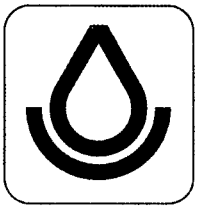
SOIL SURVEY OF

Dane County, Wisconsin



United States Department of Agriculture
Soil Conservation Service

In cooperation with
The Research Division of the
College of Agricultural and Life Sciences
University of Wisconsin

This is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and agencies of the States, usually the Agricultural Experiment Stations. In some surveys, other Federal and local agencies also contribute. The Soil Conservation Service has leadership for the Federal part of the National Cooperative Soil Survey.

Major fieldwork for this soil survey was completed in the period 1966–71. Soil names and descriptions were approved in 1972. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1972. This survey was made cooperatively by the Soil Conservation Service; the Research Division of the College of Agricultural and Life Sciences, University of Wisconsin; and the Dane County Board of Supervisors. It is part of the technical assistance furnished to the Dane County Soil and Water Conservation District.

HOW TO USE THIS SOIL SURVEY

THIS SOIL SURVEY contains information that can be applied in managing farms and woodlands; in selecting sites for roads, ponds, buildings, and other structures; and in judging the suitability of tracts of land for farming, industry, and recreation.

Locating Soils

All the soils of Dane County are shown on the detailed map at the back of this publication. This map consists of many sheets made from aerial photographs. Each sheet is numbered to correspond with a number on the Index to Map Sheets.

On each sheet of the detailed map, soil areas are outlined and are identified by symbols. All areas marked with the same symbol are the same kind of soil. The soil symbol is inside the area if there is enough room; otherwise, it is outside and a pointer shows where the symbol belongs.

Finding and Using Information

The "Guide to Mapping Units" can be used to find information. This guide lists all the soils of the county in alphabetic order by map symbol and gives the capability classification of each. It also shows the page where each soil is described and the woodland suitability group in which the soil has been placed.

Individual colored maps showing the relative suitability or degree of limitation of soils for many specific purposes can be developed by using the soil map and the information in the text. Translucent material can be used as an overlay over the soil map and colored to show soils that have the same limitation or suitability. For example, soils that have a slight limitation for a given use can be colored green, those with a moderate limitation can be colored yellow, and those with a severe limitation can be colored red.

Farmers and those who work with farmers can learn about use and management of the soils from the soil descriptions and from the discussions of the capability units and woodland groups.

Foresters and others can refer to the section "Woodland," where the soils of the county are grouped according to their suitability for trees.

Game managers, sportsmen, and others can find information about soils and wildlife in the section "Wildlife."

Community planners and others can read about soil properties that affect the choice of sites for dwellings, industrial buildings, and recreation areas in the sections "Engineering Uses of the Soils" and "Recreation."

Engineers and builders can find, under "Engineering Uses of the Soils," tables that contain test data, estimates of soil properties, and information about soil features that affect engineering practices.

Scientists and others can read about how the soils formed and how they are classified in the section "Formation and Classification of the Soils."

Newcomers in Dane County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They may also be interested in the information about the county given in the section "Additional Facts About the County."

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SOIL SURVEY OF DANE COUNTY, WISCONSIN

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UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, IN COOPERATION WITH THE RESEARCH DIVISION OF THE COLLEGE OF AGRICULTURAL AND LIFE SCIENCES, UNIVERSITY OF WISCONSIN

DANE COUNTY is located in the south-central part of Wisconsin (fig. 1). The total land area is 766,912 acres, or about 1,198 square miles. The total water area is 22,650 acres. The county extends 42 miles from east to west and 30 miles from north to south.

The population of Dane County was approximately 77,000 in 1910 and had increased to about 290,000 by 1970. The two major kinds of farming are cash cropping and dairying. The principal crops are corn, peas, sweet corn, oats, alfalfa, and clover. Some farms in the steep, rough areas in the western part of the county are used for recreation. Forest and woodland cover about 11 percent of the county.

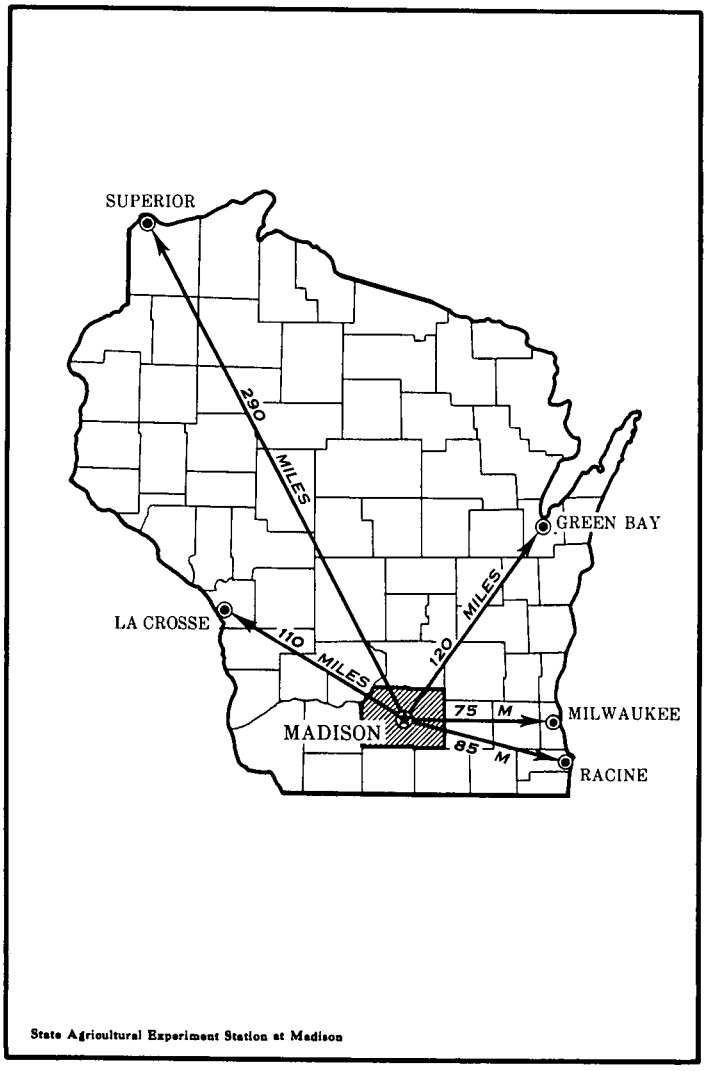

Figure 1.—Location of Dane County in Wisconsin.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Dane County, where they are located, and how they can be used. The soil scientists went into the county knowing they likely would find many soils they had already seen and perhaps some they had not. They observed the steepness, length, and shape of slopes, the size and speed of streams, the kinds of native plants or crops, the kinds of rock, and many facts about the soils. They dug many holes to expose soil profiles. A profile is the sequence of natural layers, or horizons, in a soil; it extends from the surface down into the parent material that has not been changed much by leaching or by the action of plant roots.

The soil scientists made comparisons among the profiles they studied, and they compared these profiles with those in counties nearby and in places more distant. They classified and named the soils according to nationwide, uniform procedures. The *soil series* and the *soil phase* are the categories of soil classification most used in a local survey.

Soils that have profiles almost alike make up a soil series. Except for different texture in the surface layer, all the soils of one series have major horizons that are similar in thickness, arrangement, and other important characteristics. Each soil series is named for a town or other geographic feature near the place where a soil of that series was first observed and mapped. Plano and Basco, for example, are the names of two soil series. All the soils in the United States having the same series name are essentially alike in those characteristics that affect their behavior in the undisturbed landscape.

Soils of one series can differ in texture of the sur-

face layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Orion silt loam, wet, is one of several phases within the Orion series.

After a guide for classifying and naming the soils had been worked out, the soil scientists drew the boundaries of the individual soils on aerial photographs. These photographs show woodlands, buildings, field borders, trees, and other details that help in drawing boundaries accurately. The soil map at the back of this publication was prepared from aerial photographs.

The areas shown on a soil map are called mapping units. On most maps detailed enough to be useful in planning the management of farms and fields, a mapping unit is nearly equivalent to a soil phase. It is not exactly equivalent, because it is not practical to show on such a map all the small, scattered bits of soil of some kind that have been seen within an area that is dominantly of a recognized soil phase.

Some mapping units are made up of soils of different series, or of different phases within one series. One such kind of mapping unit shown on the soil map of Dane County is an undifferentiated group.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. Dodge and Kidder soils, 6 to 20 percent slopes, eroded, is an undifferentiated group in this county.

In most areas surveyed there are places where the soil material is so rocky, so shallow, so severely eroded, or so variable that it has not been classified by soil series. These places are shown on the soil map and are described in the survey, but they are called land types and are given descriptive names. Stony and rocky land is a land type in this county.

While a soil survey is in progress, soil scientists take soil samples needed for laboratory measurements and for engineering tests. Laboratory data from the same kind of soil in other places are also assembled. Data on yields of crops under defined practices are assembled from farm records and from field or plot experiments on the same kind of soil. Yields under defined management are estimated for all the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail in a given kind of soil, and they relate this to the slow permeability of the soil or a high water table. They see that streets, road pavements, and foundations for houses are cracked on a named kind of soil, and they relate this failure to the high shrink-swell potential of the soil material. Thus, they use observation and knowledge of soil properties, together with available research data, to predict limitations or suitability of soils for present and potential uses.

After data have been collected and tested for the key, or benchmark, soils in a survey area, the soil scientists set up trial groups of soils. They test these groups by further study and by consultation with farmers, agronomists, engineers, and others. They then adjust the groups according to the results of their studies and consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Dane County. A soil association is a landscape that has a distinctive proportional pattern of soils. It normally consists of one or more major soils and at least one minor soil, and it is named for the major soils. The soils in one association may occur in another, but in a different pattern.

A map showing soil associations is useful to people who want a general idea of the soils in a county, who want to compare different parts of a county, or who want to know the location of large tracts that are suitable for a certain kind of land use. Such a map is a useful general guide in managing a watershed, a wooded tract, or a wildlife area, or in planning engineering works, recreational facilities, and community developments. It is not a suitable map for planning the management of a farm or field, or for selecting the exact location of a road, building, or similar structure, because the soils in any one association ordinarily differ in slope, depth, stoniness, drainage, and other characteristics that affect their management.

Soil associations and delineations on the general soil map in this soil survey do not fully agree with those of the general soil maps in adjacent counties published at a different date. Differences in the maps occur mainly because some soils are minor soils in adjacent counties and major soils in Dane County. Differences in the maps are the result of improvement in the classification of soils, particularly in the modifications or refinements in soil series concepts. In addition, more precise and detailed maps are needed because the uses of the general soil maps have expanded in recent years. The more modern maps meet this need. Still another difference is caused by the range in slope that is permitted within associations in different surveys.

The soil associations in this survey have been grouped into four general kinds of landscapes for broad interpretative purposes. Each of the broad groups and the soil associations in each group are described in the following pages. The terms for texture used in the title for several of the associations apply to the texture of the surface layer. For example, in the title of association 2, the words "silt loams and loams" refer to the texture of the surface layer.

Soils Underlain by Sandy Loam Glacial Till

The soils in this group of associations formed mainly in eolian deposits of silt loam underlain by sandy loam glacial till. Most of these soils have moderate permeability and high available water capacity. Most of them

have slight to moderate limitations for urban use and for farming.

1. *Dodge-St. Charles-McHenry association*

Well drained and moderately well drained, deep silt loams

This association has a varied landscape that is characterized by drumlins and by ground, end, and recessional moraines. The landscape is mostly gently sloping to sloping, but there are some areas on benches and in depressions and drainageways that are nearly level and a small acreage that is moderately steep to steep. Islands of silt-capped glacial till underlain by bedrock are a distinctive feature in the northeastern part of the association. The pattern of drainage in the association is irregular, but it is generally southerly and westerly.

This association makes up 25 percent of the county. About 20 percent is Dodge soils, 20 percent is St. Charles soils, 15 percent is McHenry soils, and the remaining 45 percent is minor soils, including 5 percent Sable soils.

Dodge soils are gently sloping to sloping. They have a surface layer and subsurface layer of dark grayish-brown and brown silt loam about 9 inches thick. The subsoil is 31 inches thick. The upper part of the subsoil is silty clay loam, and the lower part is sandy clay loam. The underlying material is sandy loam till that begins at a depth of about 40 inches.

St. Charles soils are mostly gently sloping, but they range from nearly level to sloping. They have a surface layer and subsurface layer of dark grayish-brown and brown silt loam about 9 inches thick. The subsoil is mostly silty clay loam 41 inches thick. The underlying material is sandy loam till that begins at a depth of about 50 inches.

McHenry soils are mostly sloping, but they range from gently sloping to moderately steep. In areas where the McHenry soils are cultivated, they have a surface layer of silt loam about 7 inches thick and a subsoil of silty clay loam and sandy clay loam about 26 inches thick. The underlying material is sandy loam till that begins at a depth of about 33 inches.

Sable soils are nearly level, poorly drained soils. They have a silty clay loam surface layer and a subsoil of silty clay loam. The underlying material is silt loam.

The minor soils in this association, other than the Sable soils, are Kidder, Whalan, Virgil, Westville, Military, Pecatonica, Troxel, Orion, Radford, Wacousta, and Seaton soils. Kidder, Whalan, Westville, Military, and Pecatonica soils are on side slopes and the tops of ridges on glaciated uplands. Virgil, Troxel, Orion, Radford, and Wacousta soils are on concave to plane, low benches and flood plains. Seaton soils are on colluvial foot slopes below the glaciated uplands.

Most areas of this association are cultivated. The most common crops are corn, oats, and alfalfa. Some canning crops are also grown. These soils have slight to severe limitations for cropping. Erosion, wetness, soil tilth, and fertility are the main concerns in management.

Dodge, St. Charles, and McHenry soils have slight or moderate limitations for onsite sewage disposal systems. Sable soils have very severe limitations for onsite sewage disposal, because they are saturated close to the surface during most of the year.

2. *Plano-Ringwood-Griswold association*

Moderately well drained and well drained, deep silt loams and loams

This association consists mainly of gently sloping areas on glacial uplands, but some areas on uplands are nearly level to sloping. There is also a small acreage of moderately steep rises or ridges. The pattern of drainage in the association is irregular, but the flow is southwesterly.

This association makes up 14 percent of the county. About 50 percent is Plano soils, 25 percent is Ringwood soils, 10 percent is Griswold soils, and the remaining 15 percent is minor soils, including 5 percent Elburn soils.

Plano soils are gently sloping and nearly level and moderately well drained to well drained. They have a surface layer of very dark brown silt loam about 11 inches thick. The subsoil is silty clay loam about 35 inches thick. The underlying material is sandy loam till that begins at a depth of about 46 inches.

Ringwood soils are gently sloping to sloping and well drained. They have a surface layer of mainly very dark grayish-brown silt loam about 12 inches thick. The subsoil is mainly silty clay loam to sandy clay loam and is about 24 inches thick. The underlying material is sandy loam till that begins at a depth of about 36 inches.

Griswold soils are mainly sloping, but they range from gently sloping to moderately steep and are well drained. They have a surface layer of black loam about 14 inches thick. The subsoil is clay loam and sandy loam about 23 inches thick. The underlying material is sandy loam till that begins at a depth of about 37 inches.

Elburn soils are nearly level and somewhat poorly drained. They have a surface layer of black silt loam and a subsoil of silty clay loam, silt loam, and sandy loam. The underlying layer is sandy loam till that begins at a depth of about 45 inches.

The minor soils in this association, other than the Elburn soils, are Troxel, Radford, Huntsville, Sable, and Rockton soils. All of these soils, except Rockton soils, are nearly level to gently sloping and are mainly on low benches, in drainageways, and in depressional areas on uplands. Rockton soils are on glacial uplands and are underlain by fractured dolomite bedrock.

Most areas of the soils of this association are cultivated. The soils have slight to moderate limitations for cropping. The common crops are corn, oats, and alfalfa. Most of the canning crops in the county are grown in this association. The most important canning crops are peas and sweet corn, but some cabbage and beets are also grown. The soils in this association have slight limitations for pasture. Erosion and the maintenance of tilth and fertility are the main concerns in the management of these soils.

Plano, Ringwood, and Griswold soils have slight or moderate limitations for onsite sewage disposal systems. Troxel, Radford, Huntsville, and Sable soils have very severe limitations for onsite sewage disposal, because of seasonal flooding or because the soils are saturated near the surface.

Soils Underlain at a Depth of Less Than 40 Inches Dominantly by Sandstone, Dolomite, or Shale

The soils in this group of associations formed mainly in eolian deposits of silt loam underlain by residuum derived from sandstone, dolomite, or shale. Most of these soils have moderate permeability and medium available water capacity. They generally have severe limitations for residential development and severe to moderate limitations for farming, because they have a shallow to moderate depth to bedrock.

3. Edmund-Sogn-Port Byron association

Excessively drained to moderately well drained, shallow, very shallow, and deep silt loams that are underlain by dolomite or silt

This association has a driftless landscape that typically is gently sloping to moderately steep on the tops of ridges and sloping in drainageways. The side slopes between the tops of ridges and drainageways or the tops of ridges and valleys commonly are steep to very steep. The pattern of drainage in the association is dendritic and is well defined. The flow of the large drainageways in this association is southerly and westerly.

This association makes up about 5 percent of the county. About 40 percent is Edmund soils, 15 percent is Sogn soils, 15 percent is Port Byron soils, and the remaining 30 percent is minor soils, including 10 percent Dodgeville soils.

Edmund soils are gently sloping to moderately steep soils on the upper parts of ridges. They have a surface layer of very dark brown silt loam 8 inches thick. The subsoil is 10 inches thick. The upper part is silty clay loam, and the lower part is clay. The underlying material is fractured dolomite.

Sogn soils are gently sloping to steep soils in areas between the drainageways or valleys and the tops of ridges. They have a surface layer of black silt loam about 7 inches thick. Fractured dolomite is immediately below the surface layer.

Port Byron soils are moderately well drained, gently sloping and sloping soils on colluvial foot slopes. They have a surface layer of black, very dark brown, and very dark grayish-brown silt loam 22 inches thick. The subsoil is silt loam 26 inches thick. The underlying material is massive silt loam.

Dodgeville soils are gently sloping to moderately steep soils on the upper parts of ridges. They have a surface layer of dark-colored silt loam and a subsoil of silty clay loam and clay. The underlying material is fractured dolomite bedrock.

The minor soils in this association, other than the Dodgeville soils, are Ashdale soils and Stony and rocky land. Ashdale soils are moderately deep soils in drainageways near the tops of ridges. The steep to very steep Stony and rocky land is on the upper side slopes of ridges.

Most areas of this association are in crops. The soils have moderate to very severe limitations for cropping. Dodgeville and Port Byron soils are suited to corn, small grain, and hay. Edmund soils are better suited to small grain, hay, or pasture plants than to most other crops. Sogn soils are better suited to use as pasture or wildlife habitat than to most other uses.

The soils in this association have severe or very severe limitations for onsite sewage disposal.

4. Elkmound-Stony and rocky land-Dunbarton association

Somewhat excessively drained and well drained, shallow sandy loams and silt loams that are underlain by sandstone or limestone; and Stony and rocky land

This association has a driftless landscape that is characterized by very narrow, sloping to moderately steep limestone ridgetops and steep to very steep side slopes. The soils on side slopes are underlain by sandstone or limestone. This association also includes numerous, small, irregularly shaped areas in deep, narrow valleys. The landscape of this association is the steepest in the county. The pattern of drainage is dendritic, and the flow is northwesterly toward the Wisconsin River valley.

This association makes up 4 percent of the county. About 20 percent is Elkmound soils, 20 percent is Stony and rocky land, 15 percent is Dunbarton soils, and the remaining 45 percent is minor soils, including 5 percent Seaton soils.

Elkmound soils are moderately steep to very steep soils on side slopes between the tops of ridges and the valley. They have a surface layer and subsurface layer of dark grayish-brown sandy loam about 7 inches thick. The subsoil is sandy loam about 10 inches thick. The underlying material is sandstone bedrock.

Stony and rocky land is a steep to very steep land type on side slopes between the tops of ridges and the valley. The soils in areas of Stony and rocky land range from sandy loam to silt loam. Limestone or sandstone bedrock is at a depth of 10 inches or less. There are rock outcrops in many places.

Dunbarton soils are sloping to moderately steep on the tops of ridges and gently sloping to steep where they occur in small areas. They have a surface layer of dark grayish-brown silt loam about 7 inches thick. The subsoil is 11 inches thick. The upper part of the subsoil is silty clay loam, and the lower part is silty clay and clay. The underlying material is fractured dolomite bedrock.

Seaton soils are gently sloping to moderately steep soils in drainageways and on foot slopes of ridges of bedrock. They have a surface layer and a subsoil of silt loam. The underlying material is massive silt.

The minor soils in this association, other than the Seaton soils, are Eleva and Basco soils and Seaton soils, loamy variant. Eleva and Basco soils are sloping to steep and are on foot slopes. They commonly are below the Elkmound soils and Stony and rocky land. Seaton soils, loamy variant, are sloping to steep and are on upper foot slopes in drainageways and below steeply sloping soils.

The steep and very steep Elkmound soils and Stony and rocky land are better suited to pasture, woodland, or wildlife habitat than to most other uses. The Dunbarton soils are better suited to small grain and to use as meadow, pasture, or woodland than to most other

uses. Seaton soils are better suited to corn, small grain, and hay than the other soils in this association.

The major soils in this association have very severe limitations for onsite sewage disposal.

5. *Dunbarton-NewGlarus-Seaton association*

Well drained and moderately well drained, shallow, moderately deep, and deep silt loams that are underlain by limestone or sandstone

This association has a driftless landscape. Silt-covered dolomite bedrock is on the tops of the highest ridges. Thick deposits of silt are on the colluvial foot slopes and in the lower part of the drainageways. The dolomite in the drainageways that lead to the valleys has been eroded through to sandstone. The soils on the middle and lower side slopes formed in sandstone. The pattern of drainage in this association is dendritic.

This association makes up 6 percent of the county. About 20 percent is Dunbarton soils, 15 percent is NewGlarus soils, 15 percent is Seaton soils, and the remaining 50 percent is minor soils, including 5 percent Hixton soils.

Dunbarton soils are mainly sloping to moderately steep and are on the tops of ridges and on side slopes. In most places these soils are steep on side slopes and gently sloping on the tops of ridges. They have a surface layer of dark grayish-brown silt loam about 7 inches thick. The subsoil is 11 inches thick. The upper part of the subsoil is silty clay loam, and the lower part is silty clay and clay. The underlying material is fractured dolomite bedrock.

NewGlarus soils are gently sloping to sloping on the tops of ridges and moderately steep to steep on lower side slopes. They have a surface layer and subsurface layer of very dark grayish-brown and brown silt loam about 8 inches thick. The subsoil is about 27 inches thick. The upper part of the subsoil is silty clay loam, and the lower part is silty clay and clay. The underlying material is fractured dolomite bedrock that begins at a depth of about 35 inches.

Seaton soils are mainly sloping to moderately steep on high benches and on colluvial foot slopes, but they are gently sloping to steep on lower benches and foot slopes. They have a surface layer of dark grayish-brown silt loam about 6 inches thick. The subsoil is silt loam 47 inches thick. The underlying material is massive silt loam.

Hixton soils are sloping to moderately steep and are on middle and lower side slopes. They have a surface layer and a subsoil of loam. The underlying material is partially weathered sandstone bedrock.

The minor soils in this association, other than the Hixton soils, are Gale, Eleva, and Elkmound soils. Gale soils are on side slopes above areas of Seaton soils. Eleva and Elkmound soils are on side slopes between the dolomite uplands and the drainageways and valleys.

The areas of steep soils in this association are used for pasture, woodland, or wildlife habitat. The Dunbarton soils are better suited to small grain and to use as meadow, pasture, or woodland than to most other crops and uses. The NewGlarus and Seaton soils are suited to most of the crops commonly grown in the county.

The soils in this association have moderate to very severe limitations for onsite sewage disposal.

6. *Basco-Elkmound-Gale association*

Moderately well drained to somewhat excessively drained, moderately deep and shallow silt loams and sandy loams that are underlain by sandstone

This association has a driftless landscape that is gently sloping to very steep. The soils in this association are underlain mainly by sandstone bedrock and are below the dolomite uplands and above the large drainageways and valleys. The runoff from the dolomite uplands flows through this association to the valleys and streams below.

This association makes up about 5 percent of the county. About 20 percent is Basco soils, 20 percent is Elkmound soils, 5 percent is Gale soils, and the remaining 55 percent is minor soils, including 5 percent Eleva soils.

Basco soils are well drained and moderately well drained and are on sides and tops of ridges. They are mainly gently sloping to moderately steep and are on the sides and tops of ridges in uplands, but small areas of these soils on side slopes are sloping to steep. Basco soils have a surface layer of very dark grayish-brown silt loam about 6 inches thick. The subsoil is 27 inches thick. The upper part of the subsoil is silty clay loam, and the lower part is clay. The underlying material is interlayered shale and sandstone bedrock.

Elkmound soils are mainly moderately steep and steep and are on middle and lower side slopes, but there are smaller acreages of these soils that are sloping or very steep. In areas where the Elkmound soils are cultivated, they have a surface layer and subsurface layer of dark grayish-brown sandy loam about 7 inches thick. The subsoil is sandy loam 10 inches thick. The underlying material is sandstone bedrock.

Gale soils are gently sloping to moderately steep and are on the tops of ridges, on upper side slopes, on lower side slopes, and on concave foot slopes. They have a surface layer and subsurface layer of very dark grayish-brown and grayish-brown silt loam about 9 inches thick. The subsoil is silty clay loam. The underlying material is partially weathered sandstone bedrock.

Eleva soils are sloping to moderately steep and are on middle side slopes. They have a surface layer of fine sandy loam and sandy loam and a subsoil of sandy loam. The underlying material is partially weathered sandstone bedrock.

The minor soils in this association, other than the Eleva soils, are the Hixton, Whalan, Port Byron, Seaton, Troxel, Chaseburg, Orion, Elvers, Huntsville, and Otter soils. Hixton and Whalan soils are gently sloping to moderately steep and are on uplands. Seaton and Port Byron soils are deep and are in drainageways and on foot slopes. The other minor soils are alluvial soils in drainageways and on stream bottoms.

In those areas where cropping is not limited by slope, Basco and Gale soils are suited to all the crops commonly grown in the county. Conservation practices help to control erosion and to reduce runoff. Elkmound and Eleva soils are not suited to crops. They are better

suited to woodland, pasture, or wildlife habitat than to most other uses.

The major soils in this association have slight to very severe limitations for onsite sewage disposal.

7. *Derinda-Dunbarton association*

Moderately well drained and well drained, moderately deep and shallow silt loams that are underlain by shale or limestone

This association has a driftless landscape that is gently sloping to moderately steep. This association is at a higher elevation than are the other associations in the county. The limestone bedrock is about 1,260 feet above sea level. The shale bedrock begins at an elevation of 1,260 feet above sea level and rises to about 1,490 feet. Large limestone blocks are scattered on the surface throughout the association. These blocks are believed to be the remains of a limestone layer that once capped the shale bedrock. The drainage of the association is northerly and southerly.

This association makes up about 1 percent of the county. About 70 percent is Derinda soils, 10 percent is Dunbarton soils, and the remaining 20 percent is minor soils.

Derinda soils are well drained and moderately well drained, gently sloping to moderately steep soils on upper side slopes and on tops of ridges. They have a surface layer and subsurface layer of dark grayish-brown and brown silt loam about 10 inches thick. The subsoil is 24 inches thick. The upper part of the subsoil is silty clay loam, and the lower part is clay. The underlying material is shale bedrock. Many drainageways are wet because of seepage from the soils above.

Dunbarton soils are sloping and moderately steep soils on middle and low side slopes. They have a surface layer of dark grayish-brown silt loam about 7 inches thick. The subsoil is silty clay 11 inches thick. The underlying material is fractured dolomite bedrock.

The minor soils in this association are NewGlarus, Edmund, and Dodgeville soils. These soils are on side slopes below areas of Derinda or Dunbarton soils.

The Derinda and NewGlarus soils have moderate limitations for cropping. The most common crops are corn, oats, and alfalfa.

Most soils in this association have severe or very severe limitations for onsite sewage disposal.

Soils Formed in Outwash Material

The soils in this group of associations mainly formed in outwash material near streams or adjacent to glacial moraines. These soils generally are loamy and are underlain by sand or gravel, or both. These soils have moderate permeability and medium available water capacity. Many of them are good sources of sand and gravel. Where these soils are well drained and gently sloping to sloping, they have slight to moderate limitations for most urban uses. The contamination of ground water is a hazard where these soils are used for waste disposal.

8. *Batavia-Houghton-Dresden association*

Well drained and poorly drained, deep and moderately deep silt loams and mucks that are underlain by silt, sand, and gravel

This association has a landscape that consists of outwash plains with depressions and of old lake basins. The soil material was deposited by wind and by water from melting glaciers. The texture of the material in which the soils formed is variable, but it is dominantly silt, sand, or gravel. The drainage in the association is southwesterly.

This association makes up 35 percent of the county. About 10 percent is Batavia soils, 10 percent is Houghton soils, 10 percent is Dresden soils, and the remaining 70 percent is minor soils, including 5 percent Kegonsa soils.

Batavia soils are nearly level to sloping, well-drained soils on benches of outwash plains and stream valleys. They have a surface layer and subsurface layer of very dark grayish-brown and brown silt loam about 10 inches thick. The subsoil is silty clay loam about 40 inches thick. The underlying material is sand and gravel that begins at a depth of about 50 inches.

