.	Severe: depth to rock.	Poor: depth to rock, too clayey, hard to pack.
549F, 549G---------- Marseilles	Severe: depth to rock, percs slowly, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope, too clayey.	Severe: depth to rock, slope.	Poor: depth to rock, too clayey, hard to pack.
567C2, 567C3-------- Elkhart	Slight----------	Severe: slope.	Slight----------	Slight----------	Good.
709A---------- Osceola	Severe: wetness, percs slowly.	Severe: seepage, wetness.	Severe: depth to rock, wetness, too clayey.	Severe: wetness.	Poor: too clayey, hard to pack, wetness.
753B---------- Massbach	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock.	Moderate: depth to rock.	Poor: thin layer.
820G:					
Hennepin----------	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
Casco----------	Severe: poor filter, slope.	Severe: seepage, slope.	Severe: seepage, slope, too sandy.	Severe: seepage, slope.	Poor: seepage, too sandy, small stones.

TABLE 12.--SANITARY FACILITIES--Continued

Soil name and map symbol	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
871B---------- Lenzburg	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, small stones.
871D---------- Lenzburg	Severe: percs slowly.	Severe: slope.	Moderate: slope, too clayey.	Moderate: slope.	Fair: too clayey, small stones, slope.
871G---------- Lenzburg	Severe: percs slowly, slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: slope.
872B---------- Rapatee	Severe: percs slowly.	Moderate: slope.	Moderate: too clayey.	Slight----------	Fair: too clayey, small stones.
3107, 3107+--------- Sawmill	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
3451---------- Lawson	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
8074---------- Radford	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
8076---------- Otter	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Severe: flooding, ponding.	Poor: ponding.
8077---------- Huntsville	Severe: flooding.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Good.

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
8D2, 8D3 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.
17A Keomah	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
19C3 Sylvan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
19D3 Sylvan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
19F Sylvan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
27D3 Miami	Fair: shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, too clayey, slope.
27F Miami	Fair: shrink-swell, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
36A, 36B, 36B2, 36C2, 36C3 Tama	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
41A Muscatine	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
43A 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.
59A Lisbon	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
60C2 La Rose	Fair: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones.
67 Harpster	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
68, 68+---------- Sable	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
119C2---------- Elco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
119D2, 119D3---------- Elco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
119F2---------- Elco	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope.
131D---------- Alvin	Good----------	Probable----------	Improbable: too sandy.	Poor: too sandy.
131F---------- Alvin	Fair: slope.	Probable----------	Improbable: too sandy.	Poor: too sandy, slope.
134C2---------- Camden	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
134D2---------- Camden	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
145B2, 145C2---------- Saybrook	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
148B, 148C2---------- Proctor	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
152---------- Drummer	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
154A---------- Flanagan	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
171B, 171B2, 171C2---- Catlin	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
198A---------- Elburn	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
199A, 199B, 199B2----- Plano	Good----------	Improbable: excess fines.	Improbable: excess fines.	Good.
206---------- Thorp	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
234A---------- Sunbury	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
243A---------- St. Charles	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
243B St. Charles	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, area reclaim.
257A 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, 259D3 Assumption	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer, slope.
279B, 279C2, 279C3 Rozetta	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
280D2 Fayette	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, slope.
319 Aurelius	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: excess humus, wetness, thin layer.
323D3 Casco	Good	Probable	Probable	Poor: too sandy, small stones, area reclaim.
379C2 Dakota	Good	Probable	Probable	Poor: small stones, area reclaim.
386B, 386C2 Downs	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
448C2 Mona	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones.
448D3 Mona	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, small stones, slope.
549C2, 549D2 Marseilles	Poor: depth to rock, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
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.

TABLE 13.--CONSTRUCTION MATERIALS--Continued

Soil name and map symbol	Roadfill	Sand	Gravel	Topsoil
567C2, 567C3---------- Elkhart	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey.
709A---------- Osceola	Poor: shrink-swell, low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: too clayey.
753B---------- Massbach	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Fair: too clayey, thin layer.
820G: Hennepin----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim, small stones, slope.
Casco----------	Poor: slope.	Probable----------	Probable----------	Poor: too sandy, small stones, area reclaim.
871B, 871D---------- Lenzburg	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim.
871G---------- Lenzburg	Poor: low strength, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, area reclaim, slope.
872B---------- Rapatee	Good----------	Improbable: excess fines.	Improbable: excess fines.	Poor: area reclaim.
3107, 3107+---------- Sawmill	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
3451---------- Lawson	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
8074---------- Radford	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Good.
8076---------- Otter	Poor: wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
8077---------- Huntsville	Good----------	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
8D2, 8D3, 8F, 8G--Hickory	Severe: slope.	Moderate: thin layer.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
17A--Keomah	Slight	Moderate: wetness.	Percs slowly, frost action.	Wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
19C3--Sylvan	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
19D3, 19F--Sylvan	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
27D3, 27F--Miami	Severe: slope.	Severe: piping.	Deep to water	Slope, percs slowly.	Slope, erodes easily.	Slope, erodes easily, rooting depth.
36A--Tama	Moderate: seepage.	Slight	Deep to water	Favorable	Erodes easily	Erodes easily.
36B, 36B2, 36C2--Tama	Moderate: seepage, slope.	Slight	Deep to water	Slope	Erodes easily	Erodes easily.
36C3--Tama	Moderate: seepage, slope.	Slight	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
41A--Muscatine	Moderate: seepage.	Moderate: wetness.	Frost action	Wetness	Erodes easily, wetness.	Erodes easily.
43A--Ipava	Slight	Severe: wetness.	Frost action	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.
59A--Lisbon	Moderate: seepage.	Severe: wetness.	Frost action	Wetness	Erodes easily, wetness.	Wetness, erodes easily.
60C2--La Rose	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
67--Harpster	Moderate: seepage.	Severe: piping, ponding.	Ponding, frost action.	Ponding	Ponding	Wetness.
68, 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.

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
119D2, 119D3, 119F2---------- Elco	Severe: slope.	Moderate: piping, wetness.	Frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily.
131D, 131F-------- Alvin	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, soil blowing.	Slope, soil blowing.	Slope.
134C2---------- Camden	Moderate: seepage, slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
134D2---------- Camden	Severe: slope.	Severe: piping.	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
145B2, 145C2------ Saybrook	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
148B, 148C2------- Proctor	Severe: seepage.	Severe: piping.	Deep to water	Slope----------	Erodes easily, too sandy.	Erodes easily.
152---------- Drummer	Moderate: seepage.	Severe: ponding.	Ponding, frost action.	Ponding--------	Ponding--------	Wetness.
154A---------- Flanagan	Moderate: seepage.	Severe: wetness.	Frost action---	Wetness--------	Erodes easily, wetness.	Erodes easily.
171B, 171B2, 171C2---------- Catlin	Moderate: seepage, slope.	Moderate: piping, wetness.	Deep to water	Slope----------	Erodes easily	Erodes easily.
198A---------- Elburn	Severe: seepage.	Severe: wetness.	Frost action---	Wetness--------	Erodes easily, wetness.	Wetness, erodes easily.
199A---------- Plano	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Favorable------	Erodes easily	Erodes easily.
199B, 199B2------- Plano	Severe: seepage.	Moderate: thin layer, piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
206---------- Thorp	Severe: seepage.	Severe: ponding.	Ponding, percs slowly, frost action.	Ponding, percs slowly, erodes easily.	Erodes easily, ponding, percs slowly.	Wetness, erodes easily, percs slowly.
234A---------- Sunbury	Moderate: seepage.	Severe: wetness.	Frost action---	Wetness--------	Erodes easily, wetness.	Erodes easily.
243A---------- St. Charles	Moderate: seepage.	Moderate: thin layer, piping, wetness.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
243B---------- St. Charles	Moderate: seepage, slope.	Moderate: thin layer, piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
257A---------- Clarksdale	Slight---------	Severe: wetness.	Frost action---	Wetness, erodes easily.	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
259C2---------- Assumption	Moderate: seepage, slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Erodes easily, wetness.	Erodes easily, percs slowly.
259D2, 259D3------ Assumption	Severe: slope.	Moderate: wetness.	Percs slowly, frost action, slope.	Slope, wetness, percs slowly.	Slope, erodes easily, wetness.	Slope, erodes easily, percs slowly.
279B, 279C2------- Rozetta	Moderate: seepage, slope.	Slight---------	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
279C3---------- Rozetta	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope, erodes easily.	Erodes easily	Erodes easily.
280D2---------- Fayette	Severe: slope.	Slight---------	Deep to water	Slope, erodes easily.	Slope, erodes easily.	Slope, erodes easily.
319---------- Aurelius	Severe: seepage.	Severe: piping, ponding.	Ponding, subsides, frost action.	Ponding, soil blowing, rooting depth.	Ponding, too sandy, soil blowing.	Wetness, rooting depth.
323D3---------- Casco	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty, rooting depth.
379C2---------- Dakota	Severe: seepage.	Severe: seepage, piping.	Deep to water	Slope----------	Too sandy------	Favorable.
386B, 386C2------- Downs	Moderate: seepage, slope.	Slight---------	Deep to water	Slope----------	Erodes easily	Erodes easily.
448C2---------- Mona	Moderate: slope.	Moderate: piping, wetness.	Percs slowly, slope.	Slope, wetness, percs slowly.	Wetness--------	Percs slowly.
448D3---------- Mona	Severe: slope.	Moderate: piping, wetness.	Percs slowly, slope.	Slope, wetness, percs slowly.	Slope, wetness.	Slope, percs slowly.
549C2---------- Marseilles	Moderate: depth to rock, slope.	Severe: thin layer.	Deep to water	Slope, percs slowly, depth to rock.	Depth to rock, erodes easily.	Erodes easily, depth to rock.
549D2, 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.
567C2, 567C3------ Elkhart	Moderate: seepage, slope.	Moderate: piping.	Deep to water	Slope----------	Erodes easily	Erodes easily.
709A---------- Osceola	Severe: seepage.	Severe: thin layer, wetness.	Frost action---	Wetness, percs slowly.	Erodes easily, wetness.	Wetness, erodes easily.
753B---------- Massbach	Moderate: seepage, depth to rock, slope.	Moderate: thin layer.	Deep to water	Slope, percs slowly.	Erodes easily	Erodes easily, percs slowly.