Houghton soils are nearly level, poorly drained, deep muck soils. They are in wet, depressional areas and old lake basins of outwash plains. The black muck is more than 50 inches thick.

Dresden soils are gently sloping to steep and are on benches of outwash plains and stream valleys. In areas where the Dresden soils are cultivated, they have a surface layer and subsurface layer of very dark grayish-brown and grayish-brown silt loam 11 inches thick. The subsoil is clay loam about 24 inches thick. The underlying material is sand and gravel.

Kegonsa soils are nearly level to gently sloping and are on outwash benches. They have a surface layer of silt loam and a subsoil of mostly silty clay loam. The underlying material is sand and gravel.

The minor soils in this association, other than the Kegonsa soils, are Elburn, gravelly substratum, Del Rey, Wacousta, Plano, gravelly substratum, Sable, Palms, Boyer, Marshan, Rodman, Hayfield, Warsaw, Grays, Colwood, Montgomery, and Seaton soils. Plano, gravelly substratum, Boyer, Rodman, Warsaw, and Grays soils are on high benches of outwash plains and old lake basins. Elburn, gravelly substratum, Del Rey and Hayfield soils are on moderately low benches. Wacousta, Sable, Palms, Marshan, Colwood, and Montgomery soils are on low benches and in depressional areas. Seaton soils are on high colluvial foot slopes.

A large part of this association is cultivated. In places where the poorly drained organic and mineral soils are drained, these soils have a moderate limitation for cropping. Corn is the most common crop, but mint and sod are specialty crops that are also grown.

The limitations for onsite sewage disposal range from moderate to very severe.

9. *Meridian-Granby-Dickinson association*

Well drained, poorly drained, and somewhat excessively drained, moderately deep and deep loams, loamy sands, and fine sandy loams that are underlain by sand and loamy sand

This association is in areas adjacent to the Wisconsin and Sugar Rivers. It mainly has the landscape of an outwash plain. It is dominantly nearly level, but some

areas are gently sloping or sloping, and small acreages adjacent to the Elkmound-Stony and rocky land-Dunbarton association are moderately steep to steep. The soils in this association formed in materials deposited by water and wind. The runoff from this association joins the water courses that flow through the association and drains into the Wisconsin or Sugar Rivers.

This association makes up about 1 percent of the county. About 20 percent is Meridian soils, 20 percent is Granby soils, 20 percent is Dickinson soils, and the remaining 40 percent is minor soils, including 10 percent Plainfield soils.

Meridian soils are nearly level to gently sloping, moderately deep, well-drained soils on high benches in the large river valleys. They have a surface layer of very dark brown loam about 8 inches thick. The subsoil is sandy clay loam 28 inches thick. The underlying material is sand.

Granby soils are poorly drained, nearly level soils on low, wet benches of the outwash plains. They have a surface layer of black loamy sand about 10 inches thick. The subsoil is sand 19 inches thick. The underlying material is sand.

Dickinson soils are nearly level to sloping, somewhat excessively drained soils on high benches of the outwash plains. They have a surface layer of very dark brown and very dark grayish-brown fine sandy loam about 13 inches thick. The subsoil is sandy loam 32 inches thick. The underlying material is sand.

Plainfield soils are gently sloping, excessively drained soils. They have a surface layer and subsoil of sand. The underlying material also is sand.

The minor soils in this association, other than the Plainfield soils, are the Adrian, Seaton, loamy variant, Spinks, Kickapoo, Watseka, Dickinson, sandy variant, Brems, and Seaton soils. Seaton, Seaton, loamy variant, Spinks, and some Plainfield soils are on foot slopes above the benches and below the steep soils on upland ridges. Dickinson, sandy variant, Watseka, Brems, and Adrian soils are on low to high benches of the outwash plains.

Meridian soils are suited to row crops, small grain, and hay. Dickinson soils are not well suited to row crops. Both of these soils are droughty and are subject to soil blowing. Plainfield and Granby soils are better suited to use as wildlife habitat than to most other uses. In places where the Granby soils are drained, they are suitable for row crops, small grain, and hay.

The soils in this association have slight to very severe limitations for onsite sewage disposal.

Soils Formed in Alluvium

The soils in this association formed in alluvium. They are dominantly somewhat poorly drained to poorly drained and are subject to flooding. These soils have severe limitations for urban use, because they have a seasonal high water table and are subject to flooding.

10. Otter-Orion-Troxel association

Poorly drained to well drained, deep silt loams that are underlain by silt loam

This association has a landscape made up mainly of drainageways, stream bottoms, and flood plains. The soils of the association formed in recently deposited alluvium. They are in the lowest positions on the landscape and are nearly level to gently sloping. This association is made up of many, long, narrow, irregularly shaped areas. These areas delineate the major watercourses in the county.

This association makes up about 4 percent of the county. About 25 percent is Otter soils, 10 percent is Orion soils, 10 percent is Troxel soils, and the remaining 55 percent is minor soils, including 5 percent Alluvial land.

Otter soils are nearly level, poorly drained soils that formed in alluvium on stream bottoms. They have a surface layer of very dark gray silt loam about 10 inches thick. The next layer is black silt loam about 43 inches thick.

Orion soils are nearly level, somewhat poorly drained soils on alluvial flood plains and on narrow stream bottoms. They have a surface layer of dark grayish-brown silt loam about 4 inches thick. The underlying material is silt loam that extends to a depth of more than 60 inches.

Troxel soils are gently sloping, well drained and moderately well drained soils on the upper part of drainageways and valleys. They have a surface layer of mainly very dark brown and black silt loam about 28 inches thick. The subsoil is silty clay loam and silt loam. The underlying material is silt loam.

Alluvial land is somewhat poorly drained and poorly drained. It formed in the most recent deposits of alluvium in stream valleys. The material of this soil varies in texture.

The minor soils in this association, other than Alluvial land, are Chaseburg, Elvers, Houghton, Huntsville, Palms, and Radford soils. Chaseburg, Huntsville, and Radford soils are in high, narrow drainageways. Elvers, Houghton, and Palms soils are on low bottoms that are frequently flooded for long periods.

Troxel soils have moderate limitations for farming. In places where the Otter and Orion soils are adequately drained, these soils are suited to all crops commonly grown in the county with the exception of alfalfa. These soils all are subject to flooding.

The soils in this association have very severe limitations for onsite sewage disposal.

Descriptions of the Soils

This section describes the soil series and mapping units in Dane County. Each soil series is described in detail, and then, briefly, each mapping unit in that series. Unless it is specifically mentioned otherwise, it is to be assumed that what is stated about the soil series holds true for the mapping units in that series. Thus, to get full information about any one mapping unit, it is necessary to read both the description of the mapping unit and the description of the soil series to which it belongs.

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other underly-

ing material. Each series contains two descriptions of this profile. The first is brief and in terms familiar to the layman. The second is much more detailed and is for those who need to make thorough and precise studies of soils. Color terms are for moist soil unless otherwise stated. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit is different from the one described for the series, these differences are stated in describing the mapping unit, or they are differences that are apparent in the name of the mapping unit.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Cut and fill land, for example, does not belong to a soil series but, nevertheless, is listed in alphabetic order along with the soil series.

Following the name of each mapping unit is a symbol in parentheses. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit and woodland group in which the mapping unit has been placed. The page for the description of each capability unit can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown in table 1. Many of the terms used in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*13*).[1]

Adrian Series

The Adrian series consists of deep, very poorly drained, nearly level soils on low bottoms, in depressional areas of stream valleys, and on benches. These soils formed in 30 to 40 inches of muck underlain by sandy material more than 3 feet thick.

In a representative profile the surface layer is black muck about 35 inches thick. The underlying material is very dark grayish-brown loamy sand and dark-gray sand.

These soils have low fertility. The available water capacity is high. Permeability is moderately rapid in the organic part of these soils and rapid in the sand part. Reaction is medium acid to mildly alkaline in the sand. These soils are subject to wetness. In areas where these soils are not drained, the water table is at or near the surface most of the year.

These soils can be used for row crops in areas where they are drained. Areas where they are drained and cultivated, however, are subject to soil blowing. Areas that are not drained provide good wildlife habitat, and some areas can be used for unimproved pasture. These soils are better suited to open-ditch drainage than to most other forms of drainage. It is necessary to control the level of the water table to prevent excessive oxidation and subsidence.

Representative profile of Adrian muck in undisturbed area, 27.5 yards east of town road and 55 yards north of county road M, NW¼SW¼SW¼ sec. 22, T. 8 N., R. 9 E.:

Oa1—0 to 11 inches, sapric material that is black (N 2/0) broken faced and rubbed; about 30 percent fiber undisturbed, trace when rubbed; weak, medium, granular structure; very friable; fibers are herbaceous; slightly acid; abrupt, smooth boundary.

Oa2—11 to 35 inches, sapric material that is black (N 2/0) broken faced and rubbed; about 50 percent fiber undisturbed, 4 percent when rubbed; matted to weak, fine, subangular blocky structure; very friable; fibers are herbaceous; slightly acid; abrupt, smooth boundary.

C1g—35 to 40 inches, very dark grayish-brown (2.5Y 3/2) loamy sand; very weak, medium, subangular blocky structure; very friable; neutral; abrupt, smooth boundary.

C2g—40 to 60 inches, dark-gray (N 4/0) sand; single grained; loose; mildly alkaline.

The organic material ranges from 20 to 40 inches in thickness. In some places the subsurface part has a hemic layer less than 10 inches thick. The color ranges from black (N 2/0) to very dark grayish brown (10YR 3/2) throughout the profile. The underlying material is sand, loamy sand, or gravelly sand.

Adrian soils are near Houghton, Granby, Elvers, and Marshan soils. Adrian soils are thinner to sand than Houghton soils. They are similar to Palms soils, but are underlain by sand, whereas Palms soils are underlain by loam. They have a surface layer of sapric material that Granby and Marshan soils do not have. Adrian soils do not have the silty overburden of Elvers soils.

Adrian muck (Ad).—This nearly level soil is on low bottoms or benches in stream valleys. Areas of this soil are long, irregularly shaped tracts 5 to 440 acres in size. Slopes are 0 to 2 percent.

Where this soil is cultivated, the surface layer is black. In areas where this soil is not drained, the surface layer is very dark brown or very dark grayish brown.

Included with this soil in mapping are some small areas of soils that have slopes of 2 to 6 percent. There are a few small areas of soils that have a silty overburden 6 to 12 inches thick that was washed down from higher lying soils. Also included are small areas of a soil that has organic material 40 to 51 inches thick over sand and a few small areas of Houghton soils.

This soil is suited to row crops if it is adequately drained. Deep ditches provide adequate drainage in areas where suitable outlets are available. Areas that are not drained are better suited to wildlife habitat or limited pasture than to most other uses. If this soil is used for farming, the major concerns of management are the installation of adequate drainage, control of soil blowing, reduction of subsidence, and improvement of the level of fertility. Capability unit IVw–7; not placed in a woodland suitability group.

Alluvial Land, Wet

Alluvial land, wet (Af) consists of poorly drained, stratified, silty and loamy stream deposits. The surface layer ranges from gravelly material to silt loam. This land type is nearly level and is on the lower part of flood plains along major streams.

The surface layer is grayish-brown to dark grayish-brown silt loam or loam about 8 inches thick. The surface layer is underlain by grayish-brown or gray, stratified silt, sand, and gravel. The sequence and texture of the strata of parent material vary.

Included with this land type in mapping are areas

[1] Italic numbers in parentheses refer to Literature Cited, p. 191.

TABLE 1.—*Approximate acreage and proportionate extent of the soils*

Soil	Acres	Percent
Adrian muck	4,300	0.6
Alluvial land, wet	3,500	.5
Ashdale silt loam, 2 to 6 percent slopes	700	.1
Ashdale silt loam, 6 to 12 percent slopes, eroded	770	.1
Basco silt loam, 2 to 6 percent slopes, eroded	830	.1
Basco silt loam, 6 to 12 percent slopes, eroded	4,550	.6
Basco silt loam, 12 to 20 percent slopes, eroded	4,950	.6
Basco silt loam, 20 to 30 percent slopes, eroded	980	.1
Batavia silt loam, gravelly substratum, 0 to 2 percent slopes	9,940	1.3
Batavia silt loam, gravelly substratum, 2 to 6 percent slopes	18,200	2.4
Batavia silt loam, gravelly substratum, 6 to 12 percent slopes, eroded	1,400	.2
Boyer sandy loam, 2 to 6 percent slopes	1,200	.2
Boyer sandy loam, 6 to 12 percent slopes, eroded	2,050	.3
Boyer sandy loam, 12 to 20 percent slopes, eroded	1,450	.2
Brems loamy sand	365	.1
Chaseburg silt loam, 2 to 6 percent slopes	1,400	.2
Colwood silt loam	6,100	.8
Cut and fill land	3,000	.4
Dells silt loam, 0 to 3 percent slopes	860	.1
Del Rey silt loam, 0 to 3 percent slopes	1,000	.1
Derinda silt loam, 2 to 6 percent slopes, eroded	760	.1
Derinda silt loam, 6 to 12 percent slopes, eroded	420	.1
Dickinson sandy loam, 0 to 2 percent slopes	2,100	.3
Dickinson sandy loam, 2 to 6 percent slopes	1,000	.1
Dickinson sandy loam, 6 to 12 percent slopes	120	(1)
Dickinson loamy fine sand, sandy variant, 1 to 4 percent slopes	580	.1
Dodge silt loam, 2 to 6 percent slopes	35,100	4.6
Dodge silt loam, 6 to 12 percent slopes, eroded	14,900	1.8
Dodge and Kidder soils, 6 to 20 percent slopes, eroded	2,300	.3
Dodgeville silt loam, 2 to 6 percent slopes	2,200	.3
Dodgeville silt loam, 6 to 12 percent slopes	2,850	.4
Dodgeville silt loam, 12 to 20 percent slopes, eroded	1,050	.1
Dresden loam, 12 to 20 percent slopes, eroded	3,350	.4
Dresden loam, 20 to 30 percent slopes, eroded	450	.1
Dresden silt loam, 2 to 6 percent slopes	6,600	.9
Dresden silt loam, 6 to 12 percent slopes, eroded	13,800	1.8
Dunbarton silt loam, 2 to 6 percent slopes, eroded	830	.1
Dunbarton silt loam, 6 to 12 percent slopes, eroded	14,500	1.9
Dunbarton silt loam, 12 to 20 percent slopes, eroded	15,200	2.1
Dunbarton silt loam, 20 to 30 percent slopes, eroded	3,250	.4
Edmund silt loam, 2 to 6 percent slopes, eroded	3,350	.4
Edmund silt loam, 6 to 12 percent slopes, eroded	14,200	1.8
Edmund silt loam, 12 to 20 percent slopes, eroded	7,500	1.0
Elburn silt loam, 1 to 4 percent slopes	6,000	.8
Elburn silt loam, gravelly substratum, 0 to 3 percent slopes	5,750	.8
Eleva sandy loam, 6 to 12 percent slopes, eroded	1,750	.2
Eleva sandy loam, 12 to 20 percent slopes, eroded	2,350	.3
Eleva sandy loam, 20 to 30 percent slopes, eroded	1,500	.2
Elkmound sandy loam, 6 to 12 percent slopes, eroded	1,050	0.1
Elkmound sandy loam, 12 to 20 percent slopes, eroded	3,550	.5
Elkmound sandy loam, 20 to 30 percent slopes, eroded	4,100	.5
Elkmound sandy loam, 30 to 60 percent slopes	3,150	.4
Elvers silt loam	1,850	.2
Gale silt loam, 2 to 6 percent slopes	2,000	.3
Gale silt loam, 6 to 12 percent slopes, eroded	2,100	.3
Gale silt loam, 12 to 20 percent slopes, eroded	1,350	.2
Granby loamy sand	3,100	.4
Grays silt loam, 0 to 2 percent slopes	490	.1
Grays silt loam, 2 to 6 percent slopes	2,000	.3
Grays silt loam, 6 to 12 percent slopes, eroded	570	.1
Griswold loam, 2 to 6 percent slopes	2,150	.3
Griswold loam, 6 to 12 percent slopes	9,200	1.2
Griswold loam, 12 to 20 percent slopes, eroded	1,900	.2
Hayfield silt loam, 0 to 3 percent slopes	7,300	1.0
Hixton loam, 2 to 6 percent slopes	1,250	.2
Hixton loam, 6 to 12 percent slopes, eroded	1,900	.2
Hixton loam, 12 to 20 percent slopes, eroded	1,900	.2
Houghton muck	27,550	3.6
Huntsville silt loam, 0 to 2 percent slopes	1,350	.2
Huntsville silt loam, 2 to 6 percent slopes	2,000	.3
Kegonsa silt loam, 0 to 2 percent slopes	3,000	.4
Kegonsa silt loam, 2 to 6 percent slopes	15,500	2.0
Kickapoo fine sandy loam, 2 to 6 percent slopes	1,750	.2
Kidder loam, 2 to 6 percent slopes	1,100	.1
Kidder loam, 6 to 12 percent slopes, eroded	8,400	1.1
Kidder loam, 12 to 20 percent slopes, eroded	7,800	1.0
Kidder soils, 10 to 20 percent slopes, eroded	1,850	.2
Kidder soils, 20 to 35 percent slopes, eroded	7,300	1.0
Marsh	1,350	.2
Marshan silt loam	9,100	1.1
McHenry silt loam, 2 to 6 percent slopes	4,550	.6
McHenry silt loam, 6 to 12 percent slopes, eroded	27,800	3.7
McHenry silt loam, 12 to 20 percent slopes, eroded	7,000	.9
Meridian loam, 0 to 2 percent slopes	2,000	.3
Meridian loam, 2 to 6 percent slopes	1,150	.2
Military loam, 6 to 12 percent slopes, eroded	660	.1
Military loam, 12 to 20 percent slopes, eroded	430	.1
Military loam, 20 to 30 percent slopes, eroded	175	(1)
Montgomery silty clay loam, 0 to 3 percent slopes	240	(1)
NewGlarus silt loam, 2 to 6 percent slopes, eroded	2,880	.4
NewGlarus silt loam, 6 to 12 percent slopes, eroded	6,100	.8
NewGlarus silt loam, 12 to 20 percent slopes, eroded	2,400	.3
NewGlarus silt loam, 20 to 30 percent slopes, eroded	800	.1
Orion silt loam	2,400	.3
Orion silt loam, wet	4,800	.6
Otter silt loam	8,800	1.1
Palms muck	8,900	1.1
Pecatonica silt loam, 2 to 6 percent slopes	2,200	.3
Pecatonica silt loam, 6 to 12 percent slopes, eroded	750	.1
Plainfield sand, 1 to 6 percent slopes	2,650	.3
Plano silt loam, 0 to 2 percent slopes	7,900	1.0
Plano silt loam, 2 to 6 percent slopes	44,650	5.7
Plano silt loam, 6 to 12 percent slopes, eroded	1,800	.2
Plano silt loam, gravelly substratum, 0 to 2 percent slopes	4,850	.6
Plano silt loam, gravelly substratum, 2 to 6 percent slopes	8,100	1.0

TABLE 1.—*Approximate acreage and proportionate extent of the soils*—Continued

Soil	Acres	Percent	Soil	Acres	Percent
Plano silt loam, gravelly substratum, 6 to 12 percent slopes, eroded	445	0.1	Seaton silt loam, 12 to 20 percent slopes, eroded	5,900	0.8
Port Byron silt loam, 2 to 6 percent slopes	2,550	.3	Seaton silt loam, 20 to 30 percent slopes, eroded	395	.1
Port Byron silt loam, 6 to 12 percent slopes	5,100	.6	Sogn silt loam, 2 to 20 percent slopes	7,500	1.0
Radford silt loam, 0 to 3 percent slopes	12,400	1.6	Sogn silt loam, 20 to 35 percent slopes	2,250	.3
Ringwood silt loam, 2 to 6 percent slopes	22,047	2.8	Spinks and Plainfield loamy sands, 2 to 6 percent slopes	485	.1
Ringwood silt loam, 6 to 12 percent slopes, eroded	8,500	1.1	Spinks and Plainfield loamy sands, 6 to 12 percent slopes	520	.1
Rockton silt loam, 2 to 6 percent slopes	3,000	.4	Spinks and Plainfield loamy sands, 12 to 25 percent slopes	1,000	.1
Rockton silt loam, 6 to 12 percent slopes, eroded	2,150	.3	Stony and rocky land	9,500	1.2
Rockton silt loam, 12 to 30 percent slopes, eroded	400	.1	Troxel silt loam, 1 to 4 percent slopes	21,250	2.8
Rodman sandy loam, 12 to 35 percent slopes	850	.1	Virgil silt loam, 1 to 4 percent slopes	11,300	1.4
Sable silty clay loam, 0 to 3 percent slopes	21,500	2.8	Virgil silt loam, gravelly substratum, 0 to 3 percent slopes	10,600	1.3
St. Charles silt loam, 0 to 2 percent slopes	2,650	.3	Wacousta silty clay loam	15,700	2.1
St. Charles silt loam, 2 to 6 percent slopes	35,100	4.5	Warsaw silt loam, 2 to 6 percent slopes	500	.1
St. Charles silt loam, 6 to 12 percent slopes, eroded	2,700	.4	Warsaw silt loam, 6 to 12 percent slopes, eroded	500	.1
St. Charles silt loam, 12 to 20 percent slopes, eroded	450	.1	Watseka loamy sand	1,200	.2
Salter sandy loam, 2 to 6 percent slopes	1,000	.1	Westville silt loam, 2 to 6 percent slopes	1,250	.2
Salter sandy loam, 6 to 12 percent slopes, eroded	110	(1)	Westville silt loam, 6 to 12 percent slopes, eroded	2,150	.3
Salter silt loam, 0 to 2 percent slopes	410	.1	Westville silt loam, 12 to 20 percent slopes, eroded	235	(1)
Salter silt loam, 2 to 6 percent slopes, eroded	1,330	.2	Whalan loam, 20 to 30 percent slopes, eroded	680	.1
Salter sandy loam, wet variant, 0 to 3 percent slopes	1,850	.2	Whalan silt loam, 2 to 6 percent slopes	2,150	.3
Seaton fine sandy loam, loamy variant, 6 to 12 percent slopes, eroded	700	.1	Whalan silt loam, 6 to 12 percent slopes, eroded	4,200	.5
Seaton fine sandy loam, loamy variant, 12 to 20 percent slopes, eroded	1,700	.2	Whalan silt loam, 12 to 20 percent slopes, eroded	3,050	.4
Seaton fine sandy loam, loamy variant, 20 to 30 percent slopes	385	.1	Gravel pits	1,600	.2
Seaton silt loam, 2 to 6 percent slopes	4,200	.5	Made land	350	.1
Seaton silt loam, 6 to 12 percent slopes, eroded	6,200	.8	Quarries	335	.1
			Total	766,912	100.0

(1) Less than 0.05 percent.

of alluvial soils such as Otter silt loam and Orion silt loam, wet. These areas are less than 1 acre in size and are too small to map separately.

Alluvial land, wet, has high fertility, is nearly neutral in reaction, and generally has very high available water capacity. The water table commonly is at a depth of less than 1 foot. This land type is very frequently flooded.

This land type is not suited to crops because of the high water table and severe hazard of flooding. It is better suited to pasture, woodland, or wildlife habitat than to most other uses. Most areas are in pasture and trees. Capability unit Vw–14; woodland suitability group 4w5.

Ashdale Series

The Ashdale series consists of deep, well-drained, gently sloping and sloping soils. These soils are mainly in valley fill positions in drainageways on dolomite ridges, but some areas are on the tops of ridges. The soils formed in deep, wind-deposited silt and the underlying clay that weathered from dolomite. The native vegetation is prairie grasses.

In a representative profile the surface layer is very dark brown and very dark grayish-brown silt loam about 14 inches thick. The subsoil is about 37 inches thick. The upper 4 inches is dark-brown silt loam; the next 19 inches is dark yellowish-brown and brown silty clay loam; the next 5 inches is yellowish-brown silt loam; the lower 9 inches is yellowish-red clay. The underlying bedrock is calcareous dolomite.

These soils have high fertility. The available water capacity is high, and permeability is moderate. These soils have good tilth, high organic-matter content, moderate permeability, and high fertility. The water table is at a depth of more than 5 feet.

These soils are well suited to all crops commonly grown in the county. They are not well suited to the production of timber. If these soils are used for crops, conservation practices are needed to control erosion.

Representative profile of Ashdale silt loam, 2 to 6 percent slopes, in cultivated area, 340 feet east of farm entrance and 50 feet south of road. SE¼SE¼ sec. 21, T. 5 N., R. 7 E.

Ap—0 to 8 inches, very dark brown (10YR 2/2) silt loam; moderate, very fine, subangular blocky structure; friable; common roots; neutral; abrupt, smooth boundary.

A12—8 to 14 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very

friable; common roots; neutral; clear, smooth boundary.

B1t—14 to 18 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, subangular blocky structure; friable; common roots; patchy, very dark grayish-brown (10YR 3/2) clay films; slightly acid; clear, smooth boundary.

B21t—18 to 29 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, very fine, subangular blocky structure; firm; few roots; thin, discontinuous, very dark grayish-brown (10YR 3/2) clay films; slightly acid; clear, smooth boundary.

B22t—29 to 37 inches, brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm; few roots; patchy, dark-brown (10YR 3/3) clay films; slightly acid; clear, wavy boundary.

B31t—37 to 42 inches, yellowish-brown (10YR 5/4) silt loam; weak, fine, subangular blocky structure; firm; few, patchy, dark-brown (10YR 3/3) clay films on vertical faces only; few roots; medium acid; abrupt, wavy boundary.

IIB32t—42 to 51 inches, yellowish-red (5YR 4/6) clay; moderate, fine, angular blocky structure; extremely firm; patchy, dark reddish-brown (5YR 2/2) clay films and organic stains; slightly acid; abrupt, wavy boundary.

IIR—51 to 60 inches, fractured dolomite.

The loess mantle ranges from 36 to 50 inches in thickness. The solum is 40 to 60 inches thick. The A horizon ranges from 10 to 18 inches in thickness and from black (10YR 2/1) to dark brown (10YR 3/3) in color. The upper part of the B horizon is dark yellowish-brown (10YR 4/4) to dark-brown (10YR 4/3) silt loam or silty clay loam. Dolomite bedrock is at a depth of 40 to 60 inches or more. The reaction in the B horizon is medium acid or slightly acid.

Ashdale soils are near Dodgeville and Huntsville soils. Ashdale soils are deeper to dolomite than are Dodgeville soils. They have a thinner A horizon and a better developed B horizon than Huntsville soils.

Ashdale silt loam, 2 to 6 percent slopes (AsB).—This soil is mostly on concave colluvial foot slopes at the head of drainageways, but a few areas are on convex tops of ridges. Areas of this soil are 15 to 80 acres in size. This soil receives runoff from higher lying soils.

This soil has the profile described as representative for the series.

Included with this soil in mapping are small areas of Dodgeville and Huntsville soils. Also included are a few small eroded areas.

This soil is suited to row crops, small grain, and hay. Row crops can be grown most of the time if management is intensive and erosion is controlled. The hazard of erosion is moderate. Capability unit IIe–1; not placed in a woodland suitability group.

Ashdale silt loam, 6 to 12 percent slopes, eroded (AsC2).—This soil is on the lower colluvial foot slopes in the drainageways of ridges on uplands. Areas of this soil are 5 to 40 acres in size. Slopes are concave and are 75 to 150 feet long. This soil receives runoff from higher lying soils.

This soil has a profile similar to the one described as representative for the series, but it has a thinner surface layer and is thinner to dolomite. In eroded areas it has a very dark grayish-brown or dark-brown plow layer. These areas have slightly lower organic-matter content and poorer tilth than uneroded areas.

Included with this soil in mapping are small areas of Dodgeville soils. Also included are areas of severely eroded soils.

This soil is suited to row crops, small grain, and hay. The hazard of erosion is severe, and careful management is required. Capability unit IIIe–1; not placed in a woodland suitability group.

Basco Series

The Basco series consists of moderately deep, well drained and moderately well drained, gently sloping to steep soils on side slopes and the tops of ridges in the high uplands. These soils formed in 10 to 24 inches of loess and of clayey residuum that weathered from shale and sandstone bedrock. The native vegetation is mixed hardwood trees and an understory of grasses and shrubs.

In a representative profile the surface layer is very dark grayish-brown silt loam about 6 inches thick. The subsoil is about 27 inches thick. The upper part of the subsoil is brown silt loam and silty clay loam about 10 inches thick, and the lower part is reddish-brown silty clay and clay about 17 inches thick. The underlying material is brownish-red and dusky-red sandstone and shale bedrock that is weakly cemented in the upper part.

These soils are subject to water erosion. Their fertility is medium. The available water capacity is medium or low, and permeability is slow. The seasonal high water table is below a depth of 3 feet in wet seasons and commonly is more than 5 feet. Seeps and intermittent springs are common.

Most areas of these soils are used for crops. They are suited to most crops commonly grown in the county. Where these soils are steep, they are either used for pasture or are wooded.

Representative profile of Basco silt loam, 6 to 12 percent slopes, eroded, 20 yards north of the intersection of County Trunk F and a field road, NW¼NW¼NE¼ sec. 4, T. 7 N., R. 6 E.:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, very fine, granular structure; friable; neutral; abrupt, smooth boundary.

B1—6 to 11 inches, brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; friable; many earthworm casts; small pockets of material from the underlying IIB horizon are present; neutral; clear, wavy boundary.

B21t—11 to 16 inches, brown (10YR 4/3) silty clay loam; moderate, very fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; small pockets of material from the underlying IIB horizon are present; medium acid; clear, wavy boundary.

IIB22t—16 to 24 inches, reddish-brown (5YR 4/4) silty clay; moderate, fine, subangular blocky structure; firm; thick, continuous, dark reddish-brown (2.5YR 3/4) clay films; medium acid; clear, wavy boundary.

IIB23t—24 to 33 inches, reddish-brown (2.5YR 4/4) clay; strong, medium, angular blocky structure; very firm; thick, continuous, dusky-red (10YR 3/4) clay films; medium acid; clear, wavy boundary.

IIC—33 to 60 inches, stratified, dusky-red (10YR 3/2) shale and brownish-yellow (10YR 6/6) sandstone bedrock; partially weathered and disintegrated, and more consolidated with depth; medium acid.

The solum ranges from 20 to 40 inches in thickness. The overlying silty sediment is 10 to 24 inches thick. The A horizon is 6 to 10 inches thick and is black (10YR 2 /1) to very dark grayish brown (10YR 3/2). The A2 horizon, where present, is 1 to 6 inches thick and is grayish brown or brown (10YR 5/2, 5/3). The upper part of the B horizon is brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) silt loam

or silty clay loam. The lower part is silty clay and clay that formed in shale residuum. The color is extremely variable and is directly related to the color of the parent shale, which ranges from dusky red (10R 3/2) to pale green (5G 6/2 and 5G 7/2). The interlayered sandstone ranges from yellowish red (5YR 5/6) to light gray (10YR 7/2). In some areas mottles are at a depth of 30 to 50 inches.

Basco soils are near Derinda, NewGlarus, and Hixton soils. Basco soils are underlain by sandstone and shale bedrock, whereas Derinda soils are underlain only by shale and NewGlarus soils are underlain by dolomite. Basco soils have a clayey B horizon over sandstone and shale, whereas Hixton soils have a loamy B horizon over sandstone bedrock.

Basco silt loam, 2 to 6 percent slopes, eroded (BaB2).—This soil is on the tops of ridges and on upper side slopes. Areas of this soil are elongated tracts 25 to 165 acres in size. Slopes are 150 to 250 feet long.

The profile of this soil is similar to the one described as representative for the series, but it is deeper over sandstone and shale. The surface layer generally is very dark brown, but in a few areas it is black. In cultivated areas the surface layer is 7 to 10 inches thick. Tilth is poorer and the organic-matter content is lower in eroded areas than in uneroded areas.

Included with this soil in mapping are small areas of NewGlarus soils. Also included are areas of soils that have a moderately thick silt mantle.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The major limitations of this soil are slope and slow permeability. The main concerns of management are improvement of organic matter content, tilth, and fertility; maintenance or improvement of permeability; and control of erosion. Capability unit IIe–6; woodland suitability group 2o1.

Basco silt loam, 6 to 12 percent slopes, eroded (BaC2).—This soil is on middle side slopes. Areas of this soil are nearly uniformly shaped, slightly convex, ribbonlike tracts 20 to 85 acres in size. These areas are characterized by a few narrow drainageways. Slopes are 100 to 150 feet long. This soil receives runoff from higher lying soils.

This soil has the profile described as representative for the series. In uncultivated areas, however, the surface layer is thinner and darker than that of the profile described as representative for the series.

Included with this soil in mapping are small areas of Hixton and NewGlarus soils. Also included are areas of soils that have only 12 to 20 inches of clayey material over sandstone and shale.

If this soil is managed properly, it is suited to all crops commonly grown in the county. The major limitations of this soil are its slope and slow permeability. The main concerns of management are control of erosion and the improvement of organic-matter content, tilth, and the level of fertility. Capability unit IIIe–6; woodland suitability group 2o1.

Basco silt loam, 12 to 20 percent slopes, eroded (BaD2).—This soil is on side slopes. Areas of this soil are nearly uniform in shape. These areas are slightly convex, ribbonlike tracts 20 to 50 acres in size. Slopes are 75 to 125 feet long. This soil is characterized by a few narrow drainageways. It receives runoff from higher lying soils.

The profile of this soil is similar to the one described as representative for the series, but it is not so deep over sandstone and shale. In cultivated areas the surface layer is thinner and darker than the surface layer of the profile described as representative for the series. In cultivated areas the surface layer is 6 to 8 inches thick. It is generally brown, but in a few places it is very dark grayish brown or dark brown.

Included with this soil in mapping are small areas of Hixton and Elkmound soils.

This soil is better suited to small grain, hay, pasture, woodland, and wildlife habitat than to most other crops and uses. The major limitations of this soil are slope, runoff from higher lying soils, and slow permeability. The hazard of erosion is very severe. The main concerns of management are control of erosion and improvement of organic-matter content, tilth, and the level of fertility. Capability unit IVe–6; woodland suitability group 2r2.

Basco silt loam, 20 to 30 percent slopes, eroded (BaE2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 50 to 115 acres in size. Downslope drainageways are common. Slopes are 50 to 100 feet long. Most areas of this soil are wooded. This soil receives much runoff from higher lying soils.

The profile of this soil is similar to the one described as representative for the series, but the surface layer is thinner and lighter in color. It is also not so deep over sandstone and shale bedrock. In wooded areas the very dark brown or black surface layer is 2 to 4 inches thick. In cultivated areas the surface layer is dark brown. At the base of slopes there are accumulations of some topsoil material.

Included with this soil in mapping are small areas of Hixton and Elkmound soils. Also included are some small areas of soils that have a severely eroded plow layer, low organic-matter content, and very poor tilth. Seaton, Port Byron, Chaseburg, and Troxel soils are at the base of slopes and in small drainageways. There are also some areas of soils that have slopes of 30 to 45 percent.

This soil is better suited to woodland, wildlife habitat, and very limited pasturing than to most other uses. The major limitations of this soil are its steep slope, a very severe hazard of erosion, and limited depth to bedrock. The control of grazing and the planting of trees and other elements of wildlife habitat are helpful management practices. Capability unit VIe–6; woodland suitability group 2r2.

Batavia Series

The Batavia series consists of deep, well-drained, nearly level to sloping soils on high benches. These soils formed in deep loess and loamy outwash under hardwood forest and a thick understory of prairie grasses. The depth to outwash sand and gravel is 42 to 70 inches.

In a representative profile in a cultivated area, the surface layer is very dark grayish-brown silt loam 8 inches thick. The subsurface layer is brown, friable silt loam about 2 inches thick. The dark-brown and brown subsoil is 40 inches thick. The upper part of the subsoil is silty clay loam, and the lower part is clay loam. The underlying material is pale-brown and brownish-yellow, single-grained, calcareous sand and gravel.

These soils have high fertility. The available water capacity is high, and permeability is moderate. The water table generally is at a depth of more than 5 feet, but in a few places during the wet season, it is at a depth of 3 to 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat. If these soils are used for crops, conservation practices are needed to control erosion and conserve moisture.

Representative profile of Batavia silt loam, gravelly substratum, 2 to 6 percent slopes, in a cultivated area, 6.5 yards north of road and 16.5 yards west of gravel pit, in the southwest corner of sec. 16, T. 7 N., R. 8 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable; few roots; neutral; abrupt, smooth boundary.

A2—8 to 10 inches, brown (10YR 4/3) silt loam; weak, medium, platy structure; friable; neutral; clear, smooth boundary.

B1—10 to 17 inches, dark-brown (10YR 4/3) light silty clay loam; moderate, very fine, subangular blocky structure; firm; bleached silt coats; slightly acid; clear, smooth boundary.

B21t—17 to 22 inches, brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; bleached silt coats; strongly acid; clear, smooth boundary.

B22t—22 to 36 inches, brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; bleached silt coats; strongly acid; clear, smooth boundary.

B31t—36 to 44 inches, brown (10YR 4/3) light silty clay loam; weak, medium, prismatic structure parting to weak, medium, subangular blocky; firm; thin, patchy, dark-brown (10YR 3/3) clay films on vertical faces of peds; strongly acid; clear, wavy boundary.

IIB32t—44 to 50 inches, brown (7.5YR 4/4) clay loam; weak, medium, subangular blocky structure; very firm; thin, continuous, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, wavy boundary.

IIC—50 to 60 inches, pale-brown (10YR 6/3) and brownish-yellow (10YR 6/8) sand and gravel outwash; single grained; loose; moderately alkaline; weakly effervescent.

The IIB32t horizon is dark-brown (7.5YR 4/4) to strong-brown (7.5YR 5/8) clay or sandy clay loam 2 to 6 inches thick. The depth to outwash sand and gravel ranges from 42 to 70 inches.

Batavia soils are near Virgil soils, gravelly substratum, and Plano, Kegonsa, Marshan, and Sable soils. Batavia soils have a thinner A horizon than Plano soils. They have a thicker silt mantle than Kegonsa soils. They are better drained than Virgil soils, gravelly substratum, and Marshan and Sable soils.

Batavia silt loam, gravelly substratum, 0 to 2 percent slopes (BbA).—This soil is on the convex crests of high benches. Areas of this soil are irregularly shaped and are 70 to 240 acres in size.

This soil has a profile similar to the one described as representative for the series, but it has a slightly darker surface layer. In cultivated areas the surface layer generally is very dark brown. In a few areas where the slopes are concave, the surface layer is darker.

Included with this soil in mapping are some small areas of soils that have slopes of 3 to 4 percent. Also included are a few small areas of somewhat poorly drained Virgil soils, some areas of soils that have silt deeper than 60 inches, and some areas of soils that have thin layers of water-laid silt, fine sand, or clay in the substratum.

This soil is well suited to all crops commonly grown in the county. It is necessary to apply lime in order to get good stands of legumes. This soil can be farmed intensively in areas where fertility is maintained. Capability unit I–3; woodland suitability group 2o1.

Batavia silt loam, gravelly substratum, 2 to 6 percent slopes (BbB).—This soil is in irregularly shaped areas on high benches. Areas of this soil are 75 to 235 acres in size. Slopes commonly are 150 to 225 feet long. This soil has the profile described as representative for the series.

Included with this soil in mapping are a few small areas of Kegonsa and Virgil soils. Also included are some areas of soils that have less than 40 inches or more than 60 inches of silt and some areas of soils that have thin layers of water-laid silt, fine sand, or clay in the substratum.

This soil is well suited to all crops commonly grown in the county. The only limitation to use of this soil is a moderate hazard of erosion. Row crops can be grown most of the time if management is intensive and erosion is controlled. Capability unit IIe–1; woodland suitability group 2o1.

Batavia silt loam, gravelly substratum, 6 to 12 percent slopes, eroded (BbC2).—This soil is on benches that have nearly uniformly shaped side slopes. Areas of this soil are 68 to 125 acres in size. Slopes are 100 to 200 feet long. A few small drainageways are a common feature. Runoff is moderately rapid.

This soil has a profile similar to the one described as representative for the series, but the surface layer is 4 to 6 inches thinner because of erosion. The surface layer is also less friable, lower in organic-matter content and fertility, and more difficult to keep in good tilth. The surface layer is very dark grayish brown, and the subsoil is mostly dark yellowish brown.

Included with this soil in mapping are some small areas of a soil that has slopes of more than 12 percent. Also included is a limited acreage of Kegonsa and Dresden soils.

If this soil is managed well, it is suited to all crops commonly grown in the county. Management practices that minimize the severe hazard of erosion are useful. Capability unit IIIe–1; woodland suitability group 2o1.

Boyer Series

The Boyer series consists of well-drained, gently sloping to moderately steep soils on benches in valleys. These soils formed in moderately deep loamy outwash over calcareous sand and gravel outwash under hardwood trees and an understory of prairie grass.

In a representative profile the surface layer is very dark grayish-brown sandy loam about 7 inches thick. The subsoil is about 23 inches thick. The upper part of the subsoil is brown sandy clay loam, the middle part is brown sandy loam, and the lower part is strong-brown loamy sand. The underlying material is light yellowish-brown and very pale brown sand and gravel.

These soils have low fertility. The available water

capacity is low. Permeability is moderately rapid in the surface layer and subsoil and rapid in the substratum. The seasonal high water table is at a depth of more than 5 feet.

These soils are suited to all crops commonly grown in the county. They are also suitable for the production of timber and for wildlife habitat. If these soils are cultivated, they are subject to soil blowing and erosion.

Representative profile of Boyer sandy loam, 12 to 20 percent slopes, eroded, in cultivated area, 100 yards west of county line and 75 feet north of road, SE¼SE¼ sec. 25, T. 6 N., R. 12 E.:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, fine, subangular blocky structure; very friable; few roots; neutral; abrupt, smooth boundary.

B21t—7 to 12 inches, brown (7.5YR 4/4) sandy clay loam; moderate, fine, subangular blocky structure; firm; thin, patchy, dark-brown (7.5YR 3/2) clay films on all faces of peds; slightly acid; clear, smooth boundary.

B22t—12 to 20 inches, brown (7.5YR 4/4) sandy loam; weak, fine, subangular blocky structure; friable; few, thin, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, smooth boundary.

IIB3—20 to 30 inches, strong-brown (7.5YR 5/6) loamy sand; weak, medium, subangular blocky structure; friable; medium acid; clear, smooth boundary.

IIC—30 to 60 inches, light yellowish-brown (10YR 6/4) and very pale brown (10YR 7/3) stratified sand and gravel; single grained; loose; moderately alkaline; strongly effervescent.

The solum ranges from 24 to 40 inches in thickness. In places the C horizon has thin lenses of gravel, clay, or silt and fine sand. The Bt horizon is sandy clay loam, loam, or sandy loam. The sandy clay loam is less than 10 inches thick.

Boyer soils in Dane County have an A horizon that is slightly darker than is defined as within the range for the series. This difference does not affect use and management.

Boyer soils are near Rodman and Dresden soils. Boyer soils have coarser textured A and B horizons than Dresden soils. They have a well-developed B horizon that is not present in Rodman soils.

Boyer sandy loam, 2 to 6 percent slopes (BoB).—This soil is on benches on outwash plains. Areas of this soil are 5 to 135 acres in size.

This soil has a profile similar to the one described as representative for the series, but it is deeper over loose sand and gravel. Where this soil is not eroded, it has a very dark brown surface layer.

Included with this soil in mapping are some small areas of Dresden soils. Also included are areas of soils that have loam 12 to 20 inches thick over sand and gravel, a few areas of soils that have a surface layer of loamy sand, and some small areas of soils that are 40 to 60 inches deep over sand and gravel. In a few places the underlying sand is medium acid.

This soil is subject to moderate soil blowing and erosion. Windbreaks help to protect the soil from blowing. The conservation of moisture and control of erosion are helpful management practices. Capability unit IIIs–4; woodland suitability group 3o1.

Boyer sandy loam, 6 to 12 percent slopes, eroded (BoC2).—This soil is on middle side slopes of benches on outwash plains. Areas of this soil are irregularly shaped and are 15 to 155 acres in size.

This soil has a profile similar to the one described as representative for the series, but it is slightly thicker over sand and gravel.

Included with this soil in mapping are areas of Dresden and Rodman soils and areas of soils that are loam 12 to 20 inches thick over sand and gravel. Also included are a few small areas of soils that have a surface layer of loamy sand, some areas of soils that are 40 to 60 inches thick over sand and gravel, and some areas of soils that are not eroded and have a slightly darker surface layer. In a few places the underlying sand is medium acid.

This soil is subject to slight soil blowing and to severe erosion. The conservation of moisture and control of erosion are helpful management practices. Capability unit IIIe–7; woodland suitability group 3o1.

Boyer sandy loam, 12 to 20 percent slopes, eroded (BoD2).—This soil is on side slopes of benches on outwash plains. Areas of this soil are ribbonlike tracts 5 to 125 acres in size. Slopes are convex. About 75 percent of this soil is moderately eroded in areas where it is cultivated. Downslope drainageways are a common feature in areas of this soil. This soil has a profile described as representative for the series.

Included with this soil in mapping are areas of Rodman soils and areas of soils that are loam 12 to 20 inches thick over sand and gravel. Also included are areas of soils that have slopes of 20 to 30 percent and areas of soils that are 40 to 60 inches thick over sand and gravel.

This soil is subject to moderate soil blowing and to severe erosion. It is better suited to use as meadow, pasture, woodland, or wildlife habitat than to most other uses. Many of the undisturbed areas of this soil are in timber. In areas where this soil is in pasture, the control of grazing helps to protect the sod. Capability unit IVe–7; woodland suitability group 3r2.

Brems Series

The Brems series consists of deep, moderately well drained, nearly level, sandy soils on benches in stream valleys. These soils formed in deep acid sand outwash under prairie grass and scattered black oak.

In a representative profile the surface layer is loamy sand and sand and is about 16 inches thick. The upper 9 inches is black, and the lower 7 inches is dark brown. The subsoil is dark yellowish-brown sand about 7 inches thick. The underlying material is single-grained sand that is light yellowish brown, very pale brown, and brown and has gray mottles.

These soils have low fertility. The available water capacity is very low, and permeability is rapid. The seasonal high water table is at a depth of 3 to 5 feet.

If these soils are used for row crops, conservation practices are helpful and a high level of management is needed to obtain satisfactory production of crops. The main limitation of these soils is the very low available water capacity, and the major concern of management is the control of soil blowing and erosion.

Representative profile of Brems loamy sand (0 to 3 percent slopes), in cultivated area, NW¼SE¼ sec. 23, T. 9 N., R. 6 E.:

Ap—0 to 9 inches, black (10YR 2/1) loamy sand; weak, very fine, crumb structure; very friable; strongly acid; many roots; abrupt, smooth boundary.

A3—9 to 16 inches, dark-brown (10YR 3/3) sand; weak,

fine, subangular blocky structure; very friable; strongly acid; few roots; clear, wavy boundary.
B—16 to 23 inches, dark yellowish-brown (10YR 4/4) sand; very weak, fine, subangular blocky structure; very friable; medium acid; clear, wavy boundary.
C1—23 to 32 inches, light yellowish-brown (10YR 6/4) sand; single grained; loose; slightly acid; clear, wavy boundary.
C2—32 to 48 inches, very pale brown (10YR 7/4) sand; common, medium, distinct, strong-brown (7.5YR 5/8) and light-gray (10YR 7/2) mottles; single grained; loose; slightly acid; clear, wavy boundary.
C3—48 to 60 inches, 50 percent brown (10YR 4/3) sand and 50 percent light-gray (10YR 7/2) sand; single grained; loose; slightly acid; gradual, wavy boundary.
C4—60 to 80 inches, very pale brown (10YR 7/3) sand; single grained; loose; slightly acid.

The depth to gray mottles ranges from 30 to 60 inches. The reaction of the C horizon ranges from strongly acid to slightly acid.

Brems soils are near Watseka soils; Dickinson soils, sandy variant; and Plainfield soils. Brems soils are not so well drained as Plainfield soils. They have a thinner and lighter colored A horizon and a coarser textured B horizon than Dickinson soils, sandy variant. They have a thinner A horizon and are better drained than Watseka soils.

Brems loamy sand (BrA).—This soil is on outwash plains. Areas of this soil are irregularly shaped tracts 20 to 150 acres in size. Slopes are 0 to 3 percent.

Included with this soil in mapping are some areas of soils that have a water table at a depth of 1 to 3 feet. Also included are areas of Plainfield and Watseka soils and areas of soils that have a thicker black surface layer.

Even if this soil is properly managed, it is not well suited to all crops commonly grown in the county. Intensive management practices, including supplemental irrigation and control of soil blowing, are required for the production of row crops. Capability unit IVs–3; woodland suitability group 3s1.

Chaseburg Series

This series consists of deep, well drained and moderately well drained, gently sloping soils in narrow drainageways, on bottoms of intermittent streams, and on the low sides of steep hills. These soils formed in locally derived, water-deposited, silty material more than 40 inches thick. The silty material was washed down from light-colored silty soils on the uplands. Chaseburg soils continually receive fresh deposits of silt during flooding. They have no horizons other than the original layers that were deposited by floodwater.

In a representative profile the surface layer is dark grayish-brown silt loam about 5 inches thick. The underlying material is dark grayish-brown and dark-brown laminated silt loam alluvium that extends to a depth of 60 inches.

These soils have high fertility. The available water capacity is high, and permeability is moderate. These soils are subject to frequent flooding of short duration, but the seasonal high water table does not rise above a depth of 3 feet. Streambanks are eroded in many places.

If these soils are protected from flooding and subsequent erosion, they are well suited to corn, small grain, grass, and legumes (fig. 2). Areas that are inaccessible or greatly dissected by meandering streams are better suited to permanent pasture, woodland, or wildlife habitat than to most other uses.

Representative profile of Chaseburg silt loam, 2 to 6 percent slopes, 100 feet north of farm lane and 100 feet east of road, NE¼SE¼ sec. 19, T. 7 N., R. 6 E.:

A1—0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; very friable; few roots; neutral; abrupt, smooth boundary.
C1—5 to 22 inches, dark grayish-brown (10YR 4/2) laminated silt loam; friable; few roots; neutral; clear, smooth boundary.
C2—22 to 32 inches, dark grayish-brown (10YR 4/2) and brown (10YR 5/3) laminated silt loam; friable; neutral; clear, smooth boundary.
C3—32 to 48 inches, dark-brown (10YR 4/3) and brown (10YR 5/3) laminated silt loam; friable; neutral; abrupt, smooth boundary.
C4—48 to 60 inches, dark grayish-brown (10YR 4/2) laminated silt loam; friable; neutral.

Differences in the sources of sediment in which these soils formed cause minor variations in color and texture throughout the profile. There are chert fragments less than 2 inches in size in some places. The color of the sediment is related to the original uncoated mineral grains from the A1 and A2 horizons and not to wetness. Reaction ranges from slightly acid to mildly alkaline. Some areas have mottles at a depth of 30 to 50 inches.

Chaseburg soils are near Huntsville, Troxel, and Kickapoo soils. Chaseburg soils are lighter colored than Huntsville soils. They are lighter colored than Troxel soils and lack the buried subsoil of Troxel soils. They are finer textured than Kickapoo soils.

Chaseburg silt loam, 2 to 6 percent slopes (ChB).—This soil is in narrow drainageways on uplands, intermittent stream bottoms, and the lower sides of steep hills. Areas of this soil are 3 to 10 acres in size.

Included with this soil in mapping are a few small areas of a soil that has a layer of recently deposited silty material less than 40 inches thick. In these areas the soil is underlain by a buried, light-colored, silty soil that has a subsoil of silty clay loam. Also included are a few areas of soils that have either a sandier or a slightly thicker surface layer than this Chaseburg soil and areas, especially at the heads of draws, of soils that have stones or cobblestones on the surface or throughout the profile.

This soil is suited to corn, small grain, grasses, and legumes. The hazard of erosion, especially gullying, is moderate. Consequently, careful management is required to control erosion. Management practices are needed to prevent gullying and further damage to the soil from soil material washed onto it from higher lying areas. Capability unit IIe–5; woodland suitability group 2o1.

Colwood Series

This series consists of deep, poorly drained, nearly level soils on low benches in old lake basins. These soils formed under sedge grasses in deep, alternating layers of calcareous lake-laid silt and fine sand. The lower part of these soils is very stratified.

In a representative profile the surface layer is black silt loam about 10 inches thick. The subsoil is about 25 inches thick. The upper part of the subsoil is grayish-brown clay loam about 6 inches thick; the middle part is olive-gray sandy clay loam about 8 inches thick; and the lower part is light brownish-gray loamy very fine sand about 11 inches thick. The underlying material is

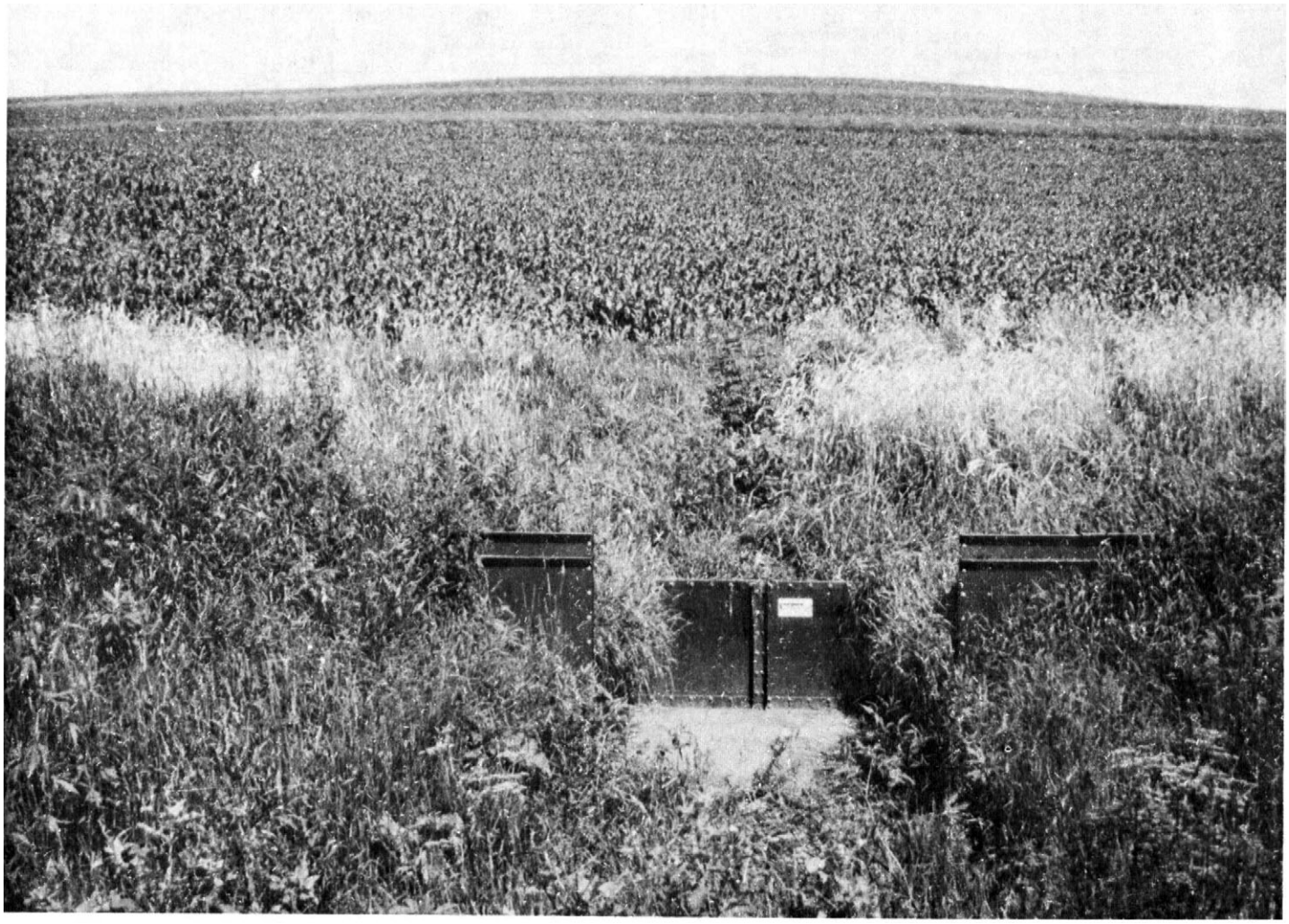

Figure 2.—**Drop spillway in area of Chaseburg silt loam, 2 to 6 percent slopes.**

calcareous and consists of alternate layers of different thickness, of brownish-gray, light yellowish-brown, and gray coarse silt, very fine sand, and fine sand.

These soils have a medium level of fertility. The available water capacity is high, and permeability is moderate. The water table is at a depth of 1 foot or less during a considerable part of the wet season.

Where these soils are drained, they are suited to row crops, small grain, and clover hay. Areas of these soils that are not drained provide good wildlife habitat and limited pasture. All areas of these soils require artificial drainage and protection from flooding in order to obtain maximum production of crops. An open-ditch drainage system is more suitable than most other systems for removing excess water from these soils. It is possible to use tile in some places if the tile is properly blinded.

Representative profile of Colwood silt loam in undisturbed area, NW¼NE¼ sec. 25, T. 6 N., R. 12 E.:

A1—0 to 10 inches, black (N 2/0) silt loam; moderate, fine, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

B21g—10 to 16 inches, grayish-brown (2.5Y 5/2) clay loam; many, medium, prominent, strong-brown (7.5YR 5/8) mottles; weak, very fine, subangular blocky structure; very firm; few roots; neutral; clear, smooth boundary.

B22g—16 to 24 inches, olive-gray (5Y 5/2) sandy clay loam; many, coarse, prominent, strong-brown (7.5YR 5/8) mottles; weak, medium, prismatic structure parting to weak, medium, subangular blocky; very firm; few roots; neutral; clear, smooth boundary.

IIB3g—24 to 35 inches, light brownish-gray (10YR 6/2) loamy very fine sand; coarse, prominent, strong-brown (7.5YR 5/8) mottles; weak, fine, subangular blocky structure; very friable; few roots; moderately alkaline; clear, smooth boundary.

IIC1g—35 to 50 inches, variegated 50 percent light brownish-gray (10YR 6/2) and 50 percent light yellowish-brown (10YR 6/4) very fine sand that has thin lenses of coarse silt; few, medium, prominent, strong-brown (7.5YR 5/8) mottles; single grained; friable; moderately alkaline; slight effervescence; abrupt, smooth boundary.