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
820G:						
Hennepin	Severe: slope.	Severe: piping.	Deep to water	Slope, rooting depth.	Slope	Slope, rooting depth.
Casco	Severe: seepage, slope.	Severe: seepage, piping.	Deep to water	Slope, droughty.	Slope, too sandy.	Slope, droughty.
871B---------- Lenzburg	Moderate: slope.	Moderate: piping.	Deep to water	Slope	Favorable	Favorable.
871D, 871G---------- Lenzburg	Severe: slope.	Moderate: piping.	Deep to water	Slope	Slope	Slope.
872B---------- Rapatee	Moderate: slope.	Severe: piping.	Deep to water	Slope, percs slowly.	Erodes easily, percs slowly.	Erodes easily.
3107, 3107+---------- Sawmill	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Wetness	Wetness.
3451---------- Lawson	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Erodes easily, wetness.	Wetness, erodes easily.
8074---------- Radford	Moderate: seepage.	Severe: wetness.	Flooding, frost action.	Wetness, flooding.	Wetness	Wetness.
8076---------- Otter	Moderate: seepage.	Severe: piping, ponding.	Ponding, flooding, frost action.	Ponding, flooding.	Erodes easily, ponding.	Wetness, erodes easily.
8077---------- Huntsville	Moderate: seepage.	Moderate: thin layer, piping.	Deep to water	Flooding	Erodes easily	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		Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
8D2	0-7	Silt loam	CL	A-6, A-4	0	0-5	95-100	90-100	90-100	75-95	20-35	8-15
Hickory	7-36	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-1	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	36-60	Sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0-1	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8D3	0-7	Clay loam	CL	A-6, A-7	0	0-5	95-100	90-100	80-95	70-85	30-50	15-30
Hickory	7-55	Clay loam, silty clay loam, clay loam.	CL	A-6, A-7	0-1	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	55-60	Sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0-1	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8F	0-7	Silt loam	CL, ML, CL-ML	A-6, A-4	0	0-5	95-100	90-100	90-100	75-95	20-35	3-15
Hickory	7-50	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-1	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	50-60	Sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0-1	0-5	85-100	75-95	70-95	60-80	20-40	5-20
8G	0-11	Loam	CL, ML, CL-ML	A-6, A-4	0	0-5	95-100	90-100	90-100	75-95	20-35	3-15
Hickory	11-48	Clay loam, silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-1	0-5	95-100	75-100	70-95	65-80	30-50	15-30
	48-60	Sandy loam, loam, clay loam.	CL-ML, CL	A-4, A-6	0-1	0-5	85-100	75-95	70-95	60-80	20-40	5-20
17A	0-10	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	100	95-100	25-35	5-15
Keomah	10-14	Silt loam	CL-ML, CL	A-4, A-6	0	0	100	100	100	95-100	25-35	4-15
	14-36	Silty clay, silty clay loam.	CH	A-7	0	0	100	100	100	95-100	45-60	30-45
	36-60	Silty clay loam, silt loam.	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	15-30

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
19C3---------- Sylvan	0-8	Silty clay loam.	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	20-30
	8-22	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	20-30
	22-60	Silt loam, silt.	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	95-100	20-40	5-20
19D3---------- Sylvan	0-8	Silty clay loam.	CL	A-7, A-6	0	0	100	100	100	95-100	35-50	20-30
	8-30	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	20-30
	30-60	Silt loam, silt.	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	95-100	20-40	5-20
19F---------- Sylvan	0-6	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	100	95-100	25-35	5-15
	6-11	Silt loam-----	CL, ML	A-4, A-6	0	0	100	100	100	95-100	30-40	7-15
	11-26	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	20-30
	26-60	Silt loam-----	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	95-100	20-40	5-20
27D3---------- Miami	0-5	Clay loam-----	CL	A-6	0	0	100	90-100	75-95	65-95	30-40	15-20
	5-12	Clay loam, silty clay loam.	CL, SC	A-6	0	0	90-100	85-100	70-95	40-95	30-40	15-25
	12-60	Loam----------	CL, CL-ML, SC, SC-SM	A-4, A-6	---	0-3	85-100	85-100	70-90	45-70	20-40	5-20
27F---------- Miami	0-6	Silt loam-----	CL, CL-ML, ML	A-4	0	0	100	95-100	80-100	50-90	15-30	3-10
	6-26	Clay loam, silty clay loam.	CL, SC	A-6	0	0	90-100	85-100	70-95	40-95	30-40	15-25
	26-60	Loam----------	CL, CL-ML, SC, SC-SM	A-4, A-6	---	0-3	85-100	85-100	70-90	45-70	20-40	5-20
36A---------- Tama	0-14	Silt loam-----	ML, CL	A-6, A-7	0	0	100	100	100	95-100	35-45	10-20
	14-46	Silty clay loam.	CL	A-7	0	0	100	100	100	95-100	40-50	15-25
	46-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
36B---------- Tama	0-11	Silt loam-----	ML, CL	A-6, A-7	0	0	100	100	100	95-100	35-45	10-20
	11-56	Silty clay loam.	CL	A-7	0	0	100	100	100	95-100	40-50	15-25
	56-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
36B2, 36C2---- Tama	0-7	Silt loam-----	CL, CL-ML	A-6, A-4	0	0	100	100	100	95-100	25-40	5-15
	7-37	Silty clay loam.	CL	A-7	0	0	100	100	100	95-100	40-50	15-25
	37-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
36C3----------	0-7	Silty clay loam.	ML	A-6, A-7	0	0	100	100	100	95-100	35-50	10-20
Tama	7-22	Silty clay loam.	CL	A-7	0	0	100	100	100	95-100	40-50	15-25
	22-60	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
41A----------	0-17	Silt loam-----	CL, CL-ML	A-6, A-4	0	0	100	100	100	95-100	25-40	5-15
Muscatine	17-45	Silty clay loam.	CL	A-7	0	0	100	100	100	95-100	40-50	20-30
	45-60	Silt loam, silty clay loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
43A----------	0-17	Silt loam-----	CL	A-6	0	0	100	100	95-100	90-100	25-40	10-20
Ipava	17-41	Silty clay loam, silty clay.	CH, CL	A-7	0	0	100	100	95-100	90-100	45-70	25-40
	41-60	Silt loam, silty clay loam.	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	90-100	25-40	5-20
45----------	0-9	Silt loam-----	CL	A-6, A-4	0	0	100	100	95-100	95-100	30-40	8-15
Denny	9-17	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	25-40	5-15
	17-46	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	0	100	100	95-100	95-100	35-60	15-35
	46-60	Silt loam, silty clay loam.	CL	A-6	0	0	100	100	95-100	95-100	25-40	11-20
59A----------	0-11	Silt loam-----	ML	A-6, A-7	0	0	100	100	95-100	80-95	35-50	10-20
Lisbon	11-28	Silty clay loam, silt loam.	CL, CH	A-7, A-6	0	0	100	95-100	95-100	80-98	35-55	15-35
	28-31	Loam, clay loam, silty clay loam.	CL	A-4, A-6, A-7	---	0-5	90-100	90-100	85-100	70-85	20-45	8-25
	31-60	Loam, silt loam.	CL	A-6, A-4	---	0-3	90-100	90-100	85-100	70-85	20-40	8-20
60C2----------	0-8	Silt loam-----	CL	A-6, A-4	0	0	100	95-100	90-100	60-95	30-40	8-15
La Rose	8-18	Clay loam, silty clay loam.	CL	A-6, A-7	0	0	95-100	90-100	85-100	60-85	30-45	15-25
	18-60	Loam, silt loam.	CL	A-6	---	0-5	95-100	90-100	75-100	50-80	25-40	10-20
67----------	0-17	Silty clay loam.	CL, CH	A-7	0	0	100	95-100	95-100	90-100	45-60	20-35
Harpster	17-36	Silty clay loam.	CL, CH	A-7	0	0	100	95-100	95-100	85-100	40-60	20-35
	36-51	Silty clay loam, silt loam, loam.	CL, CH	A-6, A-7	0	0	100	95-100	95-100	70-100	35-55	20-35
	51-60	Stratified sandy loam to clay loam.	CL, CL-ML, SC, SC-SM	A-4, A-6, A-7	0	0	100	95-100	95-100	45-95	20-50	5-25

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
68---------- Sable	0-16	Silty clay loam.	CL, CH, ML, MH	A-7	0	0	100	100	95-100	95-100	41-65	15-35
	16-45	Silty clay loam, silt loam.	CL, CH	A-7	0	0	100	100	95-100	95-100	40-55	20-35
	45-60	Silt loam, silty clay loam.	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
68+---------- Sable	0-7	Silt loam-----	CL	A-6, A-7	0	0	100	100	95-100	95-100	30-45	10-20
	7-24	Silty clay loam.	CL, CH, ML, MH	A-7	0	0	100	100	95-100	95-100	41-65	15-35
	24-55	Silty clay loam, silt loam.	CL, CH	A-7	0	0	100	100	95-100	95-100	40-55	20-35
	55-60	Silt loam, silty clay loam.	CL	A-6	0	0	100	100	95-100	95-100	30-40	10-20
119C2--------- Elco	0-7	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
	7-24	Silty clay loam, silt loam.	CL	A-7, A-6	0	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	0	100	90-100	85-95	75-95	25-45	10-30
	31-55	Silty clay loam, clay loam, silt loam.	CL	A-7, A-6	0	0	100	90-100	85-95	75-95	25-45	10-30
	55-60	Silty clay loam, loam, clay.	CL	A-7, A-6	0	0	100	90-100	80-100	60-95	25-50	10-30
119D2--------- Elco	0-7	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
	7-24	Silty clay loam, silt loam.	CL	A-7, A-6	0	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	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	0	100	90-100	80-100	60-95	25-50	10-30
119D3--------- Elco	0-5	Silty clay loam.	CL	A-6, A-7	0	0	100	100	95-100	85-100	30-45	15-30
	5-32	Silty clay loam, silt loam.	CL	A-7, A-6	0	0	100	100	95-100	85-100	25-45	10-30
	32-37	Silty clay loam, clay loam, silt loam.	CL	A-7, A-6	0	0	100	90-100	85-95	75-95	25-45	10-30
	37-60	Silty clay loam, loam, clay.	CL	A-7, A-6	0	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 >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
119F2--------- Elco	0-5	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	90-100	25-40	5-15
	5-24	Silty clay loam, silt loam.	CL	A-7, A-6	0	0	100	100	95-100	85-100	25-45	10-30
	24-34	Silty clay loam, clay loam, silt loam.	CL	A-7, A-6	0	0	100	90-100	85-95	75-95	25-45	10-30
	34-60	Silty clay loam, loam, clay.	CL	A-7, A-6	0	0	100	90-100	80-100	60-95	25-50	10-30
131D--------- Alvin	0-5	Sandy loam----	SM, ML	A-4, A-2	0	0	100	100	80-95	30-60	<25	NP-4
	5-30	Very fine sandy loam, sandy loam, loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	0	100	100	70-100	20-80	15-40	NP-15
	30-60	Loam, fine sandy loam, loamy fine sand.	SP, SP-SM, SM	A-2, A-3, A-1	0	0	95-100	90-100	45-95	10-35	<20	NP-4
131F--------- Alvin	0-8	Sandy loam----	SM, ML	A-4, A-2	0	0	100	100	80-95	30-60	<25	NP-4
	8-38	Very fine sandy loam, sandy loam, loam.	SM, SC, CL, ML	A-2, A-4, A-6	0	0	100	100	70-100	20-80	15-40	NP-15
	38-60	Very fine sand, fine sandy loam, loamy fine sand.	SP, SP-SM, SM	A-2, A-3, A-1	0	0	95-100	90-100	45-95	10-35	<20	NP-4
134C2-------- Camden	0-4	Silt loam-----	CL, ML, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-35	3-15
	4-24	Silt loam, silty clay loam.	CL	A-6	0	0	100	100	95-100	90-100	25-40	15-25
	24-51	Clay loam, sandy loam, silt loam.	ML, SC, SM, CL	A-2, A-4, A-6	0	0-5	90-100	85-100	60-100	30-70	20-40	3-15
	51-60	Stratified sandy loam to silt loam.	SM, SC, ML, CL	A-2, A-4	0	0-5	90-100	80-100	50-80	20-60	<25	3-10
134D2-------- Camden	0-5	Silt loam-----	CL, ML, CL-ML	A-4, A-6	0	0	100	100	95-100	90-100	20-35	3-15
	5-20	Silt loam, silty clay loam.	CL	A-6	0	0	100	100	95-100	90-100	25-40	15-25
	20-26	Clay loam, sandy loam, silt loam.	ML, SC, SM, CL	A-2, A-4, A-6	0	0-5	90-100	85-100	60-100	30-70	20-40	3-15
	26-60	Stratified sandy loam to silt loam.	SM, SC, ML, CL	A-2, A-4	0	0-5	90-100	80-100	50-80	20-60	<25	3-10