IIC2g—50 to 60 inches, gray (5Y 5/1) stratified silt that has some thin lenses of very fine sand; strong effervescence; firm; moderately alkaline.

The A horizon ranges from 10 to 16 inches in thickness. The B horizon formed in silty, loamy, and sandy lacustrine sediment. It ranges from loamy sand to clay loam in tex-

ture, light brownish gray (10YR 6/2) to dark gray (2.5Y 4/1) in color, and 14 to 30 inches in thickness. The C horizon is stratified silt and very fine and fine sand.

Colwood soils are near Marshan, Sable, Wacousta, Montgomery, and Del Rey soils. Colwood soils formed entirely in lacustrine material, whereas Marshan soils formed in loam over coarse-textured outwash. They formed in lacustrine silt and sand, whereas Sable soils formed mostly in loessal silt. They have horizons that are more distinct than those of Wacousta soils. Colwood soils are coarser textured than Montgomery soils. They are more poorly drained and coarser textured than Del Rey soils.

Colwood silt loam (Co).—This soil is on low benches in old lake basins. Areas of this soil are irregularly shaped tracts 10 to 250 acres in size. Slopes are 0 to 2 percent.

Included with this soil in mapping are some small areas of Salter soils, wet variant, and Wacousta and Sable soils. Also included are small areas of soils that have a surface layer of fine sandy loam.

Where adequately drained this soil can be used for row crops and forage. Maintaining tilth and keeping fertility are other helpful management practices. Capability unit IIw–1; woodland suitability group 1w5.

Cut and Fill Land

Cut and fill land (Cu) consists of fill areas and cut or borrow areas. This land type is mainly in or near cities, towns, and areas used for housing developments or related purposes.

In cut or borrow areas, the surface layer and subsoil have been removed by man and the underlying material is exposed. These areas differ from gravel pits in that the sides of the banks have been graded and landscaped so that they join smoothly with adjacent, less disturbed areas that are accessible and are suitable for building sites or roads.

The fill areas consist of a layer of material about 1 to 5 feet thick. This layer has been deposited over a mineral soil that is generally somewhat poorly drained to very poorly drained. In some places the fill material has been deposited over a well-drained mineral soil, and in others it is over an organic soil.

The material that makes up this land type is mainly loam. In cut areas, where the original soil has been removed, the material is generally sandy loam glacial till that has pockets of loamy or silty material. In fill areas the material is more variable in texture and contains debris such as rocks, bricks, and fragments of paving material, as well as some loamy or gravelly material.

The surface of this land type generally is compacted. Much of the water from rainfall runs off, and the soil material is not suitable for plants. The hazards and limitations for engineering uses are so variable that they can be determined only by onsite investigation. Capability unit VIIs–6; woodland suitability group 4f2.

Dells Series

The Dells series consists of somewhat poorly drained, nearly level soils on benches in stream valleys. These soils formed in about 2 to 3 feet of loessal silt over acid sand outwash under mixed hardwood forest and prairie grass.

In a representative profile the surface layer is very dark grayish-brown silt loam about 7 inches thick. The subsoil is about 22 inches thick. The upper part of the subsoil is mottled, brown silty clay loam, the middle part is mottled, light brownish-gray and gray silty clay loam, and the lower part is gray loam that has common dark-brown mottles. The underlying material is loose, yellowish-brown loamy sand and pale-brown sand that has a few faint mottles.

These soils have a medium level of fertility. The available water capacity is medium, and permeability is moderate in the upper part and rapid in the underlying sand. The seasonal high water table is at a depth of 1 to 3 feet during the wet season.

If adequately drained these soils are suited to all crops commonly grown in the county. All areas of these soils are suited to woodland and wildlife habitat. In some places flooding may occur during periods of prolonged rainfall, and water may stand in depressional areas long enough to reduce crop yields. These soils are not suited to tile drains, but an open-ditch drainage system provides adequate drainage where there are suitable outlets.

Representative profile of Dells silt loam, 0 to 3 percent slopes, in cultivated field, 60 feet north of road and 300 feet east of section line, SW¼SW¼SW¼ sec. 23, T. 5 N., R. 7 E.:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, fine, granular structure; very friable; slightly acid; abrupt, smooth boundary.

B21t—7 to 12 inches, brown (10YR 4/3) light silty clay loam; few, fine, faint mottles; weak, very fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; strongly acid; abrupt, smooth boundary.

B22t—12 to 17 inches, brown (10YR 4/3) silty clay loam; common, fine, prominent, yellowish-brown (10YR 5/6) and dark-gray (10YR 4/1) mottles; weak, very fine, subangular blocky structure; firm; thin, discontinuous, dark grayish-brown (10YR 4/2) clay films; strongly acid; clear, wavy boundary.

B23t—17 to 22 inches, light brownish-gray (10YR 6/2) light silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; firm; thin, discontinuous, dark grayish-brown (10YR 4/2) clay films; strongly acid; clear, wavy boundary.

B31t—22 to 26 inches, gray (10YR 6/1) light silty clay loam; common, medium, prominent, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; firm; a few, thin, patchy clay films; very strongly acid; clear, wavy boundary.

IIB32t—26 to 29 inches, gray (10YR 6/1) loam; common, medium, prominent, dark-brown (7.5YR 4/4) mottles; weak, fine, subangular blocky structure; very firm; a few, thin, patchy clay films; very strongly acid; clear, wavy boundary.

IIC1—29 to 37 inches, yellowish-brown (10YR 5/4) loamy sand; few, medium, faint, dark-brown (7.5YR 4/4) mottles; single grained; loose; strongly acid; clear, wavy boundary.

IIC2—37 to 60 inches, very pale-brown (10YR 7/3) sand; few, fine, faint mottles; single grained; loose; slightly acid.

The solum ranges from 26 to 40 inches in thickness. The mantle of loess ranges from 20 to 36 inches in thickness. The depth to and the color of high- and low-chroma mottles and base colors differ slightly from place to place. The Ap horizon is 6 to 10 inches thick and black to very dark grayish brown in color. The IIB horizon is loam or sandy loam. The reaction of the C horizon ranges from strongly acid to slightly acid.

Dells soils are near Marshan, Granby, Seaton, Port

Byron, and Meridian soils. They are better drained than Marshan soils and are both finer textured and better drained than Granby soils. They are wetter and have a thinner mantle of silt than Seaton and Port Byron soils. They are wetter than Meridian soils and have a mantle of silt that Meridian soils lack.

Dells silt loam, 0 to 3 percent slopes (DeA).—This soil is on benches. Areas of this soil are elongated tracts 10 to 35 acres in size. Slopes are slightly convex or plane.

Included with this soil in mapping are areas of soils that are 40 to 50 inches deep over the loose outwash. Also included are some small areas of soils that have a mantle of silt 36 to 50 inches thick and areas of soils that are better drained than this Dells soil.

If adequately drained, this soil is suited to row crops, small grain, and hay. All areas of this soil are suited to woodland and wildlife habitat. The major concerns of management are the removal of excess water, improvement of fertility, and maintenance of the high organic-matter content. Capability unit IIw–5; woodland suitability group 3o1.

Del Rey Series

The Del Rey series consists of deep, somewhat poorly drained, nearly level soils on moderately low benches in old lake basins. These soils formed in lake-laid silt and clay more than 5 feet thick under mixed hardwoods.

In a representative profile the surface layer is very dark gray, granular silt about 7 inches thick. The subsoil is silt loam and clay about 37 inches thick. The upper part of the subsoil is grayish brown, and the lower part is light brownish gray, yellowish brown, and pale brown and has many light brownish-gray mottles. The very firm and calcareous underlying material is pinkish-gray, laminated silt loam and clay lacustrine sediment.

These soils have medium fertility. The available water capacity is high, and permeability is slow. The water table fluctuates between depths of 1 and 3 feet in spring.

If drained, these soils are suited to all crops commonly grown in the county. All areas of these soils are suited to woodland and wildlife habitat. Both tile and surface drainage systems can be used. The maintenance of good tilth and the improvement of fertility are especially helpful management practices.

Representative profile of Del Rey silt loam, 0 to 3 percent slopes, in cultivated area, 300 feet east of farm buildings, SE¼SE¼ sec. 36, T. 6 N., R. 12 E.:

Ap—0 to 7 inches, very dark gray (10YR 3/1) silt loam; light brownish gray (2.5Y 6/2) dry; moderate, medium, granular structure; friable; many roots; neutral; abrupt, smooth boundary.

B1—7 to 9 inches, pale-brown (10YR 6/3) silt loam; common, medium, distinct, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/8) mottles; moderate, fine, subangular blocky structure; friable; many roots; neutral; clear, smooth boundary.

B21t—9 to 13 inches, grayish-brown (10YR 5/2) clay; common, medium, distinct, yellowish-brown (10YR 5/8) and light brownish-gray (10YR 6/2) mottles; moderate, fine, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown (10YR 3/3) clay films; slightly acid; clear, smooth boundary.

B22t—13 to 21 inches, grayish-brown (10YR 5/2) clay; common, fine, distinct, strong-brown (7.5YR 5/8) and brown (7.5YR 4/2) mottles; moderate, fine, angular blocky structure; firm; few roots; thin, discontinuous, dark-brown (10YR 3/3) clay films; neutral; abrupt, smooth boundary.

IIB31—21 to 31 inches, variegated 50 percent light brownish-gray (10YR 6/2) and 50 percent yellowish-brown (10YR 5/4) silt loam; moderate, very fine, subangular blocky structure; firm; few roots; thin, discontinuous, pale-brown (10YR 6/3) films; moderately alkaline; slight effervescence; clear, smooth boundary.

IIB32—31 to 44 inches, pale-brown (10YR 6/3) silt loam; common, medium, distinct, grayish-brown (10YR 5/2) and yellowish-brown (10YR 5/4) mottles; weak, very fine, subangular blocky structure; firm; few roots; moderately alkaline; strong effervescence; clear, smooth boundary.

IIC—44 to 60 inches, variegated 70 percent pinkish-gray (7.5YR 7/2) to light-brown (7.5YR 6/3) and 30 percent white (10YR 8/2) silt loam laminated with some thin layers of clay; very firm; strong effervescence; moderately alkaline.

The solum ranges from 20 to 48 inches in thickness. The Ap horizon ranges from very dark grayish brown (10YR 3/2) to black (10YR 2/1). In some places there is a platy A2 horizon that is light brownish gray and grayish brown to dark grayish brown and is 2 to 6 inches thick. The B horizon is 20 to 40 inches thick and is silt loam to clay in the upper part and silt loam to silty clay in the lower part. The C horizon is laminated silt and clay and has some thin layers of fine sand.

Del Rey soils are near Grays, Montgomery, and Colwood soils. Del Rey soils are more poorly drained than Grays soils. They are better drained than Montgomery soils. Del Rey soils are better drained and finer textured than Colwood soils.

Del Rey silt loam, 0 to 3 percent slopes (DfA).—This soil is on low benches. Areas of this soil are irregularly shaped tracts 20 to 145 acres in size. Slopes are gently undulating. Some areas pond after a heavy rain.

Included with this soil in mapping are areas of better drained Grays soils and more poorly drained Montgomery soils. Also included are areas of soils that have a loamy overburden 2 to 16 inches thick.

If drained, this soil is suited to all crops commonly grown in the county. In undrained areas wetness hampers tillage operations and severely decreases the hardiness of alfalfa in winter. Drainage can be improved by intercepting and diverting runoff from higher lying slopes. The installation of tile and open-ditch drainage systems provides surface and subsurface drainage. The timeliness of tillage is extremely important on this soil, because the clayey subsoil reduces percolation and drying is slowed. If the tilth of the surface layer is destroyed, drying is even slower. Capability unit IIw–2; woodland suitability group 3o1.

Derinda Series

The Derinda series consists of moderately deep, well drained and moderately well drained, gently sloping to moderately steep soils on broad shale ridges on uplands. These soils formed in thin, windblown silt and clayey residuum from shale bedrock under a mixed hardwood forest. They are 20 to 40 inches thick over bedrock.

In a representative profile the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsurface layer is brown silt loam about 3 inches thick.

The brown, yellowish-brown, and light olive-brown subsoil is 24 inches thick. The upper part of the subsoil is silt loam or silty clay loam, and the lower part is silty clay and clay. The massive and calcareous underlying material is brownish-yellow shale bedrock.

These soils have medium fertility. The available water capacity is low or medium, and permeability is slow. Reaction is medium acid or neutral. The zone of saturation is at a depth of more than 3 feet and commonly is at a depth of more than 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat. If these soils are cultivated, conservation practices help to control erosion and reduce runoff.

Representative profile of Derinda silt loam, 2 to 6 percent slopes, eroded, in cultivated area, at edge of woods and field 100 feet east of road, NW¼SW¼SW¼ sec. 5, T. 6 N., R. 6 E.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, very fine, granular structure; very friable; common roots; neutral; abrupt, smooth boundary.

A2—7 to 10 inches, brown (10YR 5/3) silt loam; moderate, medium, platy structure; friable; few roots; neutral; abrupt, smooth boundary.

B1—10 to 13 inches, brown (10YR 4/3) silt loam; moderate, very fine, subangular blocky structure; firm; few roots; neutral; clear, smooth boundary.

B21t—13 to 17 inches, brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm; few roots; patchy bleached silt coats; thin, discontinuous, dark yellowish-brown (10YR 4/4) clay films; medium acid; clear, smooth boundary.

B22t—17 to 21 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; firm; few roots; patchy bleached silt coats; patchy, dark yellowish-brown (10YR 4/4) clay films on all faces of peds; medium acid; clear, smooth boundary.

IIB23t—21 to 27 inches, yellowish-brown (10YR 5/4) silty clay; weak, medium, angular blocky structure; very firm; few roots; patchy, dark-brown (10YR 3/3) clay films on all faces of peds; neutral; clear, smooth boundary.

IIB3—27 to 34 inches, light olive-brown (2.5Y 5/4) clay; weak, coarse, subangular blocky structure; extremely firm; few, patchy, dark yellowish-brown (10YR 4/4) clay films on vertical faces only; moderately alkaline; strong effervescence.

IIR—34 to 60 inches, olive-yellow (2.5Y 6/6) platy shale bedrock.

The silt mantle ranges from 15 to 30 inches in thickness. The solum is 20 to 40 inches thick. The Ap horizon is 6 to 9 inches thick and is brown (10YR 4/3) to very dark grayish brown (10YR 3/2). It is light brownish gray when dry. The upper part of the B horizon is silt loam or silty clay loam and is dark yellowish brown (10YR 4/4) to dark brown (10YR 4/3). The lower part of the B horizon is heavy silty clay loam, silty clay, or clay and is yellowish brown (10YR 5/4) to light olive brown (2.5Y 5/4). Mottling is common in the lower part of the B horizon. The IIB horizon is 10 to 22 inches thick. Olive-yellow (2.5Y 6/6) clay shale bedrock is at a depth of 20 to 40 inches. It ranges from soft to hard. Some mottling commonly is evident at a depth of 30 to 40 inches.

Derinda soils are similar to Del Rey, NewGlarus, and Basco soils. They are better drained than Del Rey soils. Derinda soils are underlain by shale bedrock, whereas NewGlarus soils are underlain by dolomite and Basco soils are underlain by interlayered sandstone and shale bedrock.

Derinda silt loam, 2 to 6 percent slopes, eroded (DgB2).—This soil is on the tops of broad ridges on the unglaciated uplands. Areas of this soil are 25 to 285 acres in size. These areas are characterized by seeps and springs in some draws. Slopes are slightly convex. Segments are 100 to 250 feet long. This soil has the profile described as representative for the series.

Included with this soil in mapping are some areas of a soil on the tops of ridges that has a silt mantle more than 36 inches thick, some small areas of soils adjacent to Brigham Park that have a black or very dark grayish-brown surface layer, and small areas of soils in draws and on lower side slopes that are somewhat poorly drained and poorly drained and dry very slowly after a heavy rain.

This soil is well suited to row crops, small grain, and hay because of the slope and moderate hazard of erosion. Because the surface layer is thin and the subsoil is clayey, control of erosion is necessary. Permeability can be maintained or improved to reduce the amount of runoff. Improvement of tilth and organic-matter content of the surface layer also helps to reduce runoff. Capability unit IIe–6; woodland suitability group 2o1.

Derinda silt loam, 6 to 12 percent slopes, eroded (DgC2).—This soil is on middle side slopes on unglaciated uplands. Areas of this soil are 20 to 170 acres in size. Slopes are convex. Segments commonly are 100 to 200 feet long. These areas are characterized by a few small drainageways, some of which have seeps and springs in them. This soil receives runoff from higher lying slopes.

This soil has a profile similar to the one described as representative for the series, but it has a dark grayish-brown or dark-brown plow layer. It is 24 to 28 inches deep over calcareous clay shale bedrock. The surface layer of this soil is less friable and is lower in organic-matter content and fertility than the surface layer of the soil that has the representative profile.

Included with this soil in mapping are some areas of soils that have greater slope than this Derinda soil. Also included are small areas of soils that are less than 20 inches thick over bedrock and small areas of soils that have a severely eroded surface layer, have very poor tilth, and are difficult to cultivate.

If this soil is protected from erosion, it is suited to row crops, small grain, and hay. The hazard of erosion is severe because this soil receives runoff from higher lying soils and has slow permeability. A high level of management is necessary in order to obtain maximum crop production. Capability unit IIIe–6; woodland suitability group 2o1.

Dickinson Series

The Dickinson series consists of somewhat excessively drained, nearly level to sloping soils on high benches on outwash plains. These soils are moderately deep to sand. They formed in loamy outwash and sand and gravel outwash under prairie grass. Most areas of these soils are gently undulating and have only a few well-defined drainageways.

In a representative profile the surface layer is fine sandy loam about 13 inches thick. The upper 8 inches is very dark brown, and the lower 5 inches is very dark grayish brown. The subsoil is about 32 inches thick. The upper part of the subsoil is dark-brown

sandy loam 18 inches thick, and the lower part is brown loamy sand 14 inches thick. The underlying material is single-grained, light yellowish-brown sand outwash.

These soils have medium fertility. The available water capacity is low, and permeability is moderately rapid in the subsoil. The seasonal high water table is at a depth of more than 5 feet.

These soils are suited to all crops commonly grown in the county except row crops. Because these soils have gentle slopes, high organic-matter content, moderately rapid permeability, and good stability under wheel loads and are slightly to medium acid, they are suited to irrigation. If these soils are irrigated, they are suited to all the crops commonly grown in the county as well as to specialty crops such as cucumbers, beans, potatoes, green peppers, and tomatoes. They are also suited to pasture, meadow, woodland, and wildlife habitat.

Representative profile of Dickinson sandy loam, 0 to 2 percent slopes, in cultivated area, SW¼NE¼ sec. 10, T. 8. N., R. 6 E.:

Ap—0 to 8 inches, very dark brown (10YR 2/2) sandy loam; moderate, fine, granular structure; very friable; common roots; slightly acid; abrupt, smooth boundary.

A3—8 to 13 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; friable; few roots; medium acid; clear, wavy boundary.

B11—13 to 19 inches, dark-brown (10YR 3/3) fine sandy loam; weak, very fine, subangular blocky structure; friable; medium acid; clear, wavy boundary.

B12—19 to 23 inches, dark yellowish-brown (10YR 3/3) fine sandy loam; moderate, very fine, subangular blocky structure; friable; medium acid; abrupt, wavy boundary.

B2t—23 to 31 inches, dark-brown (7.5YR 4/4) heavy sandy loam; moderate, very fine, subangular blocky structure; firm; patchy, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, wavy boundary.

IIB3—31 to 45 inches, brown (7.5YR 5/4) loamy sand; weak, medium, subangular blocky structure; very friable; slightly acid; clear, wavy boundary.

IIC—45 to 60 inches, light yellowish-brown (10YR 6/4) sand and gravel outwash; single grained; loose; mildly alkaline.

The solum ranges from 24 to 50 inches in thickness. Where cultivated or eroded, the A horizon is very dark grayish brown. The C horizon is strong brown (7.5YR 5/6) to light yellowish brown (10YR 6/4) in color and from strongly acid to mildly alkaline in reaction. The C horizon is calcareous in places.

The Dickinson series in this county has more gravel in the C horizon than is defined for the series, but this difference does not affect the use and management of the soil.

Dickinson soils are near Dickinson soils, sandy variant, and Plainfield soils. Dickinson soils have slightly more clay in the B horizon and have a slightly thicker and darker colored A horizon than the Dickinson soils, sandy variant. Dickinson soils have a thick, dark A horizon and a well-developed B horizon, which Plainfield soils lack.

Dickinson sandy loam, 0 to 2 percent slopes (DkA).—This soil is on high benches. Areas of this soil are irregularly shaped tracts 5 to 70 acres in size. This soil has the profile described as representative for the series.

Included with this soil in mapping are areas of a moderately well drained soil on which water ponds. Also included are some small areas of coarser textured Dickinson soils, sandy variant. Some areas of Dickinson soils are 40 to 50 inches deep to loose, coarse sand that is neutral in reaction, and some of these soils in areas north of Belleville have a surface layer that is 6 to 10 inches thick.

This soil is well suited to supplemental irrigation. It is limited by a severe hazard of drought and a moderate hazard of soil blowing (fig. 3).

If this soil is used under dryland management the conservation of moisture is an especially important management practice. Capability unit IIIs–4; woodland suitability group 3o1.

Dickinson sandy loam, 2 to 6 percent slopes (DkB).—This soil is on high benches. Areas of this soil are irregularly shaped tracts 50 to 320 acres in size. These areas have only a few well-defined drainageways. Slopes are gently undulating.

This soil has a profile similar to the one described as representative for the series, but it is slightly coarser textured.

Included with this soil in mapping are areas of soils that have a surface layer of loamy sand and that are more droughty than this soil. Also included are areas of soils that are 48 inches deep to coarse sand outwash and areas of soils, in some areas north of Belleville, that have a surface layer 6 to 10 inches thick.

This soil is suited to small grain, hay, pasture, woodland, and wildlife habitat. Some row crops can be grown in the cropping system if the soil is carefully managed. The limitations of this soil are low available water capacity, medium fertility, and a severe hazard of soil blowing. The major concerns of management are conservation of moisture, control of erosion, prevention of soil blowing, improvement of the level of fertility, and maintenance of organic-matter content. Supplemental irrigation is beneficial. Capability unit IIIs–4; woodland suitability group 3o1.

Dickinson sandy loam, 6 to 12 percent slopes (DkC).—This soil is on convex benches. Areas of this soil are elongated tracts 20 to 80 acres in size. Slopes are 100 to 200 feet long.

This soil has a profile similar to the one described as representative for the series, but it is slightly coarser textured throughout and is slightly thinner over sand. Where this soil is cultivated, the surface layer is dark brown and in some areas the dark yellowish-brown subsoil is visible.

Included with this soil in mapping are small areas of Dickinson soils, sandy variant, and Port Byron soils. Also included are a few small areas of soils that have slopes of 12 to 20 percent.

If this soil is properly managed, it is suited to small grain, hay, pasture, woodland, and wildlife habitat. The limitations of this soil are the low available water capacity and severe hazards of water erosion and soil blowing. The major concerns of management are the conservation of moisture, control of erosion, and improvement of tilth, fertility, and organic-matter content. Capability unit IIIe–7; woodland suitability group 3o1.

Dickinson Series, Sandy Variant

The Dickinson series, sandy variant, consists of deep, somewhat excessively drained, nearly level and gently sloping soils that are mostly on high benches of out-

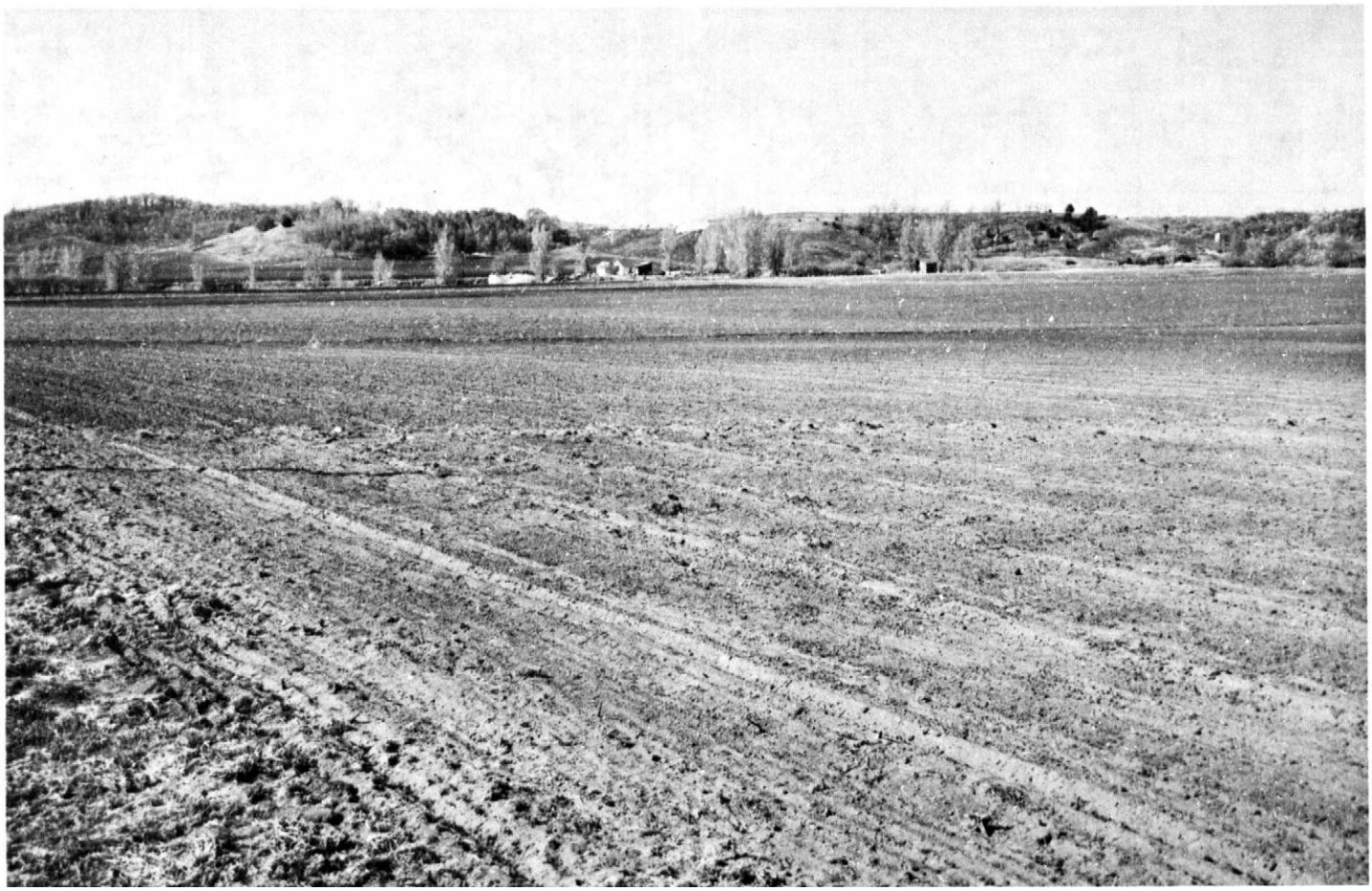

Figure 3.—**Large area of Dickinson sandy loam, 0 to 2 percent slopes. This soil is subject to soil blowing if improperly managed.**

wash plains in stream valleys. These soils formed in sandy outwash and calcareous sand and gravel under grass.

In a representative profile the surface layer is loamy fine sand about 28 inches thick. The upper 14 inches is very dark brown and very dark grayish brown, and the lower 14 inches is dark yellowish brown. The subsoil is brown, very friable gravelly loamy sand about 12 inches thick. The underlying material is light yellowish-brown sand and gravel.

These soils have low fertility. The available water capacity is low. Permeability is rapid in the subsoil and very rapid in the substratum. The seasonal high water table is at a depth of more than 5 feet.

If these soils are irrigated, special crops such as green peppers, snap beans, cucumbers, and tomatoes can be grown. These soils are suited to some of the crops commonly grown in the county. They are better suited to pasture, timber, and wildlife habitat than to most other uses. The major concerns of management are the control of soil blowing and the conservation of moisture.

Representative profile of Dickinson loamy fine sand, sandy variant, 1 to 4 percent slopes, in cultivated area, halfway between farmhouse and intersection of town road, NE¼SE¼ sec. 18, T. 8 N., R. 6 E.:

Ap—0 to 10 inches, very dark brown (10YR 2/2) loamy fine sand; weak, fine, crumb structure; very friable; common roots; mildly alkaline; abrupt, smooth boundary.

A12—10 to 14 inches, very dark grayish-brown (10YR 3/2) loamy fine sand; weak, fine, subangular blocky structure; very friable; common roots; mildly alkaline; clear, wavy boundary.

A3—14 to 28 inches, dark yellowish-brown (10YR 3/4) loamy fine sand; weak, coarse, subangular blocky structure; very friable; common roots; moderately alkaline; clear, wavy boundary.

IIB—28 to 40 inches, brown (7.5YR 4/4) gravelly loamy sand; weak, coarse, subangular blocky structure; very friable; mildly alkaline; gradual, wavy boundary.

IIC—40 to 60 inches, light yellowish-brown (10YR 6/4) sand and some gravel; single grained; loose; moderately alkaline; slight effervescence.

The part of the A horizon that is more than 1 percent organic matter ranges from 10 to 24 inches in thickness. The reaction of the loamy fine sand A horizon ranges from strongly acid to moderately alkaline, and the coarser sand and gravel B and C horizons are mildly alkaline or moderately alkaline. The thickness of the solum ranges from 24 to 48 inches.

Dickinson soils, sandy variant, are near Dickinson and Plainfield soils. Dickinson soils, sandy variant, are coarser textured than Dickinson soils. They have a finer textured B horizon and a thicker, darker-colored A horizon than Plainfield soils.

Dickinson loamy fine sand, sandy variant, 1 to 4

percent slopes (DmA).—This soil is on outwash benches. Areas of this soil are irregularly shaped tracts 25 to 200 acres in size.

Included with this soil in mapping are a few small areas of soils that have calcareous sand and gravel at a depth of 30 to 40 inches. Also included are some areas of Plainfield soils.

If this soil is intensively managed, including use of irrigation and control of soil blowing, row crops can be grown safely. Capability unit IVs–3; woodland suitability group 3o1.

Dodge Series

The Dodge series consists of deep, well-drained, gently sloping and sloping soils on glaciated uplands. These soils formed under mixed hardwoods in 26 to 36 inches of loess over sandy loam glacial till.

In a representative profile the surface layer is dark grayish-brown silt loam about 6 inches thick. The subsurface layer is brown silt loam 3 inches thick. The subsoil is 31 inches thick. The upper 20 inches of the subsoil is brown silty clay loam, and the lower 11 inches is brown, firm clay loam and sandy clay loam. The underlying material is calcareous, yellowish-brown sandy loam till.

These soils have high fertility. The available water capacity is high, and permeability is moderate. The seasonal high water table is at a depth of more than 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat. If these soils are used for crops, the control of erosion and maintenance of tilth and organic-matter content are useful conservation practices.

Representative profile of Dodge silt loam, 2 to 6 percent slopes, in road cut on east side of road, in the southwest corner of SE¼NW¼ sec. 5, T. 9 N., R. 12 E.:

A1—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; very friable; many roots; neutral; abrupt, smooth boundary.

A2—6 to 9 inches, brown (10YR 5/3) silt loam; moderate, medium, platy structure; very friable; many roots; neutral; clear, smooth boundary.

B1t—9 to 14 inches, brown (10YR 4/3) light silty clay loam; moderate, fine, subangular blocky structure; firm; thin, patchy clay films on all faces of peds; medium acid; clear, smooth boundary.

B21t—14 to 22 inches, brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; strongly acid; clear, wavy boundary.

B22t—22 to 29 inches, brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; as much as 5 percent coarse fragments; strongly acid; clear, wavy boundary.

IIB23t—29 to 32 inches, brown (10YR 4/3) clay loam; weak, fine, subangular blocky structure; very firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; as much as 10 percent coarse fragments; medium acid; abrupt, wavy boundary.

IIB3t—32 to 40 inches, brown (7.5YR 4/4) light sandy clay loam; weak, coarse, subangular blocky structure; very firm; patchy clay films on vertical faces of peds; slightly acid; as much as 10 percent coarse fragments; clear, smooth boundary.

IIC—40 to 60 inches, yellowish-brown (10YR 5/4) sandy loam; weak, thick, platy structure; friable; as much as 20 percent coarse fragments; strong effervescence; moderately alkaline.

The thickness of the silt mantle ranges from 26 to 36 inches. In cultivated areas the Ap horizon is dark grayish brown to brown. In some areas, as a result of cultivation, the original A2 horizon is completely incorporated into the Ap horizon. The B horizon is 20 to 34 inches thick. The depth to calcareous till ranges from 30 to 42 inches.

These soils differ from the normal Dodge soils in that the underlying calcareous till is heavy sandy loam or sandy loam. The calcium carbonate equivalent of the till is 15 to 32 percent.

Dodge soils are near Kidder, McHenry, St. Charles, and Virgil soils. Dodge soils are similar to Ringwood and Pecatonica soils. They have a lighter colored, thinner A horizon than Ringwood soils. They have a thinner silt mantle than St. Charles soils, which formed almost entirely in silt. They have a solum that is not so deep as that of Pecatonica soils. They have a thinner silt mantle, a lighter colored A horizon, and better drainage than Virgil soils. They have a thicker silt mantle than Kidder and McHenry soils.

Dodge silt loam, 2 to 6 percent slopes (DnB).—This soil is on the tops of ridges and on upper side slopes. Areas of this soil are elongated tracts 45 to 200 acres in size. Slopes are 150 to 250 feet long.

This soil has the profile described as representative for the series. In cultivated areas the surface layer is slightly thicker and is mostly dark grayish brown, but in a few areas it is very dark grayish brown. The tilth is poorer and the organic-matter content is lower in eroded areas than in uneroded areas.

Included with this soil in mapping are small areas of a St. Charles silt loam. Also included are areas of a soil that is moderately well drained.

If properly managed, this soil is well suited to all crops commonly grown in the county. The only limitation of this soil is the moderate hazard of erosion. The major concerns of management are the improvement of organic-matter content, tilth, and fertility and the control of erosion. Capability unit IIe–1; woodland suitability group 2o1.

Dodge silt loam, 6 to 12 percent slopes, eroded (DnC2).—This soil has nearly uniformly shaped, slightly convex slopes. Areas of this soil are ribbonlike tracts 20 to 170 acres in size. These areas are characterized by a few narrow downslope drainageways. Slopes are 100 to 150 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to sandy loam glacial till. In cultivated areas the surface layer is dark grayish brown, or lighter colored than the surface layer of the soil that has the representative profile, and 6 to 8 inches thick, or is thicker than the surface layer of the soil that has the representative profile. In a few places the surface layer is very dark grayish brown or dark brown.

Included with this soil in mapping are small areas of McHenry soils and a few small areas of Kidder soils.

If properly managed, this soil is suited to all the crops commonly grown in the county. The only limitation of this soil is a severe hazard of erosion. The major concerns of management are control of erosion and improvement of the organic-matter content, tilth of the surface layer, and fertility. Capability unit IIIe–1; woodland suitability group 2o1.

Dodge and Kidder soils, 6 to 20 percent slopes, eroded (DoC2).—The soils in this undifferentiated group are on knobs and in swales on terminal and recessional moraines. Generally, Kidder soils are on the knobs and upper side slopes and Dodge soils are on the middle and lower side slopes. The relative proportions of these soils in mapped areas vary. Slopes are complex. Drainage is closed.

Included with these soils in mapping are small areas of soils on knobs; these areas are less than 20 inches deep to underlying sandy loam glacial till. Also included are swales that commonly pond water for short periods. There are also areas of Virgil and Otter soils and areas of soils that have a surface layer of sandy loam to silt loam.

The hazard of erosion is very severe because the soils are not uniform in texture and because of slope. If these soils are cultivated, special care is needed to control erosion and to maintain tilth and fertility. Capability unit IVe–1; woodland suitability group 2o1.

Dodgeville Series

The Dodgeville series consists of moderately deep, well-drained, gently sloping to moderately steep soils on the tops of ridges and on upper side slopes on uplands. These soils formed in moderately thin loess and thin clayey residuum from dolomite bedrock. Fractured dolomite bedrock is at a depth of 2 to 3½ feet. The native vegetation is prairie grass.

In a representative profile the surface layer is very dark brown and very dark grayish-brown silt loam about 12 inches thick. The subsoil is about 19 inches thick. The upper 9 inches of the subsoil is dark yellowish-brown and dark-brown, firm silty clay loam, and the lower 10 inches is reddish-brown, extremely firm clay. The underlying bedrock is fractured dolomite, the cracks of which are filled with material from the subsoil.

These soils have medium fertility. The available water capacity is low and medium, and permeability is moderate. The water table is at a depth of more than 5 feet.

These soils are suited to most of the crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are also suited to pasture and wildlife habitat. If these soils are used for crops, conservation practices help to control erosion and conserve moisture.

Representative profile of Dodgeville silt loam, 6 to 12 percent slopes, in cultivated area, 275 feet east of the farm entrance, 150 feet south of the road, SE¼SE¼ sec. 21, T. 5 N., R. 7 E.:

Ap—0 to 8 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, subangular blocky structure; very friable; common roots; neutral; clear, smooth boundary.

A12—8 to 12 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, very fine, subangular blocky structure; very friable; common roots; neutral; clear, smooth boundary.

B21t—12 to 16 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; friable; few roots; thin, discontinuous, dark yellowish-brown (10YR 3/4) clay films; slightly acid; clear, smooth boundary.

B22t—16 to 21 inches, dark-brown (10YR 4/3) heavy silty clay loam; moderate, fine, subangular blocky structure; firm; few roots; thin, discontinuous, dark yellowish-brown (10YR 3/4) clay films; slightly acid; clear, smooth boundary.

IIB23t—21 to 31 inches, reddish-brown (5YR 4/4) clay; moderate, medium, angular blocky structure; extremely firm; few roots; thick, patchy, dark reddish-brown (5YR 3/2) clay films on all faces of peds; slightly acid; abrupt, wavy boundary.

IIR—31 to 60 inches, dolomite bedrock, fractured and creviced.

The thickness of the solum ranges from 24 to 40 inches. In cultivated areas the Ap horizon is 7 to 10 inches thick and black (10YR 2/1) to dark brown (10YR 3/3). The depth to clayey residuum ranges from 15 to 30 inches. The residuum is silty clay, sandy clay, or clay that has a hue of 7.5YR, 5YR, or 2.5YR and a value and chroma of 3 to 5. It is 10 to 20 inches thick. Where the dolomite is sandy, the weathered material is thicker than where the dolomite is strongly cemented.

Dodgeville soils are near Ashdale, Edmund, Gale, NewGlarus, and Huntsville soils. Dodgeville soils have a thicker and darker colored A horizon than NewGlarus soils. They have a dark-colored A horizon and are underlain by dolomite, whereas Gale soils have a light-colored A horizon and are underlain by sandstone. They are deeper to dolomite bedrock than Edmund soils, but they are shallower to bedrock than Ashdale soils. Dodgeville soils have a thinner A horizon than Huntsville soils.

Dodgeville silt loam, 2 to 6 percent slopes (DpB).—This soil is on the tops of broad ridges and on upper side slopes on uplands. Areas of this soil are elongated tracts 25 to 165 acres in size. Slopes are smooth and convex. They are 150 to 200 feet long.

The profile of this soil is similar to the one described as representative for the series, but it is thicker over dolomite.

Included with this soil in mapping are small areas of Ashdale soils and some small areas of soils that have slopes of 6 to 8 percent. Also included are some areas of soils that have a severely eroded plow layer. In some areas near Mt. Horeb, the soils are underlain by very sandy dolomite.

If properly managed, this soil is suited to all crops commonly grown in the county. Conservation practices are necessary because of the gently sloping topography, a moderate hazard of erosion, and a reduced infiltration rate. It is important that a maximum amount of water be stored in the soil every time it rains, because the available water capacity of this soil is only medium. Capability unit IIe–2; not placed in a woodland suitability group.

Dodgeville silt loam, 6 to 12 percent slopes (DpC).—This soil is on middle side slopes. Areas of this soil are ribbonlike tracts 50 to 125 acres in size. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. They are 100 to 175 feet long. This soil has the profile described as representative for the series.

Included with this soil in mapping are many areas of eroded soils that have a very dark grayish-brown surface layer. Also included are areas of soils that are severely eroded and have poor tilth; areas of Edmund soils; some areas of soils that have less than 10 inches of clayey residuum; and some areas of soils near Mt. Horeb that are underlain by very sandy dolomite.

If properly managed, this soil is suited to row crops, small grain, hay, pasture, and widlife habitat. The major limitations of this soil are slope and low or medium available water capacity. It is important to

conserve moisture and control erosion, because the available water capacity is medium or low, the hazard of erosion is severe, and the depth to bedrock is moderate. Capability unit IIIe–2; not placed in a woodland suitability group.

Dodgeville silt loam, 12 to 20 percent slopes, eroded (DpD2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 50 to 125 acres in size. These areas are characterized by small drainageways. Some topsoil material has accumulated at the base of the slope. Slopes are 50 to 100 feet long.

This soil has a profile similar to the one described as representative for the series, but it is 24 to 28 inches deep to dolomite and the surface layer is very dark grayish brown.

Included with this soil in mapping are some areas of soil that have less than 10 inches of clayey residuum and some small areas of Edmund soils. Also included are areas of soil that have a severely eroded plow layer, low organic-matter content, and poor tilth. Some small areas of Ashdale and Huntsville soils are at the base of slopes and in small drainageways.

This soil is better suited to small grain, forage crops, pasture, and wildlife habitat than to most other uses. The limitations of this soil are a very severe hazard of erosion and limited thickness over bedrock. If this soil is cultivated, control of erosion, conservation of moisture, and maintenance of tilth and organic-matter content are useful conservation practices. Capability unit IVe–2; not placed in a woodland suitability group.

Dresden Series

The Dresden series consists of well-drained, gently sloping to steep soils on benches in stream valleys. These soils are moderately deep to sand and gravel. They formed in loamy outwash and sandy and gravelly calcareous outwash under mixed hardwoods and an understory of prairie grass.

In a representative profile the surface layer is very dark grayish-brown silt loam about 7 inches thick. The subsurface layer is grayish-brown silt loam 4 inches thick. The subsoil is about 25 inches thick. The upper 7 inches is yellowish-brown silt loam and silty clay loam, the middle 7 inches is brown clay loam, and the lower 11 inches is brown sandy clay loam and sandy loam. The underlying material is very pale brown loose sand and gravel.

These soils have medium fertility. The available water capacity is medium, and permeability is moderate in the subsoil and rapid in the substratum. The seasonal high water table commonly is at a depth of more than 5 feet.

Areas of these soils that are gently sloping to moderately steep are suited to all crops commonly grown in the county, but areas that are steep are not suited to row crops or small grain. All areas of these soils are suited to pasture, woodland, and wildlife habitat. The control of erosion and conservation of moisture are the most beneficial conservation practices.

Representative profile of Dresden silt loam, 2 to 6 percent slopes, 200 feet east of road, SE¼SW¼SE¼ sec. 7, T. 6 N., R. 11 E.:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, very fine, granular structure; very friable; neutral; abrupt, smooth boundary.

A2—7 to 11 inches, grayish-brown (10YR 5/2) silt loam; moderate, thin, platy structure; very friable; slightly acid; abrupt, wavy boundary.

B1—11 to 14 inches, yellowish-brown (10YR 5/4) silt loam; moderate, very fine, subangular blocky structure; firm; many bleached silt coats on all faces of peds; strongly acid; clear, wavy boundary.

B21t—14 to 18 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, fine, subangular blocky structure; firm; patchy, dark-brown (10YR 3/3) clay films on all faces of peds; medium acid; clear, wavy boundary.

IIB22t—18 to 25 inches, brown (7.5YR 5/4) clay loam; moderate, fine, subangular blocky structure; firm; patchy, dark-brown (7.5YR 3/2) clay films on all faces of peds; medium acid; clear, wavy boundary.

IIB23t—25 to 31 inches, brown (7.5YR 4/4) sandy clay loam; weak, fine, subangular blocky structure; firm; patchy, dark-brown (7.5YR 3/2) clay films on all faces of peds; medium acid; clear, wavy boundary.

IIB3t—31 to 36 inches, brown (7.5YR 4/4) sandy loam; weak, medium, subangular blocky structure; friable; patchy, dark-brown (7.5YR 3/2) clay films and flows in root channels and pores; slightly acid; abrupt, wavy boundary.

IIC—36 to 60 inches, very pale brown (10YR 7/4) sand and gravel; single grained; loose; mildly alkaline; slight effervescence.

Where the silt mantle is 8 to 20 inches thick, the Ap horizon is silt loam, and where there is no silt mantle, the Ap horizon is loam. The A horizon ranges from black (10YR 2/1) in undisturbed areas to very dark grayish brown (10YR 3/2) in cultivated and eroded areas. The B horizon is loam, sandy clay loam, clay loam, silt loam, and silty clay loam. In a few places the underlying sand and gravel outwash is sandier than is normal for the series and has lower pH, from 7.0 to 8.0. The depth to sand and gravel outwash is 24 to 40 inches.

Dresden soils are near Hayfield, Rodman, Kegonsa, Boyer, and Warsaw soils. They are better drained than Hayfield soils. Dresden soils have a thinner silt mantle than Kegonsa soils, and they have finer textured A and B horizons than Boyer soils. They have a well-developed B2t horizon, which Rodman soils do not have. They have a thinner A horizon than Warsaw soils.

Dresden loam, 12 to 20 percent slopes, eroded (DrD2).—This soil is on lower side slopes on outwash plains and benches. Areas of this soil are elongated tracts 15 to 160 acres in size.

This soil has a profile similar to the one described as representative for the series, but it has a loam surface layer and is shallower to sand and gravel. Where this soil is cultivated, and consequently is eroded, the plow layer is dark brown and is 5 to 7 inches thick. In these areas some material from the subsoil is included in the plow layer, which results in poorer tilth and lower organic-matter content.

Included with this soil in mapping are small areas of a severely eroded soil that has very poor tilth and very low organic-matter content and that is difficult to cultivate. Also included are some small areas of Rodman and Boyer soils and some small areas of soils on knobs and in swales.

This soil is better suited to meadow, pasture, woodland, and wildlife habitat than to most other uses. The limitations of this soil are a medium available water capacity and a very severe hazard of erosion. Management practices that minimize these hazards are useful. Capability unit IVe–2; woodland suitability group 2r2.

Dresden loam, 20 to 30 percent slopes, eroded

(DrE2).—This soil is on lower side slopes on outwash plains and benches. Areas of this soil are elongated tracts 15 to 150 acres in size.

This soil has a profile similar to the one described as representative for the series, but it has a loam surface layer, is 20 to 30 inches deep to loose sand and gravel, and, in eroded areas, has a dark-brown plow layer 5 to 7 inches thick.

Included with this soil in mapping are small areas of Boyer and Rodman soils. Also included are some small areas of Batavia soils at the base of slopes.

This soil is better suited to pasture, woodland, and wildlife habitat than to most other uses. The limitations of this soil are a medium available water capacity and a very severe hazard of erosion. Management practices that minimize these hazards are useful. Capability unit VIe–2; woodland suitability group 2r2.

Dresden silt loam, 2 to 6 percent slopes (DsB).—This soil is on outwash plains and benches. Areas of this soil are elongated tracts 40 to 100 acres in size. Slopes are convex. Segments are 150 to 250 feet long. This soil has the profile described as representative for the series.

Included with this soil in mapping are areas of a soil that is similar to this soil but is eroded, has a dark-brown surface layer 6 to 8 inches thick, and is silt loam and silty clay loam in the upper part of the subsoil. Also included are small areas of soils that have a loam surface layer, a few small areas of Kegonsa soils, and some small areas of soils that have a seasonal high water table at a depth of 3 to 5 feet.

This soil is suited to all crops commonly grown in the county. It is subject to moderate droughtiness because of medium available water capacity. It is subject to moderate erosion because of relief. The conservation of moisture, improvement of the tilth and organic-matter content of the surface layer, and control of erosion are useful management practices. Capability unit IIe–2; woodland suitability group 2o1.

Dresden silt loam, 6 to 12 percent slopes, eroded (DsC2).—This soil is in convex areas on outwash plains and benches in stream valleys. Areas of this soil are irregularly shaped tracts 20 to 180 acres in size. Slopes are convex. They are 75 to 150 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to loose sand and gravel.

Included with this soil in mapping are areas of uneroded soils that have a black to very dark brown surface layer about 7 inches thick. Also included are small areas of severely eroded soils that have very low organic-matter content and slightly lower available water capacity than Dresden soils. There are some small areas of Kegonsa soils.

If this soil is properly managed, it is suited to row crops, small grain, and hay. The major limitations of this soil are medium available water capacity and a severe hazard of erosion. Management practices that minimize these limitations are useful. Capability unit IIIe–2; woodland suitability group 2o1.

Dunbarton Series

The Dunbarton series consists of shallow, well-drained, gently sloping to steep soils on uplands. These soils formed in thin loess and clayey residuum from dolomite under mixed hardwoods. Fractured dolomite is at a depth of 10 to 20 inches.

In a representative profile the surface layer is dark grayish-brown silt loam about 7 inches thick. The subsoil is about 11 inches thick. The upper 4 inches of the subsoil is brown, firm silty clay loam, and the lower 7 inches is dark yellowish-brown and yellowish-brown, very firm silty clay and clay. The underlying material is fractured dolomite in which the cracks are filled with material from the subsoil.

These soils have low fertility. The available water capacity is low, and permeability is moderately slow. The seasonal high water table is at a depth of more than 5 feet.

These soils are well suited to some of the crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are better suited to small grain, meadow, pasture, woodland, and wildlife habitat than to most other uses. If these soils are cultivated, the control of erosion and conservation of moisture are useful conservation practices.

Representative profile of Dunbarton silt loam, 6 to 12 percent slopes, eroded, in cultivated area, 300 feet southwest of farm driveway and 100 feet northwest of road, SE¼NE¼ sec. 13, T. 6 N., R. 7 E.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, granular structure; friable; common roots; neutral; abrupt, smooth boundary.

B21t—7 to 11 inches, brown (10YR 4/3) silty clay loam; moderate, very fine, subangular blocky structure; firm; common roots; thin, discontinuous, dark-brown (10YR 3/3) clay films; slightly acid; clear, smooth boundary.

IIB22t—11 to 15 inches, dark yellowish-brown (10YR 4/4) silty clay; moderate, very fine, subangular and angular blocky structure; very firm; common roots; thin, discontinuous, dark yellowish-brown (10YR 3/4) clay films; medium acid; clear, smooth boundary.

IIB23t—15 to 18 inches, yellowish-brown (10YR 5/4) clay; moderate, fine, angular blocky structure; extremely firm; common roots; thin, continuous, dark-brown (7.5YR 3/2) clay films; slightly acid; abrupt, smooth boundary.

R—18 to 60 inches, yellow (10YR 7/6), fractured and creviced dolomite.

The solum ranges from 12 to 20 inches in thickness. The Ap horizon is dark grayish brown to dark yellowish brown and is 5 to 8 inches thick. In some places a large number of chert fragments are scattered on the surface. The B2 horizon is silt loam or silty clay loam 0 to 8 inches thick. The IIB horizon is very dark brown to dark reddish-brown silty clay and clay 6 to 12 inches thick. There is no B2t horizon in places where the depth to bedrock is less than 15 inches. The depth to dolomite bedrock is 12 to 20 inches.

Dunbarton soils are near Edmund, Elkmound, Sogn, and NewGlarus soils. They have a thinner and lighter colored A horizon than Edmund soils. They formed partially in dolomite residuum, whereas Elkmound soils formed entirely in sandstone residuum. They are deeper to dolomite bedrock than Sogn soils and they have a B horizon, which Sogn soils do not have. They have a B horizon that formed mainly in clayey residuum weathered from dolomite, whereas the B horizon of NewGlarus soils formed only partly in clayey residuum from dolomite.

Dunbarton silt loam, 2 to 6 percent slopes, eroded (DuB2).—This soil is on the tops of broad ridges and on upper side slopes on uplands. Areas of this soil are 115 to 265 acres in size. Slopes are smooth and convex.

Segments are 150 to 200 feet long. This soil is underlain by dolomite.

Included with this soil in mapping are small areas of Whalan and NewGlarus soils and areas of a soil that has a layer of clay loam or sandy clay loam 2 to 4 inches thick in the subsoil. Also included are some small areas of soils that have slopes of 6 to 8 percent and a high rate of runoff.

If managed properly, this soil is suited to some row crops and to all other crops commonly grown in the county. The major limitations of this soil are shallow depth, low available water capacity, moderately slow permeability, and relief. The control of erosion, minimization of runoff, conservation of moisture, and maintenance or improvement of tilth and fertility are helpful management practices. Capability unit IIIe–3; woodland suitability group 3d1.

Dunbarton silt loam, 6 to 12 percent slopes, eroded (DuC2).—This soil is on middle side slopes. Areas of this soil are ribbonlike tracts 120 to 245 acres in size. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. Segments are 75 to 150 feet long. Some areas of this soil are still in woodland. This soil has the profile described as representative for the series.

Included with this soil in mapping are areas of Sogn and NewGlarus soils.

If properly managed, this soil is suited to some row crops in the crop rotation. This soil is better suited to small grain, meadow, pasture, woodland, and wildlife habitat than to most other uses. The major limitations of this soil are slope, shallow depth to bedrock, moderately slow permeability, and low available water capacity. It is very important to use management practices that control erosion, conserve moisture, and maintain tilth and fertility. Capability unit IVe–3; woodland suitability group 3d1.

Dunbarton silt loam, 12 to 20 percent slopes, eroded (DuD2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 50 to 120 acres in size. These areas are characterized by small drainageways. Slopes are 50 to 125 feet long. Some areas of this soil are still in timber.

This soil has a profile similar to the one described as representative for the series, but it is slightly shallower to dolomite and the surface layer is brown.

Included with this soil in mapping are small areas of Sogn soils and a few small areas of soils that have a severely eroded plow layer. Also included are a few small areas of soils that have a layer in the subsoil of sandy clay loam or clay 2 to 4 inches thick; some areas of Seaton soils, loamy variant; and some areas of Chaseburg and St. Charles soils at the base of slopes and in downslope drainageways.

This soil is better suited to forage crops, pasture, woodland, and wildlife habitat than to most other uses. The major limitations of this soil are a very severe hazard of erosion, moderately slow permeability, low available water capacity, and very limited depth to bedrock. Management practices such as pasture renovation and tree planting are useful for the control of erosion and conservation of moisture. Capability unit VIe–3; woodland suitability group 3d2.

Dunbarton silt loam, 20 to 30 percent slopes, eroded (DuE2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 50 to 115 acres in size. These areas are characterized by small drainageways. Some topsoil material has accumulated at the base of the slopes. Slopes are 50 to 100 feet long. Most areas are still in timber.

This soil has a profile similar to the one described as representative for the series, but it is thinner over dolomite and the surface layer is brown or dark grayish brown.

Included with this soil in mapping are small areas of Sogn soils and some areas of a soil that has a layer in the subsoil of sandy clay loam or clay loam 2 to 4 inches thick. Also included are some small areas of soils that have a moderately eroded or severely eroded plow layer, low organic-matter content, and poor tilth; some small areas of Seaton soils, loamy variant; some small areas of St. Charles, Seaton, and Chaseburg soils at the base of slopes and in small drainageways; and some areas of soils that have slopes of 30 to 45 percent.

This soil is better suited to woodland and wildlife habitat than to most other uses. Cleared areas of this soil can be used for limited pasture. The major limitations of this soil are steepness, a very severe hazard of erosion, and shallowness to bedrock. The planting of trees and planting for wildlife food and cover are helpful management practices. Capability unit VIIe–3; woodland suitability group 3d2.

Edmund Series

The Edmund series consists of shallow, well-drained, gently sloping to moderately steep soils on uplands. These soils formed in thin loess and clayey residuum from dolomite under prairie grass. Fractured dolomite is at a depth of 12 to 20 inches.

In a representative profile the surface layer is very dark brown and very dark grayish-brown silt loam about 8 inches thick. The subsoil is about 10 inches thick. The upper part of the subsoil is dark-brown, firm silty clay loam, and the lower part is very firm clay. The underlying material is fractured dolomite that has cracks filled with material from the subsoil.

These soils have low fertility. The available water capacity is low, and permeability is moderately slow. The water table is at a depth of more than 5 feet.

These soils are better suited to small grain, forage crops, pasture, and wildlife habitat than to most other uses. The main crops are corn, oats, and alfalfa. If these soils are cultivated, the control of erosion and conservation of moisture are useful management practices.

Representative profile of Edmund silt loam, 2 to 6 percent slopes, eroded, in cultivated area, 50 feet east of cemetery, SW¼NW¼ sec. 32, T. 5 N., R. 7.:

Ap—0 to 6 inches, very dark brown (10YR 2/2) silt loam; moderate, fine, granular structure; friable; many roots; neutral; abrupt, smooth boundary.

A12—6 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; few roots; many earthworm channels filled with Ap material; neutral; clear, smooth boundary.

B21t—8 to 14 inches, brown (7.5YR 4/4) heavy silty clay loam; moderate, fine, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown

(7.5YR 3/2) clay films; occasional chert fragments present; neutral; clear, smooth boundary.
IIB22t—14 to 18 inches, brown (7.5YR 4/4) clay; strong, fine, angular blocky structure; very firm; thick, continuous, dark reddish-brown (5YR 3/2) clay films; few roots; neutral; abrupt, wavy boundary.
R—18 to 60 inches, fractured dolomite; cracks and fissures are filled by partially weathered sandy loam material.

The solum ranges from 12 to 20 inches in thickness. In cultivated areas the Ap horizon is 6 to 8 inches thick and is black (10YR 2/1) to very dark grayish brown (10YR 3/2). The Ap horizon is underlain by clayey residuum. The residuum ranges from silty clay loam to clay in texture, from yellowish red (5YR 4/6) to dark brown (7.5YR 4/4) in color, and from 2 to 14 inches in thickness. Bedrock is at a depth of 12 to 20 inches.

Edmund soils are near Dunbarton, Sogn, Elkmound, Dodgeville, Port Byron, Rockton, and Huntsville soils. Edmund soils have a darker colored A horizon than Dunbarton soils. They are underlain by dolomite, whereas Elkmound soils are underlain by sandstone. They are deeper to bedrock than Sogn soils, and they are shallower to bedrock than Dodgeville and Rockton soils. Port Byron and Huntsville soils formed in thicker silty material than the Edmund soils.