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
145B2---------- Saybrook	0-9	Silt loam-----	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	90-100	25-40	5-20
	9-25	Silt loam, silty clay loam.	CL, CH	A-6, A-7	0	0	100	100	90-100	85-100	35-55	15-30
	25-37	Clay loam, loam, silt loam.	CL	A-6, A-4	0	0	95-100	85-100	80-95	60-85	20-40	8-25
	37-60	Loam, silt loam.	CL	A-6	0	0-5	95-100	85-100	80-95	60-85	20-40	10-25
145C2---------- Saybrook	0-7	Silt loam-----	CL, CL-ML	A-6, A-4	0	0	100	100	95-100	90-100	25-40	5-20
	7-26	Silt loam, silty clay loam.	CL, CH	A-6, A-7	0	0	100	100	90-100	85-100	35-55	15-30
	26-32	Clay loam, loam, silt loam.	CL	A-6, A-4	0	0	95-100	85-100	80-95	60-85	20-40	8-25
	32-60	Loam, silt loam.	CL	A-6	0	0-5	95-100	85-100	80-95	60-85	20-40	10-25
148B---------- Proctor	0-12	Silt loam-----	CL	A-6	0	0	100	100	95-100	85-100	25-40	10-20
	12-29	Silty clay loam.	CL	A-7, A-6	0	0	95-100	90-100	85-100	85-100	25-50	10-25
	29-35	Clay loam, sandy loam, loam.	CL, SC, CL-ML, SC-SM	A-6, A-7, A-4, A-2	0	0	90-100	85-100	75-100	30-80	20-45	5-25
	35-60	Stratified loam to sand.	SC, CL, SC-SM, CL-ML	A-2, A-4, A-6	0	0	85-100	80-100	50-100	25-80	20-40	5-20
148C2---------- Proctor	0-8	Silt loam-----	CL	A-6	0	0	100	100	95-100	85-100	25-40	10-20
	8-29	Silty clay loam.	CL	A-7, A-6	0	0	95-100	90-100	85-100	85-100	25-50	10-25
	29-39	Clay loam, sandy loam, loam.	CL, SC, CL-ML, SC-SM	A-6, A-7, A-4, A-2	0	0	90-100	85-100	75-100	30-80	20-45	5-25
	39-60	Stratified loam to sand.	SC, CL, SC-SM, CL-ML	A-2, A-4, A-6	0	0	85-100	80-100	50-100	25-80	20-40	5-20
152---------- Drummer	0-14	Silty clay loam.	CL	A-6, A-7	0	0	100	95-100	95-100	85-95	30-50	15-30
	14-46	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	95-100	95-100	85-95	30-50	15-30
	46-53	Loam, silt loam, clay loam.	CL	A-6, A-7	---	0-5	95-100	90-100	75-95	60-85	30-50	15-30
	53-60	Stratified loamy sand to silty clay loam.	SC, CL	A-4, A-6	---	0-5	95-100	85-95	75-95	45-80	20-35	7-20
154A---------- Flanagan	0-12	Silt loam-----	CL	A-7, A-6	0	0	100	100	95-100	85-100	35-50	15-30
	12-44	Silty clay loam.	CL, CH	A-7	0	0	100	100	95-100	85-100	40-60	15-30
	44-60	Loam, clay loam, silt loam.	CL, CL-ML	A-4, A-6, A-7	0	0	85-100	80-100	70-95	50-85	20-45	5-30

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
171B---------- Catlin	0-12	Silt loam-----	ML, CL, CL-ML	A-6, A-7, A-4	0	0	100	100	95-100	85-100	25-45	5-20
	12-42	Silty clay loam, silt loam.	CL, ML	A-7, A-6	0	0	100	90-100	90-100	80-100	30-50	15-30
	42-60	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0-3	90-100	90-100	85-100	60-100	25-45	10-20
171B2--------- Catlin	0-5	Silt loam-----	ML, CL, CL-ML	A-6, A-7, A-4	0	0	100	100	95-100	85-100	25-45	5-20
	5-41	Silty clay loam, silt loam.	CL, ML	A-7, A-6	0	0	100	90-100	90-100	80-100	30-50	15-30
	41-60	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0-3	90-100	90-100	85-100	60-100	25-45	10-20
171C2--------- Catlin	0-5	Silt loam-----	ML, CL, CL-ML	A-6, A-7, A-4	0	0	100	100	95-100	85-100	25-45	5-20
	5-47	Silty clay loam, silt loam.	CL, ML	A-7, A-6	0	0	100	90-100	90-100	80-100	30-50	15-30
	47-60	Loam, clay loam, silty clay loam.	CL	A-6, A-7	0	0-3	90-100	90-100	85-100	60-100	25-45	10-20
198A---------- Elburn	0-14	Silt loam-----	CL	A-6	0	0	100	100	95-100	90-100	25-40	10-25
	14-51	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	75-90	30-50	15-35
	51-60	Loam, sandy loam, clay loam.	CL, CL-ML, SC, SC-SM	A-6, A-4, A-2	0	0	90-100	80-100	60-90	25-80	20-40	5-20
199A---------- Plano	0-14	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	20-30	5-15
	14-49	Silty clay loam, silt loam.	CL	A-6	0	0	100	100	95-100	95-100	25-40	10-25
	49-60	Clay loam, loam, sandy loam.	CL, SC, CL-ML, SC-SM	A-6, A-7, A-4	0	0-1	90-100	85-95	60-90	40-75	20-45	5-25
199B---------- Plano	0-13	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	20-30	5-15
	13-43	Silty clay loam, silt loam.	CL	A-6	0	0	100	100	95-100	95-100	25-40	10-25
	43-46	Clay loam, loam, sandy loam.	CL, SC, CL-ML, SC-SM	A-6, A-7, A-4	0	0-1	90-100	85-95	60-90	40-75	20-45	5-25
	46-60	Stratified silt loam to sandy loam.	ML, SM, CL, SC	A-4, A-2	0	0-5	90-100	85-95	60-90	30-70	<25	NP-10

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
199B2---------- Plano	0-8	Silt loam-----	CL-ML, CL	A-4, A-6	0	0	100	100	95-100	95-100	20-30	5-15
	8-47	Silty clay loam, silt loam.	CL	A-6	0	0	100	100	95-100	95-100	25-40	10-25
	47-56	Clay loam, loam, sandy loam.	CL, SC, CL-ML, SC-SM	A-6, A-7, A-4	0	0-1	90-100	85-95	60-90	40-75	20-45	5-25
	56-60	Stratified silt loam to sandy loam.	ML, SM, CL, SC	A-4, A-2	0	0-5	90-100	85-95	60-90	30-70	<25	NP-10
206---------- Thorp	0-11	Silt loam-----	CL	A-6, A-4	0	0	95-100	95-100	90-100	75-95	20-40	8-19
	11-15	Silt loam-----	CL	A-4, A-6	0	0	95-100	95-100	90-100	75-95	25-35	7-15
	15-45	Silty clay loam, silt loam.	CL	A-7, A-6	0	0	95-100	95-100	90-100	75-95	35-50	13-27
	45-60	Sandy loam, sand.	SM, ML, CL-ML, SC-SM	A-2, A-4	0	0	85-100	75-95	65-85	20-60	<20	NP-6
234A---------- Sunbury	0-9	Silt loam-----	ML, CL	A-4, A-6, A-7	0	0	100	100	95-100	90-100	30-45	8-15
	9-13	Silt loam-----	CL, ML	A-4, A-6	0	0	100	100	95-100	90-100	30-45	8-15
	13-52	Silty clay loam, silty clay.	CL, CH	A-7, A-6	0	0	100	100	95-100	85-100	35-60	20-35
	52-60	Loam, silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	0-2	98-100	95-100	90-100	50-95	20-45	5-30
243A---------- St. Charles	0-8	Silt loam-----	CL	A-4, A-6	0	0	100	100	95-100	95-100	22-35	7-15
	8-50	Silty clay loam, silt loam.	CL	A-6	0	0	100	100	95-100	90-100	30-40	10-20
	50-60	Sandy loam, silt loam, clay loam.	SC, CL	A-4, A-6	0	0	90-100	75-100	75-90	40-80	20-35	8-20
243B---------- St. Charles	0-10	Silt loam-----	CL	A-4, A-6	0	0	100	100	95-100	95-100	22-35	7-15
	10-53	Silty clay loam, silt loam.	CL	A-6	0	0	100	100	95-100	90-100	30-40	10-20
	53-60	Clay loam, silt loam, sandy loam.	CL, SC	A-4, A-6	0	0	90-100	75-100	75-95	40-80	20-35	8-20
257A---------- Clarksdale	0-9	Silt loam-----	CL	A-6	0	0	100	100	95-100	90-100	25-40	10-20
	9-19	Silt loam-----	CL	A-6, A-4	0	0	100	100	95-100	90-100	20-35	8-18
	19-48	Silty clay loam, silty clay.	CL, CH	A-7	0	0	100	100	95-100	90-100	40-65	25-40
	48-60	Silt loam, silty clay loam.	CL	A-6	0	0	95-100	95-100	95-100	90-100	25-40	10-25