Edmund silt loam, 2 to 6 percent slopes, eroded (EdB2).—This soil is on the tops of broad ridges and on upper side slopes on uplands. Areas of this soil are 75 to 165 acres in size. Slopes are smooth and convex. They are 150 to 200 feet long. This soil has the profile described as representative for the series.

Included with this soil in mapping are small areas of Dodgeville and Rockton soils and some areas of soils that have a layer in the subsoil of clay loam or sandy clay loam 2 to 4 inches thick. Also included are some small areas of soils that have slopes of 6 to 8 percent and some small areas of soils underlain by very sandy dolomite.

If properly managed, this soil is suited to some row crops and to all other crops commonly grown in the county. The major limitations of this soil are shallowness, low available water capacity, moderately slow permeability, and slope. The control of runoff and erosion, conservation of moisture, and maintenance or improvement of tilth and fertility are helpful management practices. Capability unit IIIe–3; woodland suitability group 5d1.

Edmund silt loam, 6 to 12 percent slopes, eroded (EdC2).—This soil is on middle and lower side slopes. Areas of this soil are 70 to 125 acres in size. These areas are characterized by small drainageways. Slopes are 125 to 175 feet long.

This soil has a profile similar to the one described as representative for the series, but it is 13 to 16 inches deep to bedrock. It has a dark brown surface layer 5 to 6 inches thick. In cultivated areas much of the subsoil has been plowed into the surface layer. Organic-matter content is moderately low, and tilth is poor.

Included with this soil in mapping are a few areas of Sogn soils and small areas of soils underlain by sandy dolomite.

The major limitations of this soil are slope, moderate erosion of the surface layer, high rate of runoff, and low available water capacity. The hazard of erosion is very severe. The control of erosion, conservation of moisture, and improvement of tilth and fertility are helpful management practices. Capability unit IVe–3; woodland suitability group 5d1.

Edmund silt loam, 12 to 20 percent slopes, eroded (EdD2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 40 to 85 acres in size. These areas are characterized by small drainageways. Some topsoil material has accumulated at the base of slopes. Slopes are 50 to 100 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to dolomite and has a very dark grayish-brown surface layer.

Included with this soil in mapping are small areas of Sogn soils and areas of soils that have a severely eroded plow layer. Also included are areas of soils that have 2 to 4 inches of clay loam and sandy clay loam in the subsoil; some small areas of Port Byron and Huntsville soils at the base of slopes and in small drainageways; and small areas of soils that are underlain by sandy dolomite.

This soil is better suited to forage crops, pasture, and wildlife habitat than to most other uses. The major limitations of this soil are shallowness, low available water capacity, moderately slow permeability, and steepness. The hazard of erosion is very severe. The control of erosion, conservation of moisture, and maintenance or improvement of tilth and fertility are helpful management practices. Capability unit VIe–3; woodland suitability group 5d2.

Elburn Series

The Elburn series consists of deep, somewhat poorly drained, nearly level and gently sloping soils in glaciated stream valleys. These soils formed in moderately deep loess and glacial drift under prairie grass. The loess is 40 to 60 inches thick and is underlain by glacial till or sand and gravel outwash.

In a representative profile the surface layer is silt loam about 16 inches thick. The upper 11 inches is black, and the lower 5 inches is dark brown. The subsoil is about 29 inches thick. The upper part of the subsoil is yellowish-brown and brown silty clay loam that has light brownish-gray mottles, the middle part is light brownish-gray silt loam, and the lower part is light brownish-gray sandy loam. The underlying material is pale-brown, massive sandy loam.

These soils have high fertility. The available water capacity is high, and permeability is moderately slow in the subsoil. Reaction is medium acid to mildly alkaline above the sand and gravel. The water table is at a depth of 1 to 3 feet in spring.

If adequately drained, these soils are well suited to all crops commonly grown in the county. The main crops are corn, oats, and clover hay. These soils are also suited to meadow, pasture, and wildlife habitat. Drainage is required for maximum production. Areas of these soils that are adjacent to streams are subject to periodic flooding of short duration in spring.

Representative profile of Elburn silt loam, 1 to 4 percent slopes, in cultivated area, NE¼NW¼SE¼ sec. 27, T. 9 N., R. 11 E.:

Ap—0 to 11 inches, black (10YR 2/1) silt loam; moderate, very fine, granular structure; friable; few roots; slightly acid; clear, smooth boundary.
A3—11 to 16 inches, dark-brown (10YR 3/3) silt loam;

moderate, very fine, granular structure; very friable; few roots; medium acid; clear, smooth boundary.

B21t—16 to 24 inches, yellowish-brown (10YR 5/4) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) and light brownish-gray (10YR 6/2) mottles; moderate, very fine, subangular blocky structure; firm; thin, patchy, brown (10YR 5/3) clay films on all faces of peds; medium acid; clear, smooth boundary.

B22t—24 to 30 inches, brown (10YR 5/3) silty clay loam; common, medium, distinct, light brownish-gray (10YR 6/2) and yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; firm; thin, patchy clay films on vertical faces of peds; medium acid; clear, wavy boundary.

B31t—30 to 40 inches, light brownish-gray (2.5Y 6/2) silt loam; common, medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, coarse, subangular blocky structure; firm; clay films on vertical faces of peds, in root channels, and in pore spaces; neutral; clear, wavy boundary.

IIB32t—40 to 45 inches, light brownish-gray (10YR 6/2) heavy sandy loam; common, coarse, prominent, yellowish-brown (10YR 5/8) mottles; weak, medium, subangular blocky structure; firm; as much as 10 percent coarse fragments; patchy clay flows in root channels and pore spaces; mildly alkaline; clear, wavy boundary.

IIC—45 to 60 inches, pale-brown (10YR 6/3) sandy loam; common, medium, prominent, yellowish-brown (10YR 5/8) mottles; massive; as much as 20 percent coarse fragments; strong effervescence; moderately alkaline.

The silt mantle is 40 to 60 inches thick. The Ap horizon ranges from black (10YR 2/1) to dark brown (10YR 3/3). The A3 horizon is 5 to 8 inches thick. The IIB horizon is sandy loam or sandy clay loam 4 to 10 inches thick. The depth to calcareous drift ranges from 44 to 70 inches. The IIC horizon is sandy loam glacial till or calcareous sand. The calcium carbonate equivalent of the till is 15 to 32 percent. The depth to mottles and the intensity of the mottling differ slightly in places.

Elburn soils are near Wacousta, Sable, Plano, Ringwood, and Virgil soils. They are better drained than Sable soils. Elburn soils are better drained and have a better developed B horizon than Wacousta soils. They have a thicker A horizon than Virgil soils. They are more poorly drained than Plano soils.

Elburn silt loam, 1 to 4 percent slopes (EfB).—This soil is on benchlands in glaciated valleys. Areas of this soil are irregularly shaped tracts 70 to 240 acres in size. This soil has the profile described as representative for the series.

Included with this soil in mapping are a few small areas of Plano, Sable, and Wacousta soils.

If adequately drained, this soil is well suited to all crops commonly grown in the county. This soil is subject to moderate erosion. It can be intensively farmed if adequate drainage is provided and if erosion is controlled. Capability unit IIw–2; woodland suitability group 4o1.

Elburn silt loam, gravelly substratum, 0 to 3 percent slopes (EgA).—This soil is on convex benchlands. Areas of this soil are irregularly shaped tracts 70 to 240 acres in size.

This soil has a profile similar to the one described as representative for the series, but it is underlain by outwash sand and gravel at a depth of 44 to 80 inches and, in cultivated areas, the surface layer is mostly black.

Included with this soil in mapping are a few small areas of Wacousta, Sable, and Plano soils and areas of soils that have a silt mantle that is more than 60 inches thick.

If adequately drained, this soil is well suited to all crops commonly grown in the county. The limitations of this soil are a moderate hazard of erosion in areas where the slopes are 2 to 3 percent and moderate wetness. Interception of runoff from higher lying soils helps to control erosion and reduce wetness. Both open-ditch and tile drainage systems help to reduce wetness. Capability unit IIw–2; woodland suitability group 4o1.

Eleva Series

The Eleva series consists of moderately deep, somewhat excessively drained, sloping to steep soils on sandstone uplands. These soils formed in residuum from sandstone bedrock under mixed hardwoods.

In a representative profile the surface layer is very dark grayish-brown fine sandy loam about 3 inches thick. The subsurface layer is brown fine sandy loam and sandy loam about 7 inches thick. In cultivated areas most or all of the subsurface layer is incorporated in the plow layer and the plow layer is lighter in color. The subsoil is yellowish brown and is about 23 inches thick. The upper part of the subsoil is sandy loam, and the lower part is loamy sand. The subsoil is underlain by very pale brown loose sand about 5 inches thick. This sand is underlain by platy, cemented sandstone bedrock.

These soils have low fertility. The available water capacity is low, and permeability is moderately rapid in the subsoil. The lack of moisture late in summer reduces crop production, especially in the steeper areas. These soils have moderately low organic-matter content. The water table is at a depth of more than 5 feet.

These soils are suited to meadow, pasture, woodland, and wildlife habitat. The suitability of these soils for row crops depends on the steepness of the soils. A high level of management helps to obtain acceptable yields of crops. The low available water capacity of these soils makes it especially important to conserve moisture.

Representative profile of Eleva sandy loam, 12 to 20 percent slopes, eroded, in undisturbed area, opposite barn and 20 feet south of road, NE¼NW¼ sec. 22, T. 5 N., R. 7 E.:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; very friable; neutral; abrupt, smooth boundary.

A21—3 to 5 inches, brown (10YR 5/3) fine sandy loam; weak, fine, platy structure; very friable; neutral; clear, wavy boundary.

A22—5 to 10 inches, brown (10YR 5/3) sandy loam; weak, fine, subangular blocky structure; very friable; medium acid; gradual, wavy boundary.

B2t—10 to 22 inches, yellowish-brown (10YR 5/4) sandy loam; thin, patchy, brown (10YR 4/3) clay bridges between sand grains; weak, fine, subangular blocky structure; friable; strongly acid; gradual, wavy boundary.

IIB3—22 to 33 inches, yellowish-brown (10YR 5/6) loamy sand; weak, medium, subangular blocky structure; very friable; strongly acid; clear, wavy boundary.

IIC—33 to 38 inches, very pale brown (10YR 7/4) sand; single grained; loose; medium acid.

IIR—38 to 60 inches, platy sandstone bedrock of varying hardness.

The Ap horizon, where present, ranges from 6 to 9 inches

in thickness and from dark gray (10YR 4/1) to brown (10YR 4/3) in color. The B horizon ranges from dark yellowish brown (10YR 4/4) to strong brown (7.5YR 5/6) in color and is sandy loam or loam in texture. Reaction of the B horizon ranges from slightly acid to strongly acid. The depth to sandstone bedrock is 20 to 40 inches. The bedrock is yellowish brown (10YR 5/4) to yellowish red (5YR 5/8). Where plates of bedrock are strongly indurated, percolating water does not penetrate but flows parallel to the plates.

Eleva soils are near Hixton, Elkmound, and NewGlarus soils. Eleva soils are coarser textured throughout than Hixton soils. Eleva soils are deeper to sandstone bedrock than Elkmound soils. They lack the silt mantle and underlying dolomite of NewGlarus soils.

Eleva sandy loam, 6 to 12 percent slopes, eroded (EhC2).—This soil is on middle side slopes. Areas of this soil are ribbonlike tracts 20 to 95 acres in size. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. Segments are 100 to 175 feet long.

This soil has a profile similar to the one described as representative for the series, but it is slightly finer in texture. In areas where this soil is cultivated, the surface layer is 6 to 8 inches thick and is dark grayish brown or dark brown.

Included with this soil in mapping are areas of Hixton and Gale soils. Also included are a few small areas of soils that have a thick, dark-colored surface layer.

If properly managed, this soil is suited to small grain, timber, pasture, and wildlife habitat. The major limitations to the use of this soil are slope and low available water capacity. It is important to conserve moisture and control erosion, because of the low available water capacity, severe hazard of erosion, and moderate depth to bedrock. Capability unit IIIe–7; woodland suitability group 3o1.

Eleva sandy loam, 12 to 20 percent slopes, eroded (EhD2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 20 to 80 acres in size. These areas are characterized by small drainageways. Slope segments are 50 to 100 feet long.

This soil has the profile described as representative for the series. In cultivated areas the surface layer is about 6 inches thick and is dark brown.

Included with this soil in mapping are small areas of Hixton and Elkmound soils, and areas of soils that have a severely eroded plow layer, low organic-matter content, and poor tilth. Also included are some small areas of Seaton soils, loamy variant, and Chaseburg soils at the base of slopes and in downslope drainageways.

This soil is better suited to forage crops, timber, pasture, and wildlife habitat than to most other uses. The major limitations to the use of this soil are a very severe hazard of erosion, moderately coarse texture, and limited depth to bedrock. The control of erosion and conservation of moisture are useful management practices if this soil is used for meadow or pasture crops. Capability unit IVe–7; woodland suitability group 3r2.

Eleva sandy loam, 20 to 30 percent slopes, eroded (EhE2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 10 to 35 acres in size. These areas are characterized by small drainageways. Most areas are still in timber. Slope segments are 50 to 100 feet long.

This soil has a profile similar to the one described as representative for the series, but it is slightly shallower to sandstone bedrock.

Included with this soil in mapping are small areas of Elkmound soils and areas of soil that have a slightly eroded to severely eroded plow layer, low organic-matter content, and poor tilth. Also included are some small areas of Seaton soils, loamy variant, and Chaseburg soils at the base of slopes and in downslope drainageways.

This soil is better suited to timber and wildlife habitat than to most other uses. The major limitations to the use of this soil are a very severe hazard of erosion, moderately coarse texture, and limited depth to bedrock. Capability unit VIe–7; woodland suitability group 3r2.

Elkmound Series

The Elkmound series consists of shallow, somewhat excessively drained, sloping to very steep soils on uplands. These soils formed in residuum weathered from sandstone bedrock under thin, mixed hardwoods and an understory of prairie grasses.

In a representative profile the surface layer is dark grayish-brown sandy loam about 5 inches thick. The subsurface layer is brown, very friable sandy loam about 2 inches thick. The subsoil is dark-brown, friable sandy loam about 10 inches thick. The underlying material is light yellowish-brown sandstone bedrock.

These soils have low fertility. The available water capacity is very low, and permeability is moderately rapid. The water table is at a depth of more than 5 feet. Where sandstone is strongly indurated, water does not percolate deeply but flows parallel to the plates.

These soils are not well suited to crops. The main crops are oats, alfalfa, and bluegrass. Many areas of these soils are idle or are in timber. These soils are suited to trees, pasture, and wildlife habitat.

Representative profile of Elkmound sandy loam, 20 to 30 percent slopes, eroded, in cultivated area, 200 feet west of County Trunk PB, 50 feet north of town road, SE¼NW¼ sec. 35, T. 6 N., R. 8 E.:

Ap—0 to 5 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, fine, granular structure; very friable; few roots; slightly acid; abrupt, smooth boundary.

A2—5 to 7 inches, brown (10YR 5/3) sandy loam; weak, thin, platy structure; very friable; few roots; many worm casts; slightly acid; abrupt, smooth boundary.

B2—7 to 13 inches, dark-brown (7.5YR 4/4) sandy loam; weak, very fine, subangular blocky structure; very friable; few roots; medium acid; clear, smooth boundary.

B3—13 to 17 inches, dark-brown (7.5YR 4/4) sandy loam; weak, medium, subangular blocky structure; friable; few roots; strongly acid; clear, wavy boundary.

R—17 to 60 inches, cemented platy sandstone bedrock.

The Ap horizon ranges from 5 to 7 inches in thickness and from dark grayish brown (10YR 4/2) to brown (10YR 4/3) in color. The A1 horizon, where present, is black and is about 2 inches thick. The A2 horizon commonly is completely incorporated into the Ap horizon by plowing. The depth to cemented sandstone bedrock ranges from 10 to 20 inches.

Elkmound soils are near Military, Eleva, and Hixton soils and Seaton soils, loamy variant. They are shallower to sandstone bedrock and have a coarser textured B horizon

than Military soils. They are shallower to bedrock than Eleva soils. They are coarser textured and have a thinner solum than Hixton soils. They are underlain by sandstone, whereas Seaton soils, loamy variant, are underlain by silt.

Elkmound sandy loam, 6 to 12 percent slopes, eroded (EmC2).—This soil is on middle side slopes. Areas of this soil are ribbonlike tracts 30 to 60 acres in size. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. Slope segments are 100 to 175 feet long.

This soil has a profile similar to the one described as representative for the series, but in cultivated areas it is deeper to sandstone bedrock. In undisturbed areas it has a surface layer of black, very friable sandy loam 2 to 4 inches thick.

Included with this soil in mapping are areas of Eleva and Hixton soils.

If properly managed, this soil is suited to some row crops and all other crops commonly grown in the county. The major limitations to the use of this soil are shallow depth, very low available water capacity, a sandy subsoil, and slope. The control of erosion, minimization of runoff, conservation of moisture, and maintainance or improvement of tilth and fertility are helpful management practices. Capability unit IVe–3; woodland suitability group 3d1.

Elkmound sandy loam, 12 to 20 percent slopes, eroded (EmD2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 20 to 45 acres in size. These areas are characterized by small drainageways. Some topsoil material has accumulated at the base of slopes. Slope segments are 50 to 100 feet long.

This soil has a profile similar to the one described as representative for the series, but in cultivated areas it is deeper to bedrock. In undisturbed areas it has a very friable, thin, very dark brown surface layer.

Included with this soil in mapping are small areas of Eleva soils. Also included are some small areas of Seaton soils and Seaton soils, loamy variant, at the base of slopes and in small drainageways.

This soil is better suited to forage crops, pasture, woodland, and wildlife habitat than to most other uses. The major limitations of this soil are shallowness, very low available water capacity, a sandy subsoil, and steepness. The control of erosion, conservation of moisture, and improvement of fertility are helpful management practices. Capability unit VIe–3; woodland suitability group 3d2.

Elkmound sandy loam, 20 to 30 percent slopes, eroded (EmE2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 10 to 25 acres in size. These areas are characterized by small drainageways. Most areas of this soil are in woodland or are idle. Slope segments are 50 to 100 feet long.

This soil has the profile described as representative for the series. In undisturbed areas this soil has a very dark brown surface layer 2 to 4 inches thick.

Included with this soil in mapping are small areas of soils that have a severely eroded plow layer, low organic-matter content, and poor tilth. Also included are some small areas of Seaton soils and Seaton soils, loamy variant, at the base of slopes and in small drainageways.

This soil is better suited to woodland and wildlife habitat than to most other uses. The major limitations to the use of this soil are shallowness, very low available water capacity, a sandy subsoil, and steepness. The control of erosion, minimization of runoff, conservation of moisture, and maintainance or improvement of tilth and fertility are helpful management practices. Capability unit VIIe–3; woodland suitability group 3d2.

Elkmound sandy loam, 30 to 60 percent slopes (EmF).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 10 to 225 acres in size. These areas are characterized by small drainageways and gullies. Most areas of this soil are in woodland. Slope segments are 50 to 100 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to bedrock and has a very dark brown surface layer that is 2 or 3 inches thick.

Included with this soil in mapping are small areas of Stony and rocky land. Also included are some small areas of Seaton soils and Seaton soils, loamy variant, at the base of slopes and in small drainageways.

This soil is better suited to woodland and wildlife habitat than to most other uses. The major limitations of this soil are shallowness, very low available water capacity, a sandy subsoil, and steepness. Tree planting and specialty plantings for wildlife are helpful management practices. Capability unit VIIe–3; woodland suitability group 3d3.

Elvers Series

The Elvers series consists of poorly drained, nearly level soils on low benches and bottoms in stream valleys. These soils are moderately deep to organic material. They formed in alluvial silt underlain by thick deposits of peat and muck. Fresh material is continually added to this soil by flooding.

In a representative profile the surface layer is very dark grayish-brown silt loam about 2 inches thick. It is underlain by grayish-brown, laminated silt loam about 33 inches thick. The underlying material is matted black muck.

These soils have medium fertility. The available water capacity is very high, and permeability is moderately slow in the upper part. In undrained areas the water table is at a depth of less than 1 foot.

If adequately drained, these soils are suited to row crops, small grain, and hay (fig. 4). Undrained areas of these soils are better suited to pasture and wildlife habitat than to most other uses. These soils are subject to seepage and to frequent flooding from adjacent streams. Open-ditch or tile drainage, if positioned in the organic material, helps to remove excess water and lower the water table. Water moves very slowly from the alluvial silt into the organic material. Straightening the stream channel and constructing dikes help to prevent flooding.

In drained areas management practices that improve organic-matter content and tilth of the surface layer and permeability of the subsoil are helpful. A major concern in the management of these soils is the great difference in soil pore size between the alluvial silt and the organic material. Water does not flow from the silt into the organic material until a head that equals approximately 1 atmosphere builds up in the overlying

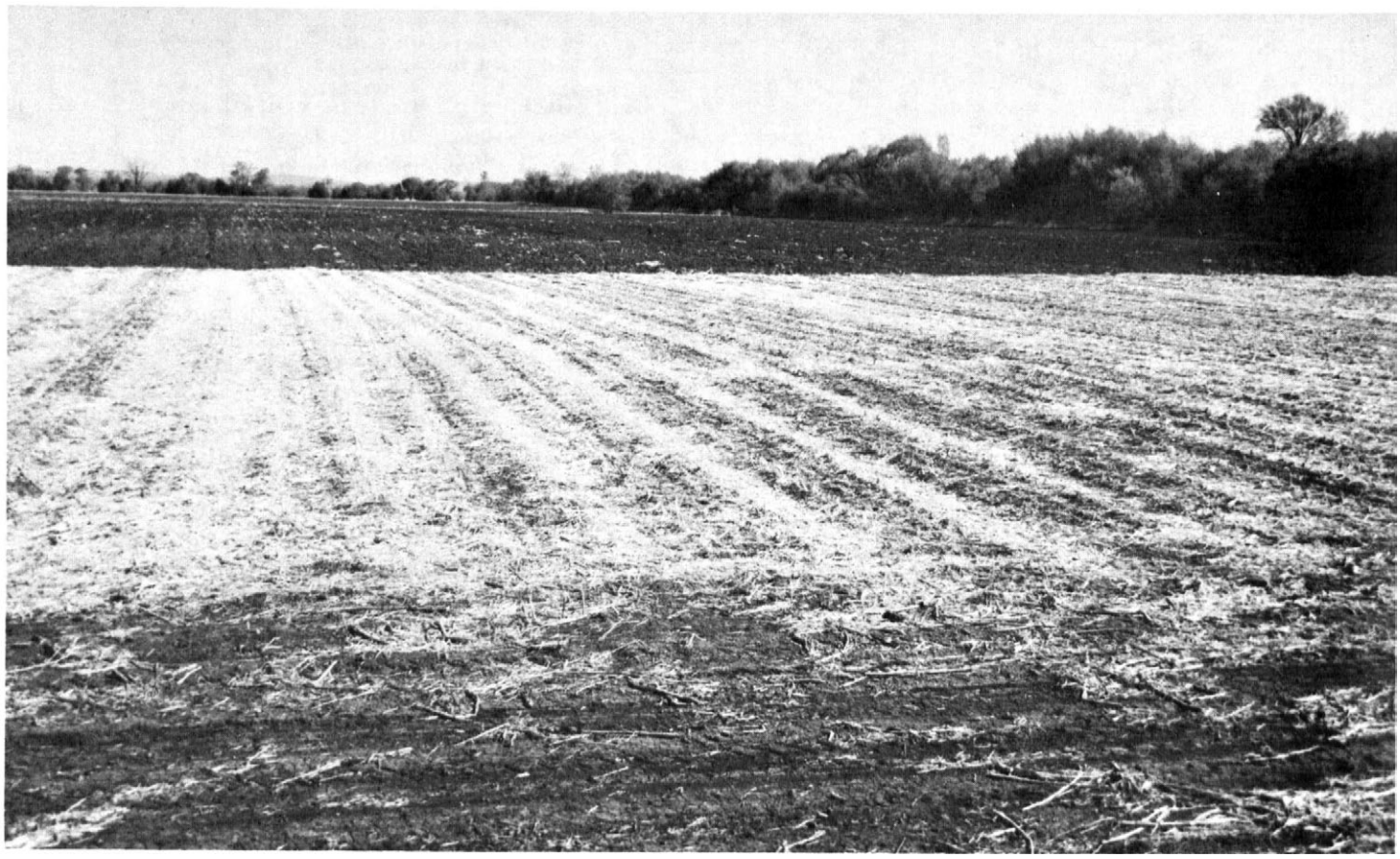

Figure 4.—Area of an Elvers silt loam under cultivation.

silt. Consequently, the hazard of wetness is difficult to overcome. If flooding is reduced by use of waterways, ditches, and dikes, less water has to percolate through the soil.

Representative profile of Elvers silt loam, in undisturbed area, 26½ yards south of east-west road near ditch, SE¼SE¼ sec. 18, T. 8 N., R. 7 E.:

A1—0 to 2 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, very fine, subangular blocky structure; friable; few roots; mildly alkaline; abrupt, smooth boundary.

C1—2 to 14 inches, grayish-brown (10YR 5/2) silt loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, thin, platy structure; friable; few roots; mildly alkaline; abrupt, smooth boundary.

C2—14 to 22 inches, gray (10YR 5/1) silt loam; many, coarse, prominent, strong-brown (7.5YR 5/6) mottles; weak, thin, platy structure; friable; few roots; few iron and manganese concretions; neutral; abrupt, smooth boundary.

C3—22 to 35 inches, laminated gray (2.5Y 5/1) and light brownish-gray (2.5Y 6/2) silt loam; common, medium, prominent, yellowish-brown (10YR 5/6) mottles in root channels; weak, very fine, platy structure; friable; slightly acid; abrupt, smooth boundary.

IIOa—35 to 60 inches, black (10YR 2/1) sapric material; matted; friable; many undecomposed sedges; slightly acid; abrupt, smooth boundary.

The silty overburden ranges from 16 to 40 inches in thickness. The A horizon ranges from dark gray (10YR 4/1) to olive gray (5Y 4/2). The underlying organic material is sapric and is more than 20 inches thick. It is black (10YR 2/1) to very dark grayish brown (10YR 3/2) and is laminated, platy, or matted.

Elvers soils are near Houghton, Adrian, Palms, Otter, Orion, Virgil, and Elburn soils. They have a silty alluvial overburden that Houghton, Adrian, and Palms soils do not have. Elvers soils are underlain by organic material, whereas, Elburn, Orion, Otter, and Virgil soils are underlain by a buried mineral soil.

Elvers silt loam (Ev).—This soil is on low benches and bottoms. Areas are irregularly shaped tracts 60 to 245 acres in size. Slopes are 0 to 2 percent. Water ponds after flooding.

Included with this soil in mapping are a few small areas of Orion soils, wet; Otter and Orion soils; and soils that have a dark-colored surface layer. Also included are a few areas of soils that have a silty overburden that is more than 40 inches thick and some areas of soils that have mineral material below the organic material at a depth of 48 to 60 inches.

If this soil is adequately drained, it is suited to all crops commonly grown in the county except alfalfa. Soils in undrained areas are better suited to pasture and wildlife habitat than to most other uses. The major concerns of management are providing adequate internal and surface drainage, preventing flooding, and improving the organic-matter content and tilth of the plow layer. Capability unit IIw–13; woodland suitability group 4w5.

Gale Series

The Gale series consists of moderately deep, well-drained, gently sloping to moderately steep soils on uplands. These soils formed in a moderately deep layer of loess over residuum from sandstone bedrock under mixed hardwoods. Most areas of these soils have a thin layer of loose sand above the bedrock.

In a representative profile in a cultivated field, the surface layer is very dark grayish-brown silt loam about 7 inches thick. The subsurface layer is grayish-brown, friable silt loam about 2 inches thick. In cultivated areas all or most of the subsurface layer commonly is incorporated into the surface layer and the surface layer is lighter in color. The yellowish-brown, firm subsoil is about 25 inches thick. The upper 21 inches of the subsoil is silty clay loam, and the lower 4 inches is loam. It is underlain by a thin layer of loose, brownish-yellow sand. The underlying sandstone is brownish yellow.

These soils have medium fertility. The available water capacity is medium to low, and permeability is moderate. The water table is at a depth of more than 5 feet.

Most areas of these soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat. If these soils are used for crops, the control of erosion and conservation of moisture are helpful management practices.

Representative profile of Gale silt loam, 6 to 12 percent slopes, eroded, in cultivated area, 50 feet north of woods and 50 feet west of town road, NE¼NW¼ sec. 16, T. 5 N., R. 8 E.:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam, light brownish-gray (10YR 6/2) dry; moderate, fine, granular structure; friable; few roots; neutral; abrupt, smooth boundary.

A2—7 to 9 inches, grayish-brown (10YR 5/2) silt loam; weak, thin, platy structure; friable; few roots; neutral; abrupt, smooth boundary.

B21t—9 to 18 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, very fine, subangular blocky structure; firm; few roots; thin, patchy, dark-brown (7.5YR 4/4) clay films on all faces of peds; very strongly acid; clear, smooth boundary.

B22t—18 to 30 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, fine, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; very strongly acid; clear, wavy boundary.

B3t—30 to 34 inches, yellowish-brown (10YR 5/4) loam; moderate, medium, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; very strongly acid; clear, wavy boundary.

IIC—34 to 39 inches, brownish-yellow (10YR 6/6) sand; single grained; loose; very strongly acid.

R—39 to 60 inches, brownish-yellow (10YR 6/6) sandstone bedrock.

The solum ranges from 20 to 40 inches in thickness. The silt mantle is 15 to 34 inches thick. The Ap horizon ranges from 6 to 9 inches in thickness and from very dark grayish brown (10YR 3/2) to dark brown (10YR 4/3) in color. Residuum of loam to loamy sand derived from sandstone underlies the silt. The C horizon is yellowish-brown (10YR 5/4) to brownish-yellow (10YR 6/6), thin, loose sand or loamy sand. Sandstone bedrock is at a depth of 30 to 40 inches.

Gale soils are near Dodgeville, NewGlarus, Hixton, and Elkmound soils. They formed in loess and residuum from sandstone, whereas Dodgeville and NewGlarus soils formed in loess and residuum from dolomite, and Hixton soils formed entirely in loamy residuum from sandstone. They are deeper to sandstone bedrock and have a finer textured B horizon than Elkmound soils.

Gale silt loam, 2 to 6 percent slopes (GaB).—This soil is on the tops of broad ridges and on upper side slopes. Areas of this soil are 75 to 165 acres in size. Slopes are smooth and convex. Slope segments are 150 to 200 feet long.

This soil has a profile similar to the one described as representative for the series, but it has a lighter colored surface layer.

Included with this soil in mapping are small areas of soils that are more than 40 inches deep to sandstone and areas of soils that have a dark-colored surface layer. Also included are small areas of soils that have slopes of 6 to 8 percent.

If this soil is properly managed, it is suited to all crops commonly grown in the county. This soil is subject to moderate erosion because of the slope. It has medium available water capacity. The control of erosion, conservation of moisture, increase in infiltration, and maintenance of tilth, fertility, and organic-matter content are helpful management practices. Capability unit IIe–2; woodland suitability group 2o1.

Gale silt loam, 6 to 12 percent slopes, eroded (GaC2).—This soil is on middle side slopes. Areas of this soil are ribbonlike tracts 40 to 95 acres in size. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. Slope segments are 150 to 200 feet long.

This soil has the profile described as representative for the series. In eroded areas it has a brown surface layer.

Included with this soil in mapping are areas of Hixton soils and areas of soils that have a dark-colored surface layer. Also included in some places are small areas of Seaton soils at the base of slopes and in drainageways.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The major limitations to the use of this soil are slope and medium available water capacity. It is important to conserve moisture and control erosion, because of the severe hazard of erosion and moderate depth to bedrock. Capability unit IIIe–2; woodland suitability group 2o1.

Gale silt loam, 12 to 20 percent slopes, eroded (GaD2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 40 to 65 acres in size. These areas are characterized by small drainageways. Some topsoil material has accumulated at the base of slopes. Slope segments are 50 to 120 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to sandstone. The surface layer is dark grayish brown.

Included with this soil in mapping are small areas of Elkmound soils and areas of soils that have a severely eroded plow layer, low organic-matter content, and poor tilth. Also included in some places are small areas of Seaton and Chaseburg soils at the base of slopes and in drainageways.

This soil is better suited to small grain, forage crops, pasture, woodland, and wildlife habitat than to most other uses. The major limitations to the use of this soil are slope, a very severe hazard of erosion, and

shallowness to bedrock. The available water capacity is low. If this soil is cultivated, the control of erosion and conservation of moisture are useful management practices. Capability unit IVe–2; woodland suitability group 2r2.

Granby Series

The Granby series consists of deep, poorly drained, nearly level soils on low benches in stream valleys and on old lakebeds. These soils formed in deep outwash under sedge grasses (fig. 5).

In a representative profile the surface layer is black, single-grained loamy sand about 10 inches thick. The subsoil is light brownish-gray, single-grained fine sand about 19 inches thick. The underlying material is light-gray, single-grained medium sand.

These soils have low fertility. The available water capacity is low and very low, and permeability is rapid. The water table is at a depth of less than 1 foot during some part of the year. Even if drained, this soil is not well suited to cultivated crops. Undrained areas are better suited to meadow, pasture, and wildlife habitat than to most other uses. The renovation of undrained areas is not commonly practicable.

Representative profile of Granby loamy sand in undisturbed area, 5½ yards north of street just east of trees, NE¼SW¼SE¼ sec. 2, T. 7 N., R. 8 E.:

A—0 to 10 inches, black (10YR 2/1) loamy sand; single grained; loose; slightly acid; clear, smooth boundary.

Bg—10 to 29 inches, light brownish-gray (2.5Y 6/2) fine sand; single grained; loose; some material from A horizon in old root channels; slightly acid; clear, smooth boundary.

C—29 to 60 inches, light-gray (10YR 7/2) medium sand; single grained; loose; moderately alkaline; slight effervescence.

The A horizon ranges from black (10YR 2/1) to very dark gray (10YR 3/1) in color. The depth to loose sand is 10 to 20 inches. Reaction of the sandy outwash ranges from neutral to moderately alkaline.

Granby soils are near Marshan, Houghton, Adrian, Hayfield, and Dells soils. Granby soils do not have the B horizon development of Marshan soils. They do not have the organic overburden of Adrian and Houghton soils. They are more poorly drained and have a coarser textured B horizon than Dells and Hayfield soils.

Granby loamy sand (Gn).—This nearly level soil is on low benchlands. Areas of this soil are 30 to 180 acres in size. Some areas pond water.

Included with this soil in mapping are a few small areas of soils that have a surface layer of muck, sandy loam, or loam. Also included are small areas of Adrian and Marshan soils.

Even if this soil is adequately drained and protected from flooding, it is not well suited to row crops. In areas that have suitable outlets, controlled open-ditch drainage is the best method. The major concerns of management are providing adequate controlled drainage, protecting the soil from flooding, maintaining the

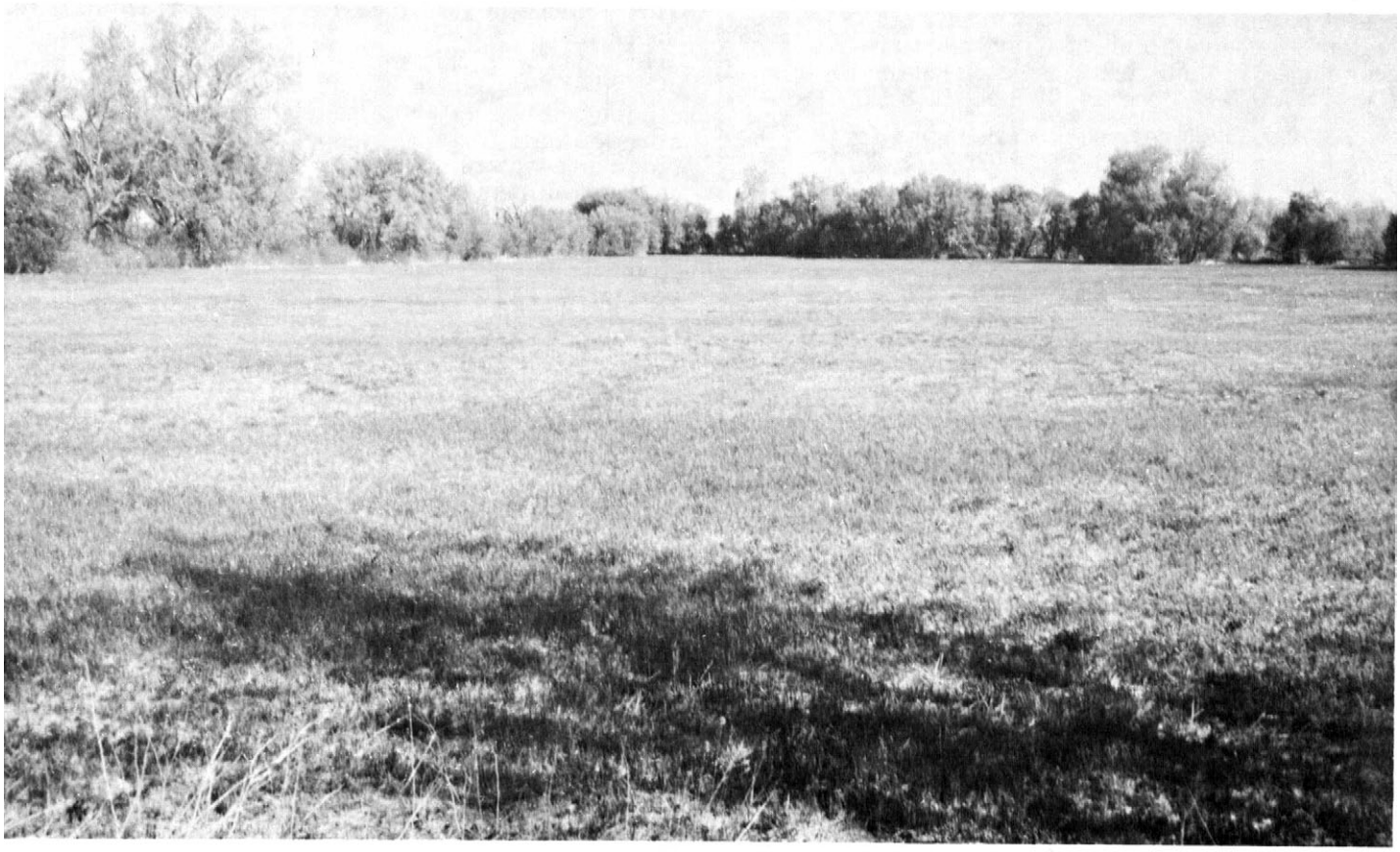

Figure 5.—Drained area of a Granby loamy sand.

organic-matter content, raising the level of fertility, and providing protection from soil blowing. Capability unit IVw–5; woodland suitability group 3w4.

Grays Series

The Grays series consists of deep, well drained and moderately well drained, nearly level to sloping soils on benches in old lake basins. These soils formed in lake-laid silt and fine sand under mixed hardwoods and an understory of prairie grasses.

In a representative profile the surface layer is very dark grayish-brown silt loam 8 inches thick. The subsurface layer is brown, friable silt loam about 2 inches thick. Where these soils are cultivated, all or most of the subsurface layer commonly is incorporated into the surface layer. The subsoil is about 23 inches thick. The upper 12 inches is dark yellowish-brown silt loam and silty clay loam, and the lower 11 inches is brown silty clay loam. The underlying material is brown, stratified, calcareous silt and fine sand.

These soils have medium fertility. The available water capacity is high, and permeability is moderate. The seasonal high water table is at a depth of more than 3 feet and commonly is at a depth of more than 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also well suited to woodland, pasture, and wildlife habitat. If these soils are cultivated, the control of erosion and conservation of moisture are useful practices.

Representative profile of Grays silt loam, 2 to 6 percent slopes, in undisturbed area, on south side of road, NW¼NW¼NE¼ sec. 10, T. 6 N., R. 8 E.:

A1—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; friable; common roots; slightly acid; abrupt, smooth boundary.

A2—8 to 10 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; common roots; many worm casts present; slightly acid; abrupt, smooth boundary.

B1—10 to 16 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, fine, subangular blocky structure; friable; few roots; few worm casts present; few small pebbles; medium acid; clear, smooth boundary.

B21t—16 to 22 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, very fine, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown (10YR 3/3) clay films; few small pebbles; medium acid; clear, smooth boundary.

B22t—22 to 27 inches, brown (10YR 4/3) silty clay loam; moderate, very fine, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown (10YR 3/3) clay films; few manganese or iron concretions; medium acid; clear, smooth boundary.

B23t—27 to 33 inches, brown (7.5YR 4/4) light silty clay loam; strong, fine, subangular blocky structure; firm; few roots; patchy dark-brown (10YR 3/3) clay films on all ped faces; neutral; clear, smooth boundary.

C—33 to 60 inches, pale-brown (10YR 6/3) very fine sand and brown (7.5YR 4/4) silt; laminated; very friable; moderately alkaline; strong effervescence.

The Ap horizon, where present, ranges from 6 to 9 inches in thickness. It is black (10YR 2/1), very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), or dark brown (10YR 3/3). Depth to calcareous lacustrine sediment ranges from 20 to 40 inches. In many areas the lower part of the B horizon and the C horizon have red and gray mottles.

Grays soils in Dane County are lower in value and higher in chroma in the B horizon in many places than is defined in the range for the series.

Grays soils are near Salter and Kegonsa soils. They lack the overburden of outwash of the Salter soils. They formed in lake-laid silt and fine sand, whereas Kegonsa soils formed in silt, sand, and gravel.

Grays silt loam, 0 to 2 percent slopes (GsA).—This soil is in convex areas on benches in old lake basins. Areas of this soil are irregularly shaped tracts 20 to 160 acres in size.

This soil has a profile similar to the one described as representative for the series, but the surface layer is darker in color. Where this soil is cultivated, it has a nearly uniform, very dark brown plow layer. In a few areas where slopes are concave, the plow layer is darker.

Included with this soil in mapping are some small areas of soils that have slopes of 3 to 4 percent. Also included are some areas of soils that have a loamy subsoil.

This soil is well suited to all crops commonly grown in the county. Areas of this soil can be farmed intensively if fertility is maintained. Capability unit I–3; woodland suitability group 2o1.

Grays silt loam, 2 to 6 percent slopes (GsB).—This soil is on broad benches in old lake basins. Areas of this soil are 45 to 265 acres in size. Slopes are smooth and convex, and segments are 150 to 200 feet long. This soil has the profile described as representative for the series.

Included with this soil in mapping are small areas of Salter soils and areas of soils that have a light-colored surface layer. Also included are some small areas of soils that have slopes of 0 to 2 percent and that pond water in some places and include seepage spots. Also included are some small areas of soils that have a loamy subsoil.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The control of erosion is a useful conservation practice because of slope. Capability unit IIe–1; woodland suitability group 2o1.

Grays silt loam, 6 to 12 percent slopes, eroded (GsC2).—This soil has nearly uniform, slightly convex slopes. Areas of this soil are irregularly shaped tracts 40 to 70 acres in size. These areas are characterized by a few narrow drainageways. Slope segments are 100 to 150 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to lake-laid silt and sand. Where this soil is cultivated, the plow layer is very dark grayish brown and is 6 to 8 inches thick. In a few places it is very dark brown or dark brown.

Included with this soil in mapping are small areas of Salter soils and areas of soils that have a light-colored surface layer. Also included are some small areas of Dresden soils, areas of Grays soils that have seepage spots, some small areas of Grays soils that have a loam subsoil, and some areas of soils that have slopes of 12 to 20 percent.

If this soil is properly managed, it is suited to all

crops commonly grown in the county. The only limitation to the use of this soil is a severe hazard of erosion. The major concerns of management are control of erosion and improvement of the organic-matter content, tilth, and level of fertility of the surface layer. Capability unit IIIe–1; woodland suitability group 2o1.

Griswold Series

The Griswold series consists of deep, well-drained, gently sloping to moderately steep soils on glaciated uplands. These soils formed in thick glacial till under prairie grasses.

In a representative profile the surface layer is loam about 14 inches thick. The upper 9 inches is black, and the lower 5 inches is dark brown. The subsoil is dark yellowish brown and is about 23 inches thick. The upper part of the subsoil is clay loam, and the lower part is sandy loam. The underlying material is massive, calcareous, yellowish-brown sandy loam till.

These soils have medium fertility. The available water capacity is medium, and permeability is moderate. The organic-matter content is high. The water table is below a depth of 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. If these soils are cultivated, the control of erosion and maintainance of tilth and organic-matter content are useful conservation practices.

Representative profile of Griswold loam, 6 to 12 percent slopes, in undisturbed area on east side of road, in the northwest corner of sec. 27, T. 6 N., R. 12 E:

A1—0 to 9 inches, black (10YR 2/1) loam; weak, fine, granular structure; very friable; common roots; neutral; clear, smooth boundary.

A3—9 to 14 inches, dark-brown (10YR 3/3) loam; weak, fine, granular structure; very friable; common roots; neutral; clear, smooth boundary.

B21t—14 to 19 inches, dark yellowish-brown (10YR 4/4) clay loam; weak, medium, subangular blocky structure; friable; as much as 20 percent coarse fragments; thin, discontinuous, brown (10YR 4/3) clay films; common roots; slightly acid; clear, smooth boundary.

B22t—19 to 28 inches, dark yellowish-brown (10YR 4/4) clay loam; weak, medium, subangular blocky structure; firm; as much as 20 percent coarse fragments; thin, discontinuous, dark-brown (10YR 3/3) clay films; common roots; medium acid; gradual, smooth boundary.

B3t—28 to 37 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, medium, subangular blocky structure; friable; as much as 20 percent coarse fragments; thin, patchy clay films on vertical faces of peds; few roots; slightly acid; gradual, wavy boundary.

C—37 to 60 inches, yellowish-brown (10YR 5/4) sandy loam; massive; as much as 20 percent coarse fragments; very friable; moderately alkaline; strong effervescence.

The A horizon ranges from black (10YR 2/1) to dark brown (10YR 3/3) in color and from 10 to 18 inches in thickness. The B horizon is 10 to 30 inches thick. Calcareous sandy loam glacial till is at a depth of 20 to 40 inches. The calcium carbonate equivalent of the till ranges from 15 to 32 percent.

Griswold soils are near Sable, Elburn, Ringwood, Kidder, and McHenry soils. They have a B horizon that formed in glacial till, whereas the B horizon of Ringwood soils formed partly in loess. Griswold soils have a thicker and darker colored A horizon than Kidder soils. They have a thicker A horizon than McHenry soils, and they do not have the silt mantle that McHenry soils have. Griswold soils are better drained than the Sable and Elburn soils.

Griswold loam, 2 to 6 percent slopes (GwB).—This soil is on glaciated ridges and upper side slopes. Areas of this soil are elongated tracts 75 to 180 acres in size. Slope segments are 150 to 250 feet long.

This soil has a profile similar to the one described as representative for the series, but it is deeper to glacial till. Where this soil is cultivated, the surface layer is nearly uniformly black, but in a few areas it is very dark brown. Tilth is poorer and the organic-matter content is lower in eroded areas.

Included with this soil in mapping are small areas of Ringwood silt loam and areas of soils that have a silt loam surface layer.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation of this soil is a moderate hazard of erosion. The major concerns of management are maintaining the organic-matter content and tilth, raising the level of fertility, and controlling erosion. Capability unit IIe–1; not placed in a woodland suitability group.

Griswold loam, 6 to 12 percent slopes (GwC).—This soil is on nearly uniformly shaped, slight convex slopes. Areas of this soil are ribbonlike tracts 60 to 140 acres in size. These areas are characterized by a few narrow drainageways. Slope segments are 100 to 150 feet long.

This soil has the profile described as representative for the series. In cultivated areas the plow layer is 6 to 9 inches thick and is mostly very dark brown. In a few places in cultivated areas, the plow layer is dark grayish brown or dark brown.

Included with this soil in mapping are many areas of eroded soils and small areas of soils that have a silt loam surface layer.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation to the use of this soil is a severe hazard of erosion. The major concerns of management are controlling erosion, maintaining the organic-matter content and tilth, and raising the level of fertility. Capability unit IIIe–1; not placed in a woodland suitability group.

Griswold loam, 12 to 20 percent slopes, eroded (GwD2).—This soil is on lower side slopes on glaciated uplands. Areas of this soil are ribbonlike tracts 25 to 60 acres in size. These areas are characterized by a few narrow drainageways. Slope segments are mainly 90 to 180 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to sandy loam till; the surface layer is very dark grayish brown and is thinner because of water erosion; and the plow layer is less friable, lower in organic-matter content and fertility, and more difficult to maintain in good tilth.

Included with this soil in mapping are small areas of soils that have greater or lesser slopes, small areas of soils that have a surface layer of silt loam, and a few areas of soils that have till at a depth of less than 24 inches and have rapid runoff.

Much of this soil is in permanent hay or pasture. This soil can be cultivated if the level of management is high. The major limitation to the use of this soil is a very severe hazard of erosion. The major concerns

of management are improving organic-matter content, maintaining tilth, raising the level of fertility, and controlling erosion. Capability unit IVe–1; not placed in a woodland suitability group.

Hayfield Series

The Hayfield series consists of somewhat poorly drained, nearly level soils on moderately low benches on outwash plains. These soils are moderately deep over sand. They formed in outwash. Native vegetation is mixed hardwoods and an understory of prairie grasses.

In a representative profile the surface layer is black silt loam about 8 inches thick. The subsoil is about 21 inches thick. The upper part of the subsoil is brown silt loam and yellowish-brown heavy loam, the middle part is yellowish-brown sandy clay loam that is mottled, and the lower part is light brownish-gray sandy loam that has many strong-brown mottles. The underlying material is single-grained, light brownish-gray sand.

These soils have medium fertility. The available water capacity is medium, and permeability is moderate in the subsoil and rapid in the underlying sand. The seasonal high water table is at a depth of 1 to 3 feet.

If these soils are adequately drained, they are suited to all crops commonly grown in the county. Undrained areas of these soils are less suitable for all crops, especially alfalfa. All areas of these soils are suited to trees, pasture, and wildlife habitat. Movement of water through these soils is moderate. Because of a high water table and an abrupt change of soil texture to sand, the rooting zone of plants is restricted. In some places these soils are subject to flooding during wet periods. After flooding, water ponds in depressional areas. These soils are not suited to tile drains; open ditches, however, provide adequate drainage where suitable outlets are available.

Representative profile of Hayfield silt loam, 0 to 3 percent slopes, 20 yards south of Highway D, NE¼ NE¼NW¼ sec. 35, T. 5 N., R. 8 E:

Ap—0 to 8 inches, black (10YR 2/1) silt loam; weak, fine, subangular blocky structure; friable; common roots; neutral; abrupt, smooth boundary.

B1—8 to 11 inches, brown (10YR 4/3) silt loam; weak, medium, subangular blocky structure; friable; common roots; many worm casts; neutral; clear, smooth boundary.

B21t—11 to 16 inches, yellowish-brown (10YR 5/4) heavy loam; weak, medium, subangular blocky structure; firm; thin, patchy, dark-brown (7.5YR 4/4) clay films on faces of peds and in pores; strongly acid; clear, wavy boundary.

B22t—16 to 23 inches, yellowish-brown (10YR 5/4) sandy clay loam; common, medium, prominent, dark grayish-brown (10YR 4/2) mottles; weak, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; strongly acid; gradual, wavy boundary.

IIB3—23 to 29 inches, light brownish-gray (10YR 6/2) sandy loam; many, coarse, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, prismatic structure parting to weak, medium, subangular blocky; friable; few, thin, patchy clay films on vertical faces of peds; strongly acid; clear, wavy boundary.

IIC—29 to 60 inches, light brownish-gray (10YR 6/2) sand; few, medium, prominent, yellowish-brown (10YR 5/6) mottles; single grained; loose; slightly acid.

The A horizon is black (10YR 2/1) to very dark grayish brown (10YR 3/2). The A2 horizon, where present, is grayish-brown (10YR 5/2) or dark grayish-brown (10YR 4/2) silt loam 1 to 4 inches thick. The depth to loose sand outwash is 20 to 40 inches. The depth to mottling and the intensity of the mottling both vary somewhat from place to place. The B horizon is silt loam, silty clay loam, clay loam, sandy clay loam, and sandy loam.

Hayfield soils are near Dresden, Kegonsa, Granby, Marshan, and Adrian soils. They are more poorly drained than Dresden and Kegonsa soils. They are better drained than Granby, Marshan, and Adrian soils. They have a finer textured B horizon than Granby soils. They do not have the organic layer of Adrian soils.

Hayfield silt loam, 0 to 3 percent slopes (HaA).—This soil is on benchlands. Areas of this soil are irregularly shaped tracts 50 to 150 acres in size. Some areas of this soil pond water.

Included with this soil in mapping are small areas of well-drained Dresden and Kegonsa soils and poorly drained Marshan soils. Also included are a few acres of soils that have a loam surface layer.

If this soil is managed at a high level, it is suited to all crops commonly grown in the county. The limitations to the use of this soil are wetness and a restricted root zone. Alfalfa is not capable of withstanding winter temperatures if it is grown in undrained areas of this soil. Maintaining tilth, raising the level of fertility, and providing drainage are helpful management practices. Capability unit IIw–5; woodland suitability group 3r2.

Hixton Series

The Hixton series consists of moderately deep, well-drained, gently sloping to moderately steep soils on sandstone uplands. These soils formed in residuum weathered from sandstone bedrock under mixed hardwoods.

In a representative profile the surface layer is very dark grayish-brown loam about 8 inches thick. The subsoil is dark brown and dark yellowish brown and is about 23 inches thick. The upper 16 inches is loam, and the lower 7 inches is sandy loam. The underlying sand residuum is about 8 inches thick and is variegated yellow and red. This layer is underlain by sandstone bedrock.

These soils have medium fertility. The available water capacity is medium, and permeability is moderate. The water table is at a depth of more than 5 feet. Where the sandstone is strongly cemented, water flows parallel to the plates and results in a perched water table during wet seasons.

The steepness of some of these soils limits their suitability for row crops. These soils are suited to meadow, pasture, woodland, and wildlife habitat. It is especially important to conserve moisture on these soils, because of their medium available water capacity.

Representative profile of Hixton loam, 2 to 6 percent slopes, in cultivated area, 100 yards west and 50 feet north of intersection of township roads, SE¼SW¼ sec. 6, T. 6 N., R. 8 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loam, light brownish-gray (10YR 6/2) dry; moderate, very fine, granular structure; very friable;

common roots; slightly acid; abrupt, smooth boundary.

B1—8 to 15 inches, dark-brown (10YR 4/3) loam; moderate, very fine, subangular blocky structure; friable; common roots; few patchy clay films on vertical faces of peds only; medium acid; clear, smooth boundary.

B2t—15 to 24 inches, dark yellowish-brown (10YR 4/4) heavy loam; moderate, very fine, subangular blocky structure; firm; few roots; thin patchy clay films on all faces of peds; strongly acid; clear, smooth boundary.

B3—24 to 31 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, medium, subangular blocky structure; very friable; few roots; strongly acid; clear, smooth boundary.

C—31 to 39 inches, yellow (10YR 7/6) and red (2.5YR red (2.5YR 4/6) sand; single grained; loose; strongly acid; abrupt, smooth boundary.

R—39 to 60 inches, yellow (10YR 7/6) and red (2.5YR 4/6) sandstone bedrock; strongly acid.

The Ap horizon ranges from 6 to 9 inches in thickness and is dark gray (10YR 4/1), dark grayish brown (10YR 4/2), very dark grayish brown (10YR 3/2), or brown (10YR 4/3). In uncultivated areas the A horizon is very dark brown (10YR 2/2) and is about 3 inches thick. The A2 horizon, where present, is 1 to 5 inches thick. It is brown, grayish brown, or dark grayish brown and is platy. The A2 horizon generally is incorporated into the Ap horizon during plowing. The upper part of the B horizon is sandy loam or loam, and the lower part is sandy loam, loam, or sandy clay loam. The depth to sandstone bedrock is 26 to 40 inches.

Hixton soils are near Seaton soils, loamy variant, and NewGlarus, Gale, Elkmound, Eleva, and Basco soils. They are underlain by sandstone, whereas Seaton soils, loamy variant, are underlain by silt and NewGlarus soils are underlain by clayey residuum. They do not have the silt mantle that Gale soils have. They are deeper to sandstone bedrock than Elkmound soils. Hixton soils have finer texture than Eleva soils, and have coarser texture than Basco soils.

Hixton loam, 2 to 6 percent slopes (HbB).—This soil is on the tops of broad ridges and on upper side slopes on uplands. Areas of this soil are 65 to 155 acres in size. Slopes are smooth and convex. Slope segments are 150 to 200 feet long. This soil has the profile described as representative for the series.

Included with this soil in mapping are small areas of Gale soils and some small areas of soils that have a thick, dark-colored surface layer. Also included are some small areas of soils that have slopes of 6 to 8 percent and are subject to a severe hazard of erosion.

If the soil is managed properly, it is suited to all crops commonly grown in the county. This soil is subject to a moderate hazard of erosion because of its slope and reduced infiltration rate. It is important to conserve moisture on this soil because of its medium available water capacity. Capability unit IIe–2; woodland suitability group 2o1.

Hixton loam, 6 to 12 percent slopes, eroded (HbC2).—This soil is on middle side slopes. Areas of this soil are elongated tracts 30 to 125 acres in size. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. Slope segments are 150 to 200 feet long.

This soil has a profile similar to the one described as representative for the series, but is shallower to bedrock. Where this soil is cultivated, the surface layer is 6 to 8 inches thick and is dark grayish brown or brown.

Included with this soil in mapping are a few small areas of soils that have a sandy loam surface layer. Also included are small areas of Elkmound and Eleva soils and some small areas of soils that have a thick, dark-colored surface layer.

Where this soil is managed properly, it is suited to all crops commonly grown in the county. The major limitations to the use of this soil are slope and medium available water capacity. It is important to conserve moisture and control erosion on this soil, because of the medium available water capacity, severe hazard of erosion, and moderate depth to bedrock. Capability unit IIIe–2; woodland suitability group 2o1.