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
259C2---------- Assumption	0-6	Silt loam-----	CL	A-6, A-4	0	0	100	100	95-100	90-100	25-40	8-20
	6-29	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-50	10-30
	29-36	Silty clay loam, silt loam.	CL	A-6, A-7	0	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	0-5	100	95-100	90-100	70-90	35-50	20-35
259D2---------- Assumption	0-8	Silt loam-----	CL	A-6, A-4	0	0	100	100	95-100	90-100	25-40	8-20
	8-30	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-50	10-30
	30-50	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	90-100	85-95	75-90	30-50	10-30
	50-60	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0	0-5	100	95-100	90-100	70-90	35-50	20-35
259D3---------- Assumption	0-5	Silty clay loam.	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-45	15-30
	5-20	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-50	10-30
	20-25	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	90-100	85-95	75-90	30-50	10-30
	25-60	Clay loam, silty clay loam, clay.	CL	A-6, A-7	0	0-5	100	95-100	90-100	70-90	35-50	20-35
279B---------- Rozetta	0-9	Silt loam-----	CL	A-4, A-6	0	0	100	100	95-100	95-100	24-35	8-15
	9-49	Silty clay loam.	CL	A-7, A-6	0	0	100	100	95-100	95-100	35-50	15-30
	49-60	Silt loam-----	CL	A-6, A-4	0	0	100	100	95-100	85-100	25-40	7-20
279C2---------- Rozetta	0-7	Silt loam-----	CL	A-4, A-6	0	0	100	100	95-100	95-100	24-35	8-15
	7-60	Silty clay loam.	CL	A-7, A-6	0	0	100	100	95-100	95-100	35-50	15-30
279C3---------- Rozetta	0-6	Silty clay loam.	ML, CL	A-6, A-7	0	0	100	100	95-100	95-100	35-45	10-20
	6-34	Silty clay loam.	ML	A-6, A-7	0	0	100	100	95-100	95-100	35-50	10-20
	34-60	Silt loam-----	CL	A-6, A-4	0	0	100	100	90-100	85-100	25-40	7-20
280D2---------- Fayette	0-6	Silt loam-----	CL	A-6, A-7	0	0	100	100	100	95-100	30-45	10-25
	6-48	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-45	15-25
	48-60	Silt loam-----	CL	A-6	0	0	100	100	100	95-100	30-40	10-20
319---------- Aurelius	0-8	Muck----------	PT	A-8	0	0	---	---	---	---	---	---
	8-33	Coprogenous earth.	OL	A-8	0	0	---	---	---	---	---	---
	33-37	Marl----------	---	---	0	0	100	95-100	80-90	60-80	---	---
	37-60	Stratified sand to clay loam.	SM, ML	A-2, A-4	0	0	95-100	90-100	70-90	30-80	<40	NP-10

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
323D3--------- Casco	0-4	Clay loam-----	CL	A-6	0	0-5	95-100	95-100	90-100	50-80	30-40	10-20
	4-16	Clay loam, sandy clay loam, gravelly loam.	SC, CL, GC	A-6, A-7, A-2	0-1	0-5	60-100	55-100	45-100	20-80	25-46	11-26
	16-60	Stratified sand to gravel.	GP, SP, GP-GM, SP-SM	A-1, A-2, A-3	0-3	0-10	30-100	30-100	10-95	2-10	---	NP
379C2--------- Dakota	0-6	Silt loam-----	CL	A-4, A-6	0	0	95-100	85-100	80-100	65-90	25-35	7-15
	6-20	Loam, sandy clay loam, clay loam.	CL, SC	A-4, A-6	0	0	95-100	85-100	70-100	35-80	25-40	9-20
	20-32	Sandy loam, loamy sand, gravelly loamy coarse sand.	SM, SP, GM, GP	A-2, A-4, A-1, A-3	0-1	0-5	55-100	45-100	20-75	2-40	<21	NP-4
	32-60	Sand, gravelly coarse sand, loamy sand.	SP, GP, GM, SM	A-1, A-3, A-2	0-1	0-5	50-100	45-100	20-75	2-30	---	NP
386B--------- Downs	0-8	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	100	95-100	25-35	5-15
	8-34	Silty clay loam, silt loam.	CL	A-7, A-6	0	0	100	100	100	95-100	35-45	15-25
	34-60	Silt loam-----	CL	A-6	0	0	100	100	100	95-100	30-40	11-20
386C2--------- Downs	0-7	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	100	95-100	25-35	5-15
	7-36	Silty clay loam, silt loam.	CL	A-7, A-8	0	0	100	100	100	95-100	35-45	15-25
	36-60	Silt loam-----	CL	A-6	0	0	100	100	100	95-100	30-40	10-20
448C2--------- Mona	0-8	Silt loam-----	CL	A-4, A-6, A-7	0	0	100	95-100	95-100	85-100	25-45	8-25
	8-30	Clay loam, silty clay loam, sandy clay loam.	CL	A-6, A-7	0	0-5	95-100	85-95	75-90	60-85	35-50	11-25
	30-60	Silty clay, clay.	CH, CL	A-7	0-1	0-10	95-100	85-95	80-95	75-90	40-60	15-32
448D3--------- Mona	0-8	Clay loam-----	CL	A-4, A-6, A-7	0	0	100	95-100	95-100	85-100	25-45	8-25
	8-31	Clay loam, silty clay loam, sandy clay loam.	CL	A-6, A-7	0	0-5	95-100	85-95	75-90	60-85	35-50	11-25
	31-60	Silty clay, clay.	CH, CL	A-7	0-1	0-10	95-100	85-95	80-95	75-90	40-60	15-32
549C2--------- Marseilles	0-5	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-15
	5-26	Silty clay loam, silty clay, clay loam.	CL, CH	A-7	0-1	0-5	95-100	90-100	85-100	80-95	40-60	15-30
	26-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Frag-ments >10 inches	Frag-ments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
549D2---------- Marseilles	0-4	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-15
	4-38	Silty clay loam, silty clay, clay loam.	CL, CH	A-7	0-1	0-5	95-100	90-100	85-100	80-95	40-60	15-30
	38-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
549F---------- Marseilles	0-7	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-15
	7-34	Silty clay loam, silty clay, clay loam.	CL, CH	A-7	0-1	0-5	95-100	90-100	85-100	80-95	40-60	15-30
	34-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
549G---------- Marseilles	0-6	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	85-100	25-40	5-15
	6-23	Silty clay loam, silty clay, clay loam.	CL, CH	A-7	0-1	0-5	95-100	90-100	85-100	80-95	40-60	15-30
	23-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
567C2---------- Elkhart	0-9	Silt loam-----	CL	A-4, A-6	0	0	100	100	100	95-100	25-35	8-15
	9-27	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	18-30
	27-60	Silt loam, silt.	CL	A-6, A-4	0	0	100	100	95-100	95-100	20-37	8-20
567C3---------- Elkhart	0-7	Silty clay loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	18-30
	7-24	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	100	95-100	35-50	18-30
	24-60	Silt loam, silt.	CL	A-6, A-4	0	0	100	100	95-100	95-100	20-37	8-20
709A---------- Osceola	0-9	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	95-100	25-40	5-15
	9-15	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	95-100	95-100	25-35	5-15
	15-41	Silty clay, silty clay loam.	CL, CH	A-7	0	0	100	100	95-100	95-100	35-55	15-30
	41-47	Sandy loam, loamy sand.	ML, SM	A-4, A-2	0	0	100	95-100	80-95	30-60	<25	NP-4
	47-52	Silty clay, silty clay loam.	CH, CL	A-7	0-1	0-5	95-100	90-100	85-100	75-95	35-55	15-35
	52-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---
753B---------- Massbach	0-7	Silt loam-----	CL	A-6	0	0	100	100	95-100	90-100	30-40	10-20
	7-47	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-45	15-25
	47-55	Silty clay loam, silty clay, sandy clay loam.	CL, CH	A-7, A-6	0-1	0-5	95-100	90-100	85-100	75-95	30-55	15-35
	55-60	Weathered bedrock.	---	---	---	---	---	---	---	---	---	---

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
820G:												
Hennepin-----	0-4	Loam----------	CL, CL-ML	A-4, A-6, A-7	0-1	0-5	90-100	85-100	70-100	60-95	25-45	5-20
	4-19	Loam, clay loam, silt loam.	SC, SC-SM, CL, CL-ML	A-4, A-6, A-7	0-1	0-5	85-100	75-100	65-100	35-95	20-50	5-25
	19-60	Loam, clay loam, silt loam.	SC, SC-SM, CL, CL-ML	A-4, A-6, A-7	0-1	0-5	85-100	75-100	65-100	35-95	20-50	5-25
Casco---------	0-8	Silt loam-----	ML, CL-ML, CL	A-4	0	0	95-100	90-100	75-100	55-90	20-30	3-10
	8-23	Clay loam, sandy clay loam, gravelly loam.	SC, CL, GC	A-6, A-7, A-2	0-1	0-5	60-100	55-100	45-100	20-80	25-46	11-26
	23-60	Stratified sand to gravel.	GP, SP, GP-GM, SP-SM	A-1, A-3, A-2	0-3	0-10	30-100	30-100	10-95	2-10	---	NP
871B---------- Lenzburg	0-8	Stony silt loam.	CL	A-6, A-4, A-7	0-3	3-15	75-95	70-90	60-85	50-85	25-46	8-20
	8-22	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0-1	0-10	80-95	75-90	70-90	55-85	25-45	10-25
	22-60	Gravelly loam, gravelly silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	3-25	70-95	60-90	55-90	50-90	25-45	10-25
871D---------- Lenzburg	0-11	Stony silty clay loam.	CL	A-6, A-7	0-3	3-15	80-95	75-90	65-90	50-85	30-45	10-25
	11-19	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0-1	0-10	80-95	75-90	70-90	55-85	25-45	10-25
	19-60	Gravelly loam, gravelly silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	3-25	70-95	60-90	55-90	50-90	25-45	10-25
871G---------- Lenzburg	0-10	Stony silty clay loam.	CL	A-6, A-7	0-3	3-15	80-95	75-90	65-90	50-85	30-45	10-25
	10-37	Silt loam, silty clay loam, loam.	CL	A-6, A-7	0-1	0-10	80-95	75-90	70-90	55-85	25-45	10-25
	37-60	Gravelly loam, gravelly silty clay loam, gravelly clay loam.	CL	A-6, A-7	0-5	3-25	70-95	60-90	55-90	50-90	25-45	10-25
872B---------- Rapatee	0-11	Silt loam-----	ML	A-4, A-6, A-7	0	0	100	100	95-100	90-100	35-45	7-15
	11-60	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

TABLE 15.--ENGINEERING INDEX PROPERTIES--Continued

Soil name and map symbol	Depth	USDA texture	Classification		Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO			4	10	40	200		
	In				Pct	Pct					Pct	
3107---------- Sawmill	0-16	Silty clay loam.	CL	A-6, A-7	0	0	100	100	95-100	85-100	30-50	15-30
	16-33	Silty clay loam.	CL	A-6, A-7	0	0	100	100	95-100	85-100	30-50	15-30
	33-50	Silty clay loam, clay loam, loam.	CL	A-6, A-7, A-4	0	0	100	100	85-100	70-95	25-50	8-25
	50-60	Silty clay loam, clay loam, silt loam.	CL	A-4, A-6, A-7	0	0	100	100	75-100	65-95	20-50	8-30
3107+--------- Sawmill	0-13	Silt loam-----	CL	A-6	0	0	100	100	80-100	75-95	25-40	10-20
	13-39	Silty clay loam.	CL	A-6, A-7	0	0	100	100	95-100	85-100	30-50	15-30
	39-52	Silty clay loam, clay loam, loam.	CL	A-6, A-7, A-4	0	0	100	100	85-100	70-95	25-50	8-25
	52-60	Silty clay loam, clay loam, silt loam.	CL	A-4, A-6, A-7	0	0	100	100	75-100	65-95	20-50	8-30
3451---------- Lawson	0-13	Silt loam-----	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	85-100	20-40	5-20
	13-32	Silt loam, silty clay loam.	CL, CL-ML	A-4	0	0	100	100	90-100	85-100	20-30	5-10
	32-48	Silty clay loam, silt loam.	CL	A-6, A-7	0	0	100	100	90-100	60-100	20-45	10-25
	48-60	Stratified silty clay loam to sandy loam.	CL-ML, CL, SC-SM, SC	A-4, A-6	0	0	100	100	60-100	35-85	20-35	5-20
8074---------- Radford	0-11	Silt loam-----	ML, CL	A-4, A-6	0	0	100	100	95-100	80-100	30-40	5-15
	11-30	Silt loam-----	CL, ML	A-4, A-6	0	0	100	100	95-100	80-100	25-35	5-15
	30-60	Silt loam, silty clay loam, clay loam.	CL	A-6, A-7	0	0	100	100	95-100	80-95	35-50	15-25
8076---------- Otter	0-21	Silt loam-----	CL	A-6, A-7, A-4	0	0	100	95-100	90-100	80-100	25-45	7-20
	21-46	Silt loam, loam, silty clay loam.	CL	A-6, A-7	0	0	100	95-100	90-100	80-100	30-45	10-20
	46-60	Silt loam, sandy loam, silty clay loam.	CL-ML, CL, SC-SM, SC	A-4, A-6, A-7	0	0	90-100	80-100	55-95	45-85	25-45	5-20
8077---------- Huntsville	0-39	Silt loam-----	CL	A-6	0	0	100	98-100	90-100	85-100	25-40	10-25
	39-60	Silt loam, loam, sandy loam.	CL, ML, SM, SC	A-4, A-6	0	0	90-100	80-100	55-95	45-85	20-35	NP-15

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 erodibility group	Organic matter
								K	T		
	In	Pct	g/cc	In/hr	In/in	pH					Pct
8D2	0-7	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
Hickory	7-36	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate	0.28			
	36-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low	0.28			
8D3	0-7	27-35	1.40-1.65	0.6-2.0	0.17-0.19	4.5-7.3	Moderate	0.37	4	6	.5-1
Hickory	7-55	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-6.0	Moderate	0.28			
	55-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low	0.28			
8F	0-7	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
Hickory	7-50	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-7.3	Moderate	0.28			
	50-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low	0.28			
8G	0-11	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
Hickory	11-48	27-35	1.45-1.65	0.6-2.0	0.15-0.19	4.5-7.3	Moderate	0.28			
	48-60	15-32	1.50-1.70	0.6-2.0	0.11-0.19	5.1-8.4	Low	0.28			
17A	0-10	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
Keomah	10-14	16-26	1.35-1.45	0.2-0.6	0.18-0.20	4.5-7.3	Low	0.37			
	14-36	35-42	1.30-1.45	0.2-0.6	0.18-0.20	4.5-5.5	High	0.37			
	36-60	24-38	1.40-1.55	0.2-0.6	0.18-0.20	5.1-7.3	Moderate	0.37			
19C3	0-8	27-32	1.25-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Moderate	0.37	4	7	<1
Sylvan	8-22	25-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.37			
	22-60	10-27	1.30-1.50	0.6-2.0	0.20-0.22	6.6-8.4	Low	0.37			
19D3	0-8	27-32	1.25-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Moderate	0.37	4	7	<1
Sylvan	8-30	25-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.37			
	30-60	10-27	1.30-1.50	0.6-2.0	0.20-0.22	6.6-8.4	Low	0.37			
19F	0-6	18-27	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.37	5	6	1-2
Sylvan	6-11	15-25	1.25-1.45	0.6-2.0	0.20-0.22	5.6-7.3	Low	0.37			
	11-26	25-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.37			
	26-60	18-27	1.30-1.50	0.6-2.0	0.20-0.22	6.6-8.4	Low	0.37			
27D3	0-5	27-35	1.35-1.50	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.37	3	6	.5-1
Miami	5-12	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.3	Moderate	0.37			
	12-60	15-25	1.70-1.90	0.06-0.2	0.05-0.10	7.4-8.4	Moderate	0.37			
27F	0-6	11-22	1.30-1.45	0.6-2.0	0.20-0.24	5.6-7.3	Low	0.37	4	5	1-2
Miami	6-26	27-35	1.45-1.65	0.6-2.0	0.15-0.20	5.1-7.3	Moderate	0.37			
	26-60	15-25	1.70-1.90	0.06-0.2	0.05-0.10	7.4-8.4	Moderate	0.37			
36A	0-14	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
Tama	14-46	27-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-6.5	Moderate	0.43			
	46-60	20-30	1.35-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
36B	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
Tama	11-56	27-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-6.5	Moderate	0.43			
	56-60	20-30	1.35-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
36B2, 36C2	0-7	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
Tama	7-37	27-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-6.5	Moderate	0.43			
	37-60	22-28	1.35-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
36C3	0-7	30-35	1.25-1.30	0.6-2.0	0.22-0.24	5.1-7.3	Moderate	0.43	4	7	1-2
Tama	7-22	30-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-6.5	Moderate	0.43			
	22-60	22-28	1.35-1.40	0.6-2.0	0.18-0.20	5.6-7.3	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
41A	0-17	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
Muscatine	17-45	30-35	1.28-1.35	0.6-2.0	0.18-0.20	5.1-7.3	Moderate	0.43			
	45-60	22-30	1.35-1.40	0.6-2.0	0.18-0.20	6.6-7.8	Moderate	0.43			
43A	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
Ipava	17-41	35-43	1.25-1.50	0.2-0.6	0.11-0.20	5.6-7.8	High	0.43			
	41-60	20-30	1.30-1.55	0.2-0.6	0.20-0.22	6.1-8.4	Moderate	0.43			
45	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
Denny	9-17	15-22	1.25-1.45	0.2-0.6	0.18-0.20	5.6-6.5	Low	0.37			
	17-46	35-45	1.20-1.40	0.06-0.2	0.11-0.22	5.6-6.5	High	0.37			
	46-60	25-35	1.40-1.60	0.2-0.6	0.20-0.22	5.6-7.8	Moderate	0.37			
59A	0-11	20-25	1.10-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.28	5	6	3-5
Lisbon	11-28	25-35	1.15-1.35	0.6-2.0	0.18-0.22	6.1-7.8	Moderate	0.43			
	28-31	20-30	1.45-1.55	0.6-2.0	0.15-0.20	6.1-8.4	Low	0.43			
	31-60	18-27	1.50-1.60	0.2-0.6	0.07-0.11	7.4-8.4	Low	0.43			
60C2	0-8	18-27	1.10-1.35	0.6-2.0	0.20-0.24	6.6-7.8	Moderate	0.32	5	6	2-3
La Rose	8-18	27-35	1.35-1.55	0.6-2.0	0.15-0.20	6.1-7.8	Moderate	0.32			
	18-60	18-27	1.50-1.70	0.6-2.0	0.09-0.11	7.4-8.4	Moderate	0.32			
67	0-17	27-35	1.05-1.25	0.6-2.0	0.21-0.24	7.4-8.4	Moderate	0.28	5	4L	5-6
Harpster	17-36	27-35	1.20-1.50	0.6-2.0	0.18-0.22	7.4-8.4	Moderate	0.28			
	36-51	22-35	1.25-1.55	0.6-2.0	0.17-0.22	7.4-8.4	Moderate	0.28			
	51-60	15-30	1.40-1.60	0.6-2.0	0.11-0.22	7.4-8.4	Low	0.28			
68	0-16	27-35	1.15-1.35	0.6-2.0	0.21-0.23	5.6-7.3	Moderate	0.28	5	7	4-6
Sable	16-45	24-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.8	Moderate	0.28			
	45-60	20-28	1.30-1.50	0.6-2.0	0.20-0.22	6.6-8.4	Low	0.28			
68+	0-7	20-27	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.28	5	6	2-4
Sable	7-24	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.28			
	24-55	24-35	1.30-1.50	0.6-2.0	0.18-0.20	5.6-7.8	Moderate	0.28			
	55-60	20-28	1.30-1.50	0.6-2.0	0.20-0.22	6.6-8.4	Low	0.28			
119C2	0-7	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
Elco	7-24	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			
119D2	0-7	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
Elco	7-24	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			
119D3	0-5	25-33	1.20-1.35	0.6-2.0	0.18-0.21	5.6-7.3	Moderate	0.37	4	7	.5-1
Elco	5-32	23-35	1.25-1.45	0.6-2.0	0.18-0.21	5.1-7.8	Moderate	0.37			
	32-37	23-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.8	Moderate	0.37			
	37-60	25-45	1.45-1.70	0.06-0.6	0.14-0.20	5.1-7.8	High	0.37			
119F2	0-5	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
Elco	5-24	23-35	1.25-1.45	0.6-2.0	0.18-0.21	5.1-7.8	Moderate	0.37			
	24-34	23-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.8	Moderate	0.37			
	34-60	25-45	1.45-1.70	0.06-0.6	0.14-0.20	5.1-7.8	High	0.37			
131D	0-5	10-15	1.45-1.65	2.0-6.0	0.14-0.17	4.5-7.3	Low	0.24	5	3	.5-1
Alvin	5-30	15-18	1.40-1.65	2.0-6.0	0.14-0.18	4.5-7.3	Low	0.24			
	30-60	3-10	1.45-1.65	2.0-6.0	0.10-0.15	5.1-8.4	Low	0.24			
131F	0-8	10-15	1.45-1.65	2.0-6.0	0.14-0.17	4.5-7.3	Low	0.24	5	3	.5-1
Alvin	8-38	15-18	1.40-1.65	2.0-6.0	0.14-0.18	4.5-7.3	Low	0.24			
	38-60	3-10	1.45-1.65	2.0-6.0	0.10-0.15	5.1-8.4	Low	0.24			