Hixton loam, 12 to 20 percent slopes, eroded (HbD2).—This soil is on lower side slopes. Areas are elongated and are 80 to 145 acres. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. Slope segments are 100 to 150 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to bedrock. Culivated areas have a brown surface layer 6 to 8 inches thick.

Included with this soil in mapping are a few areas of soils that have a sandy loam surface layer and small areas of Elkmound and Eleva soils. Also included are some small areas of Seaton soils or Seaton soils, loamy variant, at the base of slopes or in drainageways.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The major limitations to use are steepness and a medium available water capacity. It is important to conserve moisture and control erosion on this soil because of the medium available water capacity, very severe hazard of erosion, and moderate depth to bedrock. Capability unit IVe–2; woodland suitability group 2r2.

Houghton Series

The Houghton series consists of deep, very poorly drained, nearly level soils on low benches and bottoms in stream valleys. These soils formed under sedge grasses. Mineral soil material is below the muck at a depth of more than 5 feet. Undrained areas of these soils are frequently flooded for long periods. Reeds and cattails grow in ponded areas.

In a representative profile the surface layer is black muck (sapric material) about 15 inches thick. The middle layer is very dark brown, matted muck (sapric material) about 23 inches thick. The lower layer is very dark grayish-brown and dark yellowish-brown muck (sapric material).

These soils have medium fertility. The available water capacity is very high, and permeability is moderately rapid. The seasonal high water table is at or near the surface. These soils are very severely limited by wetness.

If these soils are properly managed, they are suited to row and forage crops. If markets are accessible, these soils are also suited to specialized crops such as sod or mint. Undrained areas are better suited to wildlife habitat, limited pasture, and marsh hay than to most other uses. A high level of management includes artificial drainage, soil testing, and control of soil blowing. If suitable outlets are available, both open-ditch and tile drainage systems can be used to remove excess water. These soils tend to be low in certain plant nutrients, especially trace elements; therefore, it is neces-

sary to have a complete program of soil testing and fertilization that insures against nutrient deficiencies. Large areas of these soils that are intensively cultivated should be protected from soil blowing.

Representative profile of Houghton muck in undisturbed area, NW¼SE¼ sec. 8, T. 6 N., R. 12 E.:

Oa1—0 to 15 inches, sapric material that is black (10YR 2/1) undisturbed and rubbed; 10 percent fiber unrubbed and a trace rubbed; moderate, medium, granular structure; friable; slightly acid; clear, smooth boundary.

Oa2—15 to 38 inches, sapric material that is very dark brown (10YR 2/2) undisturbed and black (10YR 2/1) when rubbed; about 30 percent fiber unrubbed and a trace rubbed; weak, thick, platy structure; very friable; fibers are herbaceous; medium acid; clear, smooth boundary.

Oa3—38 to 60 inches, sapric material that is very dark grayish-brown (10YR 3/2) and dark yellowish brown (10YR 3/4) undisturbed; about 25 percent fibers unrubbed and a trace rubbed; matted; very friable; fibers are herbaceous; slightly acid.

The Oa1 horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2) and from 4 to 20 inches in thickness. The depth to underlying mineral material is more than 51 inches. The fibers are herbaceous.

Houghton soils are near Adrian, Palms, Hayfield, Elburn, Virgil, and Sable soils and Salter soils, wet variant. They have more than 51 inches of organic material, whereas Adrian and Palms soils are underlain at a depth of 20 to 51 inches by mineral material. Houghton soils do not have the silty alluvial overburden that Sable soils have.

Houghton muck (Ho).—This nearly level soil is on low benchlands and bottoms. Areas of this soil are irregular tracts 30 to 600 acres in size.

Included with this soil in mapping are areas of Palms and Adrian soils, in which the underlying mineral material is at a depth of less than 51 inches. Also included are some small areas of soils that have slopes of 2 to 6 percent.

If this soil is properly managed, it is suited to all crops commonly grown in the county and to some specialty crops. The major limitations to the use of this soil are a high water table, severe hazard of flooding, moderate hazard of soil blowing, and medium level of fertility. The major concerns of management are removing excess water, reducing the frequency of flooding, raising the level of fertility, and preventing soil blowing. Capability unit IIIw–9; not placed in a woodland suitability group.

Huntsville Series

The Huntsville series consists of deep, well drained and moderately well drained, nearly level and gently sloping soils in many of the valleys of larger streams and in small drainageways on uplands. These soils formed in deep alluvium under prairie grasses. They are subject to frequent, brief flooding. Fresh silt is added during flooding.

In a representative profile the upper 11 inches of the surface layer is very dark brown silt loam, and the lower 25 inches is very dark gray silt loam. Below this layer is black silt loam about 12 inches thick, which is underlain by dark-brown silt loam.

These soils have high fertility. The available water capacity is very high, and permeability is moderate. The water table is below a depth of 3 feet and commonly is below a depth of 5 feet.

These soils are well suited to corn, small grain, grasses, and legumes. Where these soils are in areas of meandering streams, they are better suited to permanent pasture or wildlife habitat than to most other uses. In most areas these soils are subject to occasional flooding, but the water drains away very quickly as the stream subsides. Crops can be damaged to some extent during flooding. In small depressional areas where water is retained for longer periods of time, crops are damaged by excess water. Reducing the frequency of flooding or controlling flooding is beneficial.

Representative profile of Huntsville silt loam, 2 to 6 percent slopes, 200 feet north of road to sewage plant and 50 feet east of county road, SE¼SE¼ sec. 11, T. 6 N., R. 6 E.:

Ap—0 to 11 inches, very dark brown (10YR 2/2) silt loam; weak, fine, granular structure; very friable; many roots; neutral; abrupt, wavy boundary.

A12—11 to 36 inches, very dark gray (10YR 3/1) silt loam; weak, medium, platy structure parting to weak, medium, granular; friable; many roots; neutral; abrupt, wavy boundary.

Ab—36 to 48 inches, black (10YR 2/1) silt loam; weak, fine, granular structure; friable; few roots; slightly acid; clear, wavy boundary.

Cb—48 to 60 inches, dark-brown (10YR 3/3) heavy silt loam; moderate, very fine, subangular blocky structure; friable; few roots; medium acid.

The thickness of each layer of the profile is the same as the thickness of the original alluvial layer. In a few places gray silt loam or light silty clay loam ocurs at a depth between 30 and 42 inches. The profile has low chroma, which is the result of mineral grain color. Mottling is present at a depth of 36 to 60 inches in some places.

Huntsville soils are near Otter, Port Byron, Ashdale, and Dodgeville soils. They are similar to Chaseburg and Kickapoo soils. They are better drained than Otter soils. They do not have the B horizon of Port Byron soils, and they have a thicker A horizon. Huntsville soils have a thicker A horizon and are deeper to bedrock than Ashdale and Dodgeville soils. They are darker in color than Chaseburg soils. They are finer in texture and darker in color than Kickapoo soils.

Huntsville silt loam, 0 to 2 percent slopes (HuA).—This soil is on natural levees beside streams. Areas of this soil are narrow, elongated tracts 80 to 180 acres in size.

This soil has a profile similar to the one described as representative for the series, but it is underlain by slightly darker material.

Included with this soil in mapping are small areas of somewhat poorly drained soils in depressional areas that collect runoff. These soils are slow to dry, and tillage operations are delayed.

This soil is suited to row crops, small grain, and hay. It is subject to flooding. Concerns of management are maintaining the organic-matter content and tilth of the surface layer, reducing flooding, and controlling erosion of streambanks. Capability unit IIw–11; woodland suitability group 2o1.

Huntsville silt loam, 2 to 6 percent slopes (HuB).—This soil is in drainageways and small draws. Areas of this soil are elongated tracts 2 to 10 acres in size. This soil has the profile described as representative for the series.

Included with this soil in mapping are small areas of Port Byron soils.

This soil is suited to row crops, small grain, and hay. It is subject to periodic flooding. The hazard of erosion

is moderate; gullying is especially difficult to control. Concerns of management are control of flooding and erosion and maintenance of the organic-matter content and tilth of the surface layer. Grassed waterways or mechanical structures can be used to prevent gullying. Capability unit IIe–5; woodland suitability group 2o1.

Kegonsa Series

The Kegonsa series consists of well-drained, nearly level and gently sloping, moderately deep soils on benches on outwash plains. These soils formed in loess and outwash under a thin stand of mixed hardwoods and an understory of prairie grasses. Loose sand and gravel are at a depth of about 33 inches (fig. 6).

In a representative profile in a cultivated area, the surface layer is very dark grayish-brown silt loam about 7 inches thick. The subsurface layer is brown, friable silt loam about 5 inches thick. The subsoil is dark brown and brown and is about 21 inches thick. The upper part of the subsoil is firm silty clay loam, and the lower part is firm sandy clay loam. The underlying material is varicolored, single-grained, calcareous sand and gravel.

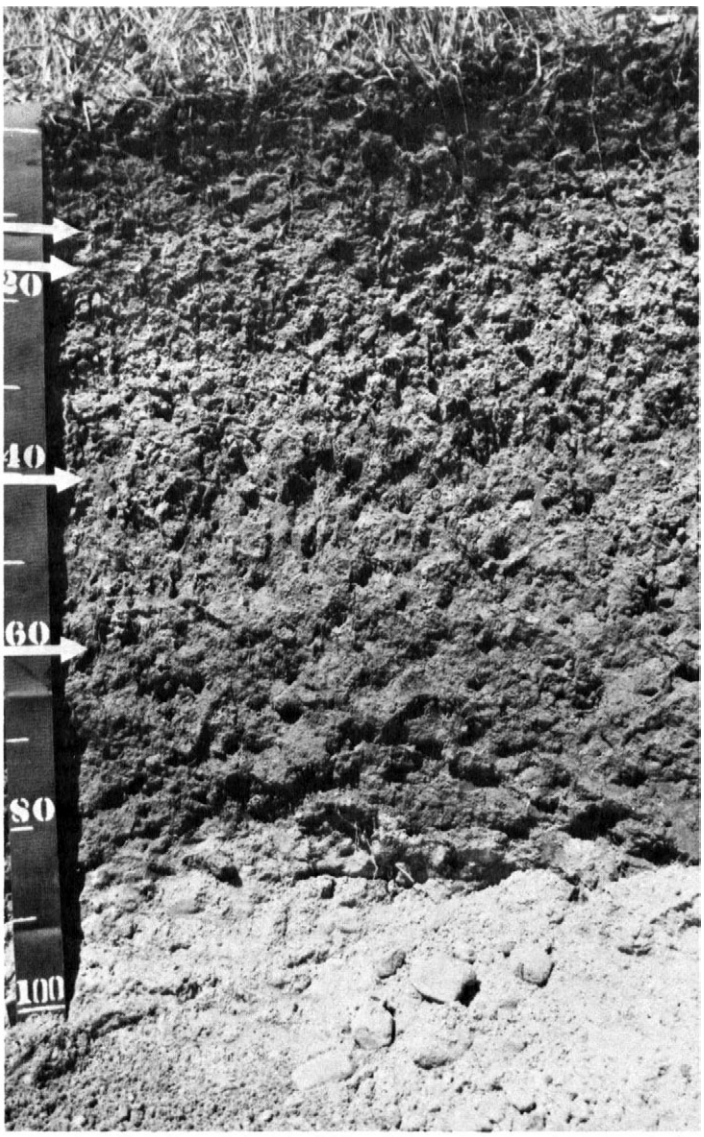

Figure 6.—**Profile of a Kegonsa silt loam. (Rule is in centimeters.)**

These soils have medium fertility. The available water capacity is medium, and permeability is moderate in the subsoil and rapid in the substratum. The water table commonly is at a depth of more than 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat. If these soils are cultivated, conservation practices that help to conserve moisture, control erosion, and maintain tilth and organic-matter content should be used.

Representative profile of Kegonsa silt loam, 2 to 6 percent slopes, in cultivated area, 150 feet east and 16 feet north of road, SE¼SW¼SW¼ sec. 16, T. 7 N., R. 8 E.:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, very fine, subangular blocky structure; friable; few roots; neutral; abrupt, smooth boundary.

A2—7 to 12 inches, brown (10YR 5/3) silt loam; weak, medium, platy structure; friable; few roots; slightly acid; clear, smooth boundary.

B1t—12 to 17 inches, dark-brown (10YR 4/3) light silty clay loam; moderate, very fine, subangular blocky structure; firm; few roots; thin, patchy, dark-brown (10YR 3/3) clay films; strongly acid; clear, smooth boundary.

B21t—17 to 23 inches, dark-brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown (10YR 3/3) clay films; strongly acid; clear, smooth boundary.

B22t—23 to 29 inches, dark-brown (10YR 4/3) silty clay loam; moderate, medium, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown (10YR 3/3) clay films; very pale brown (10YR 7/3) silt coats along major cleavage planes; strongly acid; clear, smooth boundary.

IIB23t—29 to 33 inches, brown (7.5YR 5/4) sandy clay loam; weak, coarse, subangular blocky structure; firm; few roots; patchy dark-brown (10YR 3/3) clay films; slightly acid; clear, smooth boundary.

IIC—33 to 60 inches, light brownish-gray (10YR 6/2), yellowish-brown (10YR 5/6), and light yellowish-brown (10YR 6/4) sand and gravel; single grained; loose; strong effervescence; moderately alkaline.

The solum ranges from 26 to 40 inches in thickness, which commonly is the same as the depth to free carbonates and the depth to sand and gravel. The silty sediment ranges from 24 inches to about 36 inches in thickness. The reaction of the solum below the influence of applied lime ranges from slightly acid to mildly alkaline. The sandy and gravelly outwash below the solum is mildly alkaline to moderately alkaline and has very slight to strong effervescence. The Ap horizon has hue of 10YR, value of 2 or 3, and chroma of 1 to 3. It has weak, subangular blocky or granular structure and is friable or very friable. The A2 horizon has hue of 10YR, value of 4 to 6, and chroma of 2 or 3. It has platy structure. The upper part of the B horizon is dark-brown or dark yellowish-brown silty clay loam. The lower part is clay loam, sandy clay loam, loam, or sandy loam. In some places tongues of the B2t horizon extend several feet into the C horizon. In some places a strongly illuviated horizon of clay and organic matter is at the contact of the calcareous sand and gravel. It normally has a darker color than the overlying part of the B horizon. The C horizon varies considerably in proportion of sand and gravel and generally is stratified.

Kegonsa soils are near Grays, Dresden, Batavia, Hayfield, and Marshan soils and Virgil soils, gravelly sub-

stratum. They have a silty B horizon underlain by sand and gravel, whereas Grays soils have a silty B horizon underlain by fine sand and silt. They have a thicker silt mantle than Dresden soils and a thinner silt mantle and solum than Batavia soils. They are better drained than Hayfield and Marshan soils and Virgil soils, gravelly substratum.

Kegonsa silt loam, 0 to 2 percent slopes (KeA).—This soil is on benches in stream valleys. Areas of this soil are irregularly shaped tracts 40 to 280 acres in size.

This soil has a profile similar to the one described as representative for the series, but it is slightly deeper to sand and gravel. In cultivated areas the surface layer is mostly very dark brown. In a few areas where the slopes are concave, the surface layer is darker.

Included with this soil in mapping are small areas of Hayfield soils and areas of moderately well drained soils that have a thicker and darker colored surface layer. Also included are a few small areas of Dresden soils and some small areas of Batavia soils, gravelly substratum.

If this soil is properly managed, it is well suited to row crops, small grain, and hay. It can be farmed intensively. The only limitation to the use of this soil is a moderate hazard of drought. The conservation of moisture and maintenance of the organic-matter content and tilth of the surface layer are helpful management practices. Capability unit IIs–1; woodland suitability group 2o1.

Kegonsa silt loam, 2 to 6 percent slopes (KeB).—This soil is on benches in stream valleys. Areas of this soil are elongated tracts 75 to 265 acres in size. Slope segments are 150 to 250 feet long.

This soil has the profile described as representative for the series. Where this soil is cultivated, the surface layer is nearly uniformly very dark grayish brown, but in a few areas it is dark brown.

Included with this soil in mapping are areas where this soil is eroded, tilth is poorer, and organic-matter content is lower. Also included are a few small areas of Batavia soils, gravelly substratum; a few small areas of Dresden and Warsaw soils; and small areas of soils that have sand and gravel at a depth of 40 to 60 inches.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitations to the use of this soil for crops are a moderate hazard of drought and a moderate hazard of erosion. The major concerns of management are conserving moisture, increasing organic-matter content, improving tilth, raising the level of fertility, and controlling erosion. Capability unit IIe–2; woodland suitability group 2o1.

Kickapoo Series

The Kickapoo series consists of deep, well drained and moderately well drained, gently sloping soils in narrow drainageways, on bottoms of intermittent streams, and on lower foot slopes of steep hills. These soils formed in alluvium. They are composed of local, water-deposited silt and sand over a loamy soil on benchlands. The alluvial material washed from uplands. During flooding, fresh soil is continually deposited on the Kickapoo soils. Therefore, the upper layers of these soils are not well-developed horizons but are the original layers of material as it was deposited by floodwater.

In a representative profile the surface layer is dark grayish-brown fine sandy loam about 7 inches thick. The underlying layer is massive fine sandy loam 34 inches thick. The upper part is grayish brown, and the lower part is brown. The buried alluvial soil is very dark grayish-brown fine sandy loam in the upper part and brown and dark-brown sandy loam in the lower part. Yellowish-brown, loose sand is below a depth of about 54 inches.

These soils have medium fertility. The available water capacity is medium, and permeability is moderately rapid in the subsoil and rapid in the underlying material. These soils are subject to frequent, brief floods. The water table does not rise above a depth of 3 feet during the growing season. Erosion of streambanks is active in many areas.

If these soils are protected from flooding and subsequent erosion, they are suited to corn, small grain, grasses, and legumes. Areas of these soils that are inaccessible or are too dissected by meandering streams for cropping are better suited to permanent pasture, woodland, or wildlife habitat than to most other uses. Diversions, contour tillage, and shaping and seeding of grassed waterways are especially helpful management practices.

Representative profile of Kickapoo fine sandy loam, 2 to 6 percent slopes, 20 yards east of road, in the southeast corner of sec. 17, T. 8 N., R. 6 E.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) fine sandy loam; weak, fine, subangular blocky structure; very friable; slightly acid; abrupt, smooth boundary.

C1—7 to 22 inches, grayish-brown (10YR 5/2) fine sandy loam; massive; friable; slightly acid; clear, wavy boundary.

C2—22 to 34 inches, brown (10YR 5/3) fine sandy loam; massive; friable; slightly acid; clear, wavy boundary.

C3—34 to 41 inches, brown (10YR 5/3) fine sandy loam; few, fine, distinct, strong-brown (7.5YR 5/6) mottles; weak, medium, platy structure; friable; slightly acid; clear, wavy boundary.

Ab—41 to 45 inches, very dark grayish-brown (10YR 3/2) fine sandy loam; weak, fine, granular structure; friable; slightly acid; abrupt, wavy boundary.

B1b—45 to 49 inches, brown (10YR 5/3) sandy loam; weak, medium, subangular blocky structure; friable; slightly acid; abrupt, wavy boundary.

B2b—49 to 54 inches, dark-brown (7.5YR 4/4) sandy loam; weak, medium, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

IICb—54 to 60 inches, yellowish-brown (10YR 5/6) sand; single grained; loose; neutral.

Differences in the source of sediment cause minor differences in color and texture throughout the profile. Chert fragments less than 2 inches in size occur in some places. The A horizon in a few areas is silt loam because of the presence of a thin layer of finer textured overwash. Reaction is slightly acid to neutral. In some places mottles are at a depth of 36 to 60 inches.

Kickapoo soils are near Chaseburg and Huntsville soils. They are coarser textured than Chaseburg soils. They are coarser textured and lighter colored than Huntsville soils.

Kickapoo fine sandy loam, 2 to 6 percent slopes (KcB).—This soil is on alluvial fans and in draws. Areas of this are long, narrow, ribbonlike tracts 3 to 15 acres in size.

Included with this soil in mapping are small areas of Huntsville and Chaseburg soils.

If this soil is protected from flooding and gullying, and if fertility and tilth are maintained, it is suited to many crops commonly grown in the county. Most of the acreage of this soil is cultivated. The rest is in pasture, woodland, meadow, or wildlife habitat. This soil has a moderate hazard of erosion. It is also subject to frequent, brief floods and to deposition of overwash. Gullies form quickly. Capability unit IIIw–12; woodland suitability group 3r2.

Kidder Series

The Kidder series consists of deep, well-drained, gently sloping to very steep soils on glaciated uplands. These soils formed in glacial till under mixed hardwoods. The depth to calcareous glacial till is 24 to 40 inches.

In a representative profile the surface layer is very dark grayish-brown loam about 3 inches thick. The subsurface layer is brown loam about 6 inches thick. In cultivated areas all or most of the subsurface layer commonly is incorporated into the surface layer and the surface layer is lighter in color. The subsoil is 29 inches thick. The upper 21 inches is brown sandy clay loam, and the lower 8 inches is strong-brown sandy loam. The underlying material is yellowish-brown, platy, calcareous sandy loam till.

These soils have medium fertility. The available water capacity is medium, and permeability is moderate.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are also suited to pasture, woodland, and wildlife habitat. If these soils are cultivated, control of erosion and maintenance of tilth and organic-matter content are helpful conservation practices.

Representative profile of Kidder loam, 2 to 6 percent slopes, in undisturbed area, in road cut on south side of road, NE¼SW¼SE¼ sec. 16, T. 5 N., R. 10 E.:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) loam; moderate, fine, granular structure; friable; common roots; slightly acid; abrupt, smooth boundary.

A2—3 to 9 inches, brown (10YR 5/3) loam; weak, medium, platy structure; friable; common roots; slightly acid; abrupt, smooth boundary.

B21t—9 to 14 inches, brown (7.5YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; firm; as much as 10 percent coarse fragments; common roots; very patchy, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, smooth boundary.

B22t—14 to 20 inches, brown (7.5YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; firm; as much as 10 percent coarse fragments; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, smooth boundary.

B23t—20 to 30 inches, brown (7.5YR 4/4) light sandy clay loam; moderate, fine, subangular blocky structure; as much as 10 percent coarse fragments; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; strongly acid; clear, smooth boundary.

B3—30 to 38 inches, strong-brown (7.5YR 5/6) sandy loam; weak, medium, subangular blocky structure; firm; as much as 10 percent coarse fragments; patchy, dark-brown (7.5YR 3/2) clay films; medium acid; gradual, wavy boundary.

C—38 to 60 inches, yellowish-brown (10YR 5/4) sandy loam; weak, medium, platy structure; friable; as much as 20 percent coarse fragments; slight effervescence; moderately alkaline.

The solum ranges from 24 to 40 inches in thickness. The Ap horizon, where present, ranges from dark grayish brown to brown. In some cultivated areas the A2 horizon is completely incorporated in the Ap horizon. The texture of the B2t horizon is clay loam or sandy clay loam. The underlying calcareous till is sandy loam or loamy sand.

Kidder soils are near McHenry, Dodge, and Virgil soils. They are similar to Griswold soils. Kidder soils do not have the mantle of loess of McHenry soils; rather, they formed entirely in glacial till. They lack the silt mantle of Dodge soils. They lack the silt mantle of Virgil soils, and they are better drained. They have a thinner and lighter colored A horizon than Griswold soils.

Kidder loam, 2 to 6 percent slopes (KdB).—This soil is on the top of ridges and on upper side slopes. Areas of this soil are elongated tracts 45 to 165 acres in size. Slope segments are 150 to 250 feet long.

This soil has the profile described as representative for the series. Where this soil is cultivated, the surface layer is nearly uniformly dark grayish brown and is about 8 inches thick, but in a few areas it is very dark grayish brown.

Included with this soil in mapping are areas where this soil is eroded and has a lighter colored, thinner plow layer; tilth is poorer; and the organic-matter content is lower. Also included are small areas of McHenry soils and areas of soils that are 40 to 50 inches deep to till.

If this soil is properly managed, it is suited to all crops commonly grown in the county. Some areas are in timber. The only limitation to the use of this soil is the moderate hazard of erosion. The major concerns of management are conserving moisture, improving organic-matter content and tilth, raising the level of fertility, and controlling erosion. Capability unit IIe–1; woodland suitability group 2o1.

Kidder loam, 6 to 12 percent slopes, eroded (KdC2).—This soil is in nearly uniformly shaped areas. Areas of this soil are ribbonlike tracts 20 to 225 acres in size. These areas are characterized by a few narrow drainageways. Slopes are slightly convex. Slope segments are 100 to 150 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to glacial till. Where this soil is cultivated, the surface layer is dark grayish brown and is 6 to 8 inches thick. In a few places the surface layer is brown.

Included with this soil in mapping are small areas of McHenry soils and areas of soils that have a surface layer of sandy loam and that have poorer tilth and are more difficult to manage than this Kidder soil.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation to the use of this soil is a severe hazard of erosion. The major concerns of management are controlling erosion, conserving moisture, improving organic-matter content and tilth of the surface layer, and raising the level of fertility. Capability unit IIIe–1; woodland suitability group 2o1.

Kidder loam, 12 to 20 percent slopes, eroded (KdD2).—This soil is on lower side slopes. Areas of this soil are elongated tracts 20 to 120 acres in size. These areas are characterized by a few narrow drainageways. Slope segments mainly are 80 to 130 feet long.

This soil has a profile similar to the one described as representative for the series, but it has an eroded plow layer and is 20 to 30 inches deep to calcareous sandy loam till. As a result of erosion, 2 to 6 inches of the original surface layer has been removed. The plow layer is less friable, lower in organic-matter content and fertility, and more difficult to keep in good tilth. The surface layer is brown, and in most places material from it is mixed with material from the dark yellowish-brown subsoil.

Included with this soil in mapping are small areas of soils that have slopes of 10 to 12 percent or 20 to 25 percent. Also included are some areas of soils that have a sandy loam surface layer and are subject to rapid runoff.

Much of this soil is in pasture. It is better suited to small grain, hay, forage crops, timber, and wildlife habitat than to most other uses. The hazard of erosion is very severe. The major concerns of management are improving organic-matter content, maintaining tilth, raising the level of fertility, and controlling erosion. Capability unit IVe–1; woodland suitability group 2r2.

Kidder soils, 10 to 20 percent slopes, eroded (KrD2). —These soils are in areas of drumlins and terminal and recessional moraines. Most of the acreage of these soils is moderately eroded, and the rest is slightly eroded.

These soils have a profile similar to the one described as representative for the series, but the surface layer is silt loam, loam, and sandy loam. Also, the depth to glacial till varies greatly over short distances.

Included with these soils in mapping are areas of Whalan soils and areas of soils that are 10 to 20 inches deep to till. Also included are some areas of soils that are severely eroded.

These soils are difficult to manage properly, because they lack uniformity. They are subject to a very severe hazard of erosion and are moderately droughty. They are better suited to small grain, hay, pasture, woodland, and wildlife habitat than to most other uses. Capability unit VIe–4; woodland suitability group 2r2.

Kidder soils, 20 to 35 percent slopes, eroded (KrE2). —These soils are in areas of drumlins and terminal and recessional moraines. Some areas of these soils are slightly to severely eroded.

These soils have a profile similar to the one described as representative for the series, but the surface layer is silt loam, loam, and sandy loam. Also, the depth to glacial till varies greatly over short distances.

Included with these soils in mapping are areas of Whalan and Dunbarton soils and areas of soils that are 10 to 20 inches deep to till. Also included are some areas of soils that have a severely eroded surface layer.

These soils are difficult to manage properly, because of their lack of uniformity. They are subject to a very severe hazard of erosion and are moderately droughty. Most areas of these soils are not cultivated. These soils are better suited to limited pasture, woodland, and wildlife habitat than to most other uses. Capability unit VIIe–4; woodland suitability group 2r2.

Made Land

Made land (Ma) is areas of land filled in with nonsoil material. The composition of these areas is quite varied, ranging from concrete and brick rubble to sanitary landfill sites. The physical characteristics vary from place to place. Slopes are nearly level or gently sloping. Capability unit VIIIs–10; woodland suitability group 4f2.

Marsh

Marsh (Mb) is poorly drained material adjacent to major rivers, streams, and lakes in all parts of the county. Texture varies greatly from place to place, and in many places there is no soil development. The natural vegetation is cattails, rushes, sedges, willows, and other water-tolerant plants.

The surface layer ranges from sandy loam to muck and is black or very dark brown. Below the surface layer, the material ranges from sand to silt loam, and in places is peat; is black or gray; and is slightly acid to neutral in reaction.

Fertility, available water capacity, and permeability are highly variable. This land type is flooded and has a high water table during most of the year.

Marsh is not suitable for crops or trees and has limited suitability for pasture. It is used mainly for wildlife habitat or recreation. Capability unit VIIIw–15; woodland suitability group 6w5.

Marshan Series

The Marshan series consists of moderately deep, poorly drained, nearly level soils on low benches in major stream valleys. These soils formed in moderately deep silty and loamy outwash and in deep sand outwash under sedges.

In a representative profile the surface layer is black silt loam about 13 inches thick. The subsoil is mottled and about 20 inches thick. The upper 5 inches is dark-gray silty clay loam, the middle 6 inches is gray clay loam, and the lower 9 inches is light brownish-gray loamy sand. The underlying material is pinkish-gray and brownish-yellow sand.

These soils have medium fertility. The available water capacity is medium, and permeability is moderate in the subsoil and rapid in the substratum. The water table is at a depth of less than 1 foot during wet seasons.

If these soils are adequately drained, they are well suited to row crops