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
134C2	0-4	14-27	1.35-1.55	0.6-2.0	0.21-0.25	5.1-7.3	Low	0.37	5	6	1-2
Camden	4-24	22-35	1.40-1.60	0.6-2.0	0.14-0.24	5.1-7.3	Moderate	0.37			
	24-51	18-30	1.45-1.65	0.6-2.0	0.11-0.22	5.1-7.3	Low	0.32			
	51-60	5-20	1.40-1.70	0.6-6.0	0.12-0.22	5.6-8.4	Low	0.32			
134D2	0-5	14-27	1.35-1.55	0.6-2.0	0.21-0.25	5.1-7.3	Low	0.37	5	6	1-2
Camden	5-20	22-35	1.40-1.60	0.6-2.0	0.14-0.24	5.1-7.3	Moderate	0.37			
	20-26	18-30	1.45-1.65	0.6-2.0	0.11-0.22	5.1-7.3	Low	0.32			
	26-60	5-20	1.40-1.70	0.6-6.0	0.12-0.22	5.6-8.4	Low	0.32			
145B2	0-9	20-26	1.10-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.32	5	6	2-4
Saybrook	9-25	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
	25-37	24-35	1.50-1.60	0.6-2.0	0.15-0.21	6.1-7.8	Low	0.32			
	37-60	20-27	1.55-1.75	0.2-0.6	0.10-0.14	7.4-8.4	Low	0.37			
145C2	0-7	20-26	1.10-1.30	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.32	5	6	2-4
Saybrook	7-26	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
	26-32	24-35	1.50-1.60	0.6-2.0	0.15-0.21	6.1-7.8	Low	0.32			
	32-60	20-27	1.55-1.75	0.2-0.6	0.10-0.14	7.4-8.4	Low	0.37			
148B	0-12	18-27	1.10-1.30	0.6-2.0	0.22-0.24	5.1-7.8	Low	0.32	5	6	2-4
Proctor	12-29	25-35	1.20-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
	29-35	15-35	1.30-1.55	0.6-6.0	0.13-0.16	5.6-7.3	Moderate	0.32			
	35-60	10-20	1.40-1.70	0.6-6.0	0.07-0.19	6.1-7.8	Low	0.17			
148C2	0-8	18-27	1.10-1.30	0.6-2.0	0.22-0.24	5.1-7.8	Low	0.32	5	6	2-4
Proctor	8-29	25-35	1.20-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
	29-39	22-35	1.30-1.55	0.6-6.0	0.13-0.16	5.6-7.3	Moderate	0.32			
	39-60	10-20	1.40-1.70	0.6-6.0	0.07-0.19	6.1-7.8	Low	0.17			
152	0-14	27-35	1.10-1.30	0.6-2.0	0.21-0.23	5.6-7.8	Moderate	0.28	5	7	5-7
Drummer	14-46	20-35	1.20-1.45	0.6-2.0	0.21-0.24	5.6-7.8	Moderate	0.28			
	46-53	22-33	1.30-1.55	0.6-2.0	0.17-0.20	6.1-8.4	Moderate	0.28			
	53-60	15-32	1.40-1.70	0.6-2.0	0.11-0.19	6.6-8.4	Low	0.28			
154A	0-12	20-27	1.20-1.40	0.6-2.0	0.22-0.24	5.1-7.3	Moderate	0.28	5	6	4-5
Flanagan	12-44	35-42	1.25-1.45	0.6-2.0	0.15-0.22	5.6-7.3	High	0.43			
	44-60	20-30	1.45-1.70	0.2-0.6	0.15-0.22	6.1-8.4	Low	0.37			
171B	0-12	18-27	1.25-1.45	0.6-2.0	0.23-0.26	5.1-7.3	Low	0.32	5	6	3-4
Catlin	12-42	27-35	1.25-1.55	0.6-2.0	0.18-0.20	5.1-7.3	Moderate	0.43			
	42-60	20-30	1.40-1.70	0.6-2.0	0.07-0.11	6.1-8.4	Low	0.43			
171B2	0-5	18-27	1.25-1.45	0.6-2.0	0.23-0.26	5.1-7.3	Low	0.32	5	6	3-4
Catlin	5-41	27-35	1.25-1.55	0.6-2.0	0.18-0.20	5.1-7.3	Moderate	0.43			
	41-60	20-30	1.40-1.70	0.6-2.0	0.07-0.11	6.1-8.4	Low	0.43			
171C2	0-5	18-27	1.25-1.45	0.6-2.0	0.23-0.26	5.1-7.3	Low	0.32	5	6	3-4
Catlin	5-47	27-35	1.25-1.55	0.6-2.0	0.18-0.20	5.1-7.3	Moderate	0.43			
	47-60	20-30	1.40-1.70	0.6-2.0	0.07-0.11	6.1-8.4	Low	0.43			
198A	0-14	22-27	1.10-1.30	0.6-2.0	0.22-0.24	5.6-7.8	Low	0.28	5	6	4-5
Elburn	14-51	25-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-7.8	Moderate	0.43			
	51-60	15-30	1.50-1.70	0.6-6.0	0.12-0.18	6.1-8.4	Low	0.43			
199A	0-14	18-27	1.10-1.30	0.6-2.0	0.22-0.24	6.1-7.3	Low	0.32	5	6	3-5
Plano	14-49	25-35	1.20-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate	0.43			
	49-60	15-32	1.30-1.55	0.6-6.0	0.09-0.16	5.6-7.3	Low	0.37			
199B	0-13	18-27	1.10-1.30	0.6-2.0	0.22-0.24	6.1-7.3	Low	0.32	5	6	3-5
Plano	13-43	25-35	1.20-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate	0.43			
	43-46	15-32	1.30-1.55	0.6-6.0	0.09-0.16	5.6-7.3	Low	0.37			
	46-60	10-20	1.50-1.70	2.0-6.0	0.11-0.22	5.6-8.4	Low	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
199B2	0-8	18-27	1.10-1.30	0.6-2.0	0.22-0.24	6.1-7.3	Low	0.32	5	6	3-5
Plano	8-47	25-35	1.20-1.40	0.6-2.0	0.18-0.20	5.1-7.3	Moderate	0.43			
	47-56	15-32	1.30-1.55	0.6-6.0	0.09-0.16	5.6-7.3	Low	0.37			
	56-60	10-20	1.50-1.70	2.0-6.0	0.11-0.22	5.6-8.4	Low	0.37			
206	0-11	20-27	1.15-1.35	0.2-0.6	0.22-0.24	5.1-7.8	Low	0.37	5	6	4-6
Thorp	11-15	18-25	1.30-1.50	0.2-0.6	0.20-0.22	5.1-7.3	Low	0.37			
	15-45	22-35	1.35-1.55	0.06-0.2	0.18-0.20	5.1-7.3	Moderate	0.37			
	45-60	5-20	1.50-1.70	2.0-6.0	0.05-0.13	6.1-8.4	Low	0.24			
234A	0-9	20-27	1.20-1.40	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.32	5	6	2-4
Sunbury	9-13	18-27	1.30-1.45	0.6-2.0	0.18-0.22	5.6-7.3	Low	0.43			
	13-52	35-45	1.35-1.55	0.6-2.0	0.18-0.20	5.6-7.8	High	0.43			
	52-60	20-30	1.40-1.60	0.2-0.6	0.07-0.11	6.6-8.4	Low	0.43			
243A	0-8	20-27	1.15-1.30	0.6-2.0	0.22-0.24	5.1-7.8	Low	0.37	5	6	1-3
St. Charles	8-50	25-35	1.30-1.50	0.6-2.0	0.18-0.20	4.5-7.3	Moderate	0.37			
	50-60	15-30	1.30-1.50	0.6-2.0	0.11-0.16	5.1-7.3	Low	0.24			
243B	0-10	20-27	1.15-1.30	0.6-2.0	0.22-0.24	5.1-7.8	Low	0.37	5	6	1-3
St. Charles	10-53	25-35	1.30-1.50	0.6-2.0	0.18-0.20	4.5-7.3	Moderate	0.37			
	53-60	15-30	1.30-1.50	0.6-2.0	0.11-0.16	5.1-7.3	Low	0.32			
257A	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
Clarksdale	9-19	15-27	1.25-1.50	0.2-0.6	0.20-0.22	5.1-6.5	Low	0.37			
	19-48	35-45	1.30-1.50	0.2-0.6	0.11-0.20	5.1-7.3	High	0.37			
	48-60	20-30	1.40-1.60	0.2-0.6	0.20-0.22	6.1-8.4	Moderate	0.37			
259C2	0-6	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
Assumption	6-29	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	0-8	20-27	1.25-1.45	0.6-2.0	0.23-0.25	5.6-7.3	Low	0.28	5	6	2-4
Assumption	8-30	25-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Moderate	0.43			
	30-50	25-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.3	Moderate	0.43			
	50-60	30-45	1.45-1.65	0.06-0.6	0.14-0.20	5.1-7.3	High	0.43			
259D3	0-5	27-35	1.30-1.50	0.6-2.0	0.15-0.19	5.6-7.3	Moderate	0.32	4	7	1-2
Assumption	5-20	25-35	1.20-1.40	0.6-2.0	0.18-0.22	5.1-7.3	Moderate	0.43			
	20-25	25-35	1.40-1.60	0.2-0.6	0.16-0.20	5.1-7.3	Moderate	0.43			
	25-60	30-45	1.45-1.65	0.06-0.6	0.14-0.20	5.1-7.3	High	0.43			
279B	0-9	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
Rozetta	9-49	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			
279C2	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
Rozetta	7-60	27-35	1.35-1.55	0.6-2.0	0.18-0.22	4.5-6.0	Moderate	0.37			
279C3	0-6	27-35	1.30-1.45	0.6-2.0	0.18-0.22	5.1-7.3	Moderate	0.43	4	7	<1
Rozetta	6-34	27-35	1.35-1.50	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	0.43			
	34-60	15-27	1.40-1.60	0.6-2.0	0.20-0.22	5.6-7.8	Low	0.43			
280D2	0-6	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
Fayette	6-48	25-35	1.30-1.45	0.6-2.0	0.18-0.20	4.5-6.0	Moderate	0.43			
	48-60	22-26	1.45-1.50	0.6-2.0	0.18-0.20	5.1-7.8	Moderate	0.43			
319	0-8	---	0.32-0.52	0.2-6.0	0.35-0.45	6.6-8.4	---	----	1	2	40-60
Aurelius	8-33	---	---	0.6-2.0	---	6.6-8.4	---	----			
	33-37	---	---	0.6-2.0	---	7.4-8.4	---	----			
	37-60	0-35	1.56-1.89	0.6-2.0	0.18-0.24	7.4-8.4	Low	----			

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
323D3	0-4	27-30	1.40-1.50	0.6-2.0	0.18-0.22	5.6-7.3	Low	0.32	2	6	.5-1
Casco	4-16	18-35	1.55-1.65	0.6-2.0	0.09-0.19	5.6-7.8	Moderate	0.32			
	16-60	0-2	1.30-1.80	>20	0.02-0.04	7.4-8.4	Low	0.10			
379C2	0-6	14-27	1.40-1.50	0.6-2.0	0.22-0.24	5.1-7.3	Low	0.28	4	5	2-5
Dakota	6-20	18-32	1.30-1.55	0.6-2.0	0.15-0.19	5.1-7.3	Low	0.32			
	20-32	4-11	1.55-1.65	2.0-6.0	0.02-0.14	5.1-7.3	Low	0.24			
	32-60	1-4	1.55-1.65	6.0-20	0.02-0.10	5.1-7.8	Low	0.15			
386B	0-8	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
Downs	8-34	26-35	1.30-1.35	0.6-2.0	0.18-0.20	5.1-7.3	Moderate	0.43			
	34-60	18-27	1.35-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
386C2	0-7	18-26	1.25-1.30	0.6-2.0	0.21-0.23	5.1-7.3	Low	0.32	5	6	2-3
Downs	7-36	26-35	1.30-1.35	0.6-2.0	0.18-0.20	4.5-7.3	Moderate	0.43			
	36-60	22-26	1.35-1.45	0.6-2.0	0.18-0.20	5.6-7.3	Moderate	0.43			
448C2	0-8	20-33	1.10-1.30	0.6-2.0	0.17-0.24	6.1-7.8	Low	0.28	3	6	2-5
Mona	8-30	25-35	1.35-1.55	0.2-0.6	0.15-0.20	5.6-7.8	Moderate	0.28			
	30-60	40-50	1.40-1.65	0.06-0.2	0.05-0.08	7.4-8.4	Moderate	0.28			
448D3	0-8	20-33	1.10-1.30	0.6-2.0	0.17-0.24	6.1-7.8	Low	0.28	3	6	2-5
Mona	8-31	25-35	1.35-1.55	0.2-0.6	0.15-0.20	5.6-7.8	Moderate	0.28			
	31-60	40-50	1.40-1.65	0.06-0.2	0.05-0.08	7.4-8.4	Moderate	0.28			
549C2	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
Marseilles	5-26	27-42	1.35-1.60	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	0.37			
	26-60	---	---	0.06-0.2	---	---					
549D2	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
Marseilles	4-38	27-42	1.35-1.60	0.6-2.0	0.18-0.20	4.5-6.5	Moderate	0.37			
	38-60	---	---	0.06-0.2	---	---					
549F	0-7	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
Marseilles	7-34	27-42	1.35-1.60	0.06-0.2	0.09-0.20	4.5-6.5	Moderate	0.37			
	34-60	---	---	0.01-0.2	---	---					
549G	0-6	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
Marseilles	6-23	27-42	1.35-1.60	0.06-0.2	0.09-0.20	4.5-6.5	Moderate	0.37			
	23-60	---	---	0.01-0.2	---	---					
567C2	0-9	20-27	1.15-1.35	0.6-2.0	0.22-0.24	5.6-7.8	Low	0.32	5	6	2-4
Elkhart	9-27	25-35	1.25-1.45	0.6-2.0	0.18-0.20	5.6-8.4	Moderate	0.43			
	27-60	20-27	1.35-1.55	0.6-2.0	0.20-0.22	7.4-8.4	Low	0.43			
567C3	0-7	27-35	1.20-1.40	0.6-2.0	0.18-0.20	5.6-7.8	Moderate	0.32	4	7	1-3
Elkhart	7-24	25-35	1.25-1.45	0.6-2.0	0.18-0.20	5.6-8.4	Moderate	0.43			
	24-60	20-27	1.35-1.55	0.6-2.0	0.20-0.22	7.4-8.4	Low	0.43			
709A	0-9	20-27	1.20-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.32	5	6	2-4
Osceola	9-15	15-27	1.20-1.35	0.6-2.0	0.20-0.22	5.1-7.3	Low	0.32			
	15-41	30-45	1.30-1.50	0.2-0.6	0.15-0.18	5.1-7.3	High	0.43			
	41-47	10-25	1.45-1.65	0.6-6.0	0.10-0.15	5.1-7.3	Low	0.24			
	47-52	30-45	1.60-1.70	0.06-0.2	0.11-0.15	6.1-7.8	Moderate	0.37			
	52-60	---	---	0.01-0.2	---	---					
753B	0-7	22-27	1.15-1.35	0.6-2.0	0.22-0.24	5.6-7.3	Low	0.32	4	6	2-4
Massbach	7-47	25-35	1.30-1.60	0.6-2.0	0.18-0.20	5.6-7.8	Moderate	0.43			
	47-55	35-50	1.60-1.70	0.06-0.2	0.11-0.18	6.1-7.8	Moderate	0.32			
	55-60	---	---	0.01-0.2	---	---					

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
820G:											
Hennepin	0-4	20-30	1.20-1.40	0.6-2.0	0.18-0.24	6.1-7.8	Low	0.28	2	6	1-2
	4-19	18-30	1.30-1.60	0.2-0.6	0.14-0.22	6.1-8.4	Low	0.32			
	19-60	18-30	1.70-1.85	0.2-0.6	0.10-0.15	7.4-8.4	Low	0.32			
Casco	0-8	10-20	1.35-1.55	0.6-2.0	0.19-0.24	5.6-7.3	Low	0.32	3	5	1-3
	8-23	18-35	1.55-1.65	0.6-2.0	0.09-0.19	5.6-7.8	Moderate	0.32			
	23-60	0-2	1.30-1.70	>20	0.02-0.04	7.4-8.4	Low	0.10			
871B	0-8	18-27	1.30-1.60	0.6-2.0	0.14-0.20	6.6-8.4	Moderate	0.24	5	8	.5-4
Lenzburg	8-22	18-35	1.30-1.70	0.2-0.6	0.17-0.20	6.6-8.4	Moderate	0.32			
	22-60	18-35	1.40-1.70	0.2-0.6	0.11-0.18	6.6-8.4	Moderate	0.24			
871D	0-11	27-35	1.30-1.60	0.6-2.0	0.17-0.22	6.6-8.4	Moderate	0.28	5	8	.5-4
Lenzburg	11-19	18-35	1.30-1.70	0.2-0.6	0.17-0.20	6.6-8.4	Moderate	0.32			
	19-60	18-35	1.40-1.70	0.2-0.6	0.11-0.18	6.6-8.4	Moderate	0.24			
871G	0-10	27-35	1.30-1.60	0.6-2.0	0.17-0.22	6.6-8.4	Moderate	0.28	5	8	.5-4
Lenzburg	10-37	18-35	1.30-1.70	0.2-0.6	0.17-0.20	6.6-8.4	Moderate	0.32			
	37-60	18-35	1.40-1.70	0.2-0.6	0.11-0.18	6.6-8.4	Moderate	0.24			
872B	0-11	24-27	1.25-1.60	0.2-0.6	0.15-0.20	6.1-7.3	Low	0.37	3	6	3-5
Rapatee	11-60	15-35	1.50-1.90	0.06-0.2	0.08-0.15	6.6-8.4	Moderate	0.37			
3107	0-16	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
Sawmill	16-33	27-35	1.20-1.40	0.6-2.0	0.21-0.23	6.1-7.8	Moderate	0.28			
	33-50	25-35	1.30-1.45	0.6-2.0	0.17-0.20	6.1-7.8	Moderate	0.28			
	50-60	18-35	1.35-1.50	0.6-2.0	0.15-0.19	6.1-8.4	Moderate	0.28			
3107+	0-13	18-27	1.25-1.40	0.6-2.0	0.22-0.24	6.1-7.8	Low	0.28	5	6	4-5
Sawmill	13-39	27-35	1.20-1.40	0.6-2.0	0.21-0.23	6.1-7.8	Moderate	0.28			
	39-52	25-35	1.30-1.45	0.6-2.0	0.17-0.20	6.1-7.8	Moderate	0.28			
	52-60	18-35	1.35-1.50	0.6-2.0	0.15-0.19	6.1-8.4	Moderate	0.28			
3451	0-13	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
Lawson	13-32	10-30	1.20-1.55	0.6-2.0	0.18-0.22	6.1-7.8	Low	0.28			
	32-48	18-30	1.55-1.65	0.6-2.0	0.18-0.20	6.1-7.8	Moderate	0.43			
	48-60	18-30	1.50-1.70	0.6-2.0	0.11-0.15	6.1-7.8	Moderate	0.43			
8074	0-11	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
Radford	11-30	18-27	1.40-1.60	0.6-2.0	0.20-0.22	6.1-7.8	Low	0.28			
	30-60	24-35	1.35-1.55	0.6-2.0	0.18-0.20	6.6-7.8	Moderate	0.28			
8076	0-21	18-27	1.10-1.25	0.6-2.0	0.22-0.24	6.1-7.8	Low	0.28	5	6	3-10
Otter	21-46	18-27	1.20-1.45	0.6-2.0	0.17-0.22	6.1-7.8	Moderate	0.43			
	46-60	15-28	1.30-1.55	0.6-2.0	0.15-0.20	6.1-8.4	Low	0.43			
8077	0-39	18-27	1.15-1.35	0.6-2.0	0.22-0.24	6.1-7.3	Moderate	0.28	5	6	3-4
Huntsville	39-60	15-25	1.20-1.50	0.6-2.0	0.12-0.21	6.1-7.8	Low	0.43			

TABLE 17.--SOIL AND WATER FEATURES

("Flooding" and "water table" and terms such as "occasional," "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	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
8D2, 8D3, 8F, 8G--Hickory	C	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
17A--Keomah	C	None	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
19C3, 19D3, 19F--Sylvan	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.
27D3, 27F--Miami	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Moderate.
36A, 36B, 36B2, 36C2, 36C3--Tama	B	None	---	---	4.0-6.0	Apparent	Nov-Jun	>60	---	High	Moderate	Moderate.
41A--Muscatine	B	None	---	---	2.0-4.0	Apparent	Nov-Jul	>60	---	High	High	Moderate.
43A--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.
59A--Lisbon	B	None	---	---	1.0-3.0	Apparent	Nov-May	>60	---	High	High	Moderate.
60C2--La Rose	B	None	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
67--Harpster	B/D	None	---	---	+.5-2.0	Apparent	Feb-Jun	>60	---	High	High	Low.
68, 68+--Sable	B/D	None	---	---	+.5-2.0	Apparent	Mar-Jun	>60	---	High	High	Low.
119C2, 119D2, 119D3, 119F2--Elco	B	None	---	---	2.5-4.5	Perched	Mar-May	>60	---	High	High	Moderate.
131D, 131F--Alvin	B	None	---	---	>6.0	---	---	>60	---	Moderate	Low	High.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
134C2, 134D2---- Camden	B	None	---	---	>6.0	---	---	>60	---	High	Low	Moderate.
145B2, 145C2---- Saybrook	B	None	---	---	>6.0	---	---	>60	---	High	High	Moderate.
148B, 148C2---- Proctor	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.
152---- Drummer	B/D	None	---	---	+.5-2.0	Apparent	Mar-Jun	>60	---	High	High	Moderate.
154A---- Flanagan	B	None	---	---	1.5-3.5	Apparent	Mar-Jun	>60	---	High	High	Moderate.
171B, 171B2, 171C2---- Catlin	B	None	---	---	3.5-6.0	Apparent	Feb-May	>60	---	High	High	Moderate.
198A---- Elburn	B	None	---	---	1.0-3.0	Apparent	Jan-May	>60	---	High	High	Moderate.
199A, 199B, 199B2- Plano	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Low.
206---- Thorp	C/D	None	---	---	+.5-2.0	Apparent	Feb-Jun	>60	---	High	High	Moderate.
234A---- Sunbury	B	None	---	---	1.5-3.5	Apparent	Mar-Jun	>60	---	High	High	Moderate.
243A---- St. Charles	B	None	---	---	3.0-6.0	Apparent	Feb-Jun	>60	---	High	Moderate	Moderate.
243B---- St. Charles	B	None	---	---	>6.0	---	---	>60	---	High	Moderate	Moderate.
257A---- Clarksdale	C	None	---	---	1.0-3.0	Apparent	Mar-Jun	>60	---	High	High	Moderate.
259C2, 259D2, 259D3---- Assumption	B	None	---	---	2.5-4.5	Perched	Feb-May	>60	---	High	High	Moderate.
279B, 279C2, 279C3---- Rozetta	B	None	---	---	4.0-6.0	Apparent	Mar-Jun	>60	---	High	Moderate	Moderate.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
280D2---------- Fayette	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
319---------- Aurelius	B/D	None---------	---	---	+1-1.0	Apparent	Sep-Jun	>60	---	High-----	High-----	Low.
323D3---------- Casco	B	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate	Low.
379C2---------- Dakota	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Moderate.
386B, 386C2------- Downs	B	None---------	---	---	4.0-6.0	Apparent	Mar-Jun	>60	---	High-----	Moderate	Moderate.
448C2, 448D3------ Mona	B	None---------	---	---	2.5-4.0	Perched	Mar-Jun	>60	---	Moderate	High-----	Moderate.
549C2, 549D2, 549F, 549G------- Marseilles	B	None---------	---	---	>6.0	---	---	20-40	Soft	High-----	High-----	Moderate.
567C2, 567C3------ Elkhart	B	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Moderate.
709A---------- Osceola	B	None---------	---	---	1.0-3.0	Apparent	Mar-Jun	40-60	Soft	High-----	High-----	Moderate.
753B---------- Massbach	B	None---------	---	---	3.0-5.0	Perched	Feb-Jun	40-60	Soft	High-----	High-----	Moderate.
820G:												
Hennepin----------	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Low------	Low.
Casco----------	B	None---------	---	---	>6.0	---	---	>60	---	Low------	Moderate	Low.
871B, 871D, 871G-- Lenzburg	B	None---------	---	---	>6.0	---	---	>60	---	Moderate	Moderate	Low.
872B---------- Rapatee	D	None---------	---	---	>6.0	---	---	>60	---	High-----	Moderate	Low.
3107, 3107+------- Sawmill	B/D	Frequent----	Brief-----	Mar-Jun	0-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
3451---------- Lawson	C	Frequent----	Brief-----	Mar-Nov	1.0-3.0	Apparent	Nov-May	>60	---	High-----	Moderate	Low.

TABLE 17.--SOIL AND WATER FEATURES--Continued

Soil name and map symbol	Hydrologic group	Flooding			High water table			Bedrock		Potential frost action	Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness		Uncoated steel	Concrete
					Ft			In				
8074-------------- Radford	B	Occasional	Brief-----	Mar-Jun	1.0-3.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
8076-------------- Otter	B/D	Occasional	Brief-----	Mar-Jun	+.5-2.0	Apparent	Mar-Jun	>60	---	High-----	High-----	Low.
8077-------------- Huntsville	B	Occasional	Brief-----	Jan-Jun	4.0-6.0	Apparent	Mar-Jun	>60	---	High-----	Low------	Low.

TABLE 18.--CLASSIFICATION OF THE SOILS

(An asterisk in the first column indicates that the soil is a taxadjunct to the series. See text for a description of those characteristics of the soil that are outside the range of the series)

Soil name	Family or higher taxonomic class
Alvin	Coarse-loamy, mixed, mesic Typic Hapludalfs
*Assumption	Fine-silty, mixed, mesic Typic Argiudolls
Aurelius	Fine-silty, carbonatic, mesic Histic Humaquepts
Camden	Fine-silty, mixed, mesic Typic Hapludalfs
Casco	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Hapludalfs
Catlin	Fine-silty, mixed, mesic Typic Argiudolls
Clarksdale	Fine, montmorillonitic, mesic Udollic Ochraqualfs
*Dakota	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Typic Argiudolls
Denny	Fine, montmorillonitic, mesic Mollic Albaqualfs
Downs	Fine-silty, mixed, mesic Mollic Hapludalfs
Drummer	Fine-silty, mixed, mesic Typic Haplaquolls
Elburn	Fine-silty, mixed, mesic Aquic Argiudolls
Elco	Fine-silty, mixed, mesic Typic Hapludalfs
*Elkhart	Fine-silty, mixed, mesic Typic Argiudolls
Fayette	Fine-silty, mixed, mesic Typic Hapludalfs
*Flanagan	Fine, montmorillonitic, mesic Aquic Argiudolls
Harpster	Fine-silty, mesic Typic Calciaquolls
Hennepin	Fine-loamy, mixed, mesic Typic Eutrochrepts
Hickory	Fine-loamy, mixed, mesic Typic Hapludalfs
Huntsville	Fine-silty, mixed, mesic Cumulic Hapludolls
Ipava	Fine, montmorillonitic, mesic Aquic Argiudolls
Keomah	Fine, montmorillonitic, mesic Aeric Ochraqualfs
La Rose	Fine-loamy, mixed, mesic Typic Argiudolls
Lawson	Fine-silty, mixed, mesic Cumulic Hapludolls
Lenzburg	Fine-loamy, mixed (calcareous), mesic Typic Udorthents
Lisbon	Fine-silty, mixed, mesic Aquic Argiudolls
Marseilles	Fine-silty, mixed, mesic Typic Hapludalfs
Massbach	Fine-silty, mixed, mesic Mollic Hapludalfs
Miami	Fine-loamy, mixed, mesic Typic Hapludalfs
*Mona	Fine-loamy, mixed, mesic Typic Argiudolls
*Muscatine	Fine-silty, mixed, mesic Aquic Hapludolls
Osceola	Fine, mixed, mesic Mollic Ochraqualfs
Otter	Fine-silty, mixed, mesic Cumulic Haplaquolls
Plano	Fine-silty, mixed, mesic Typic Argiudolls
Proctor	Fine-silty, mixed, mesic Typic Argiudolls
Radford	Fine-silty, mixed, mesic Fluvaquentic Hapludolls
Rapatee	Fine-silty, mixed, nonacid, mesic Typic Udorthents
Rozetta	Fine-silty, mixed, mesic Typic Hapludalfs
Sable	Fine-silty, mixed, mesic Typic Haplaquolls
Sawmill	Fine-silty, mixed, mesic Cumulic Haplaquolls
*Saybrook	Fine-silty, mixed, mesic Typic Argiudolls
St. Charles	Fine-silty, mixed, mesic Typic Hapludalfs
Sunbury	Fine, montmorillonitic, mesic Aquollic Hapludalfs
Sylvan	Fine-silty, mixed, mesic Typic Hapludalfs
Tama	Fine-silty, mixed, mesic Typic Argiudolls
Thorp	Fine-silty, mixed, mesic Argiaquic Argialbolls

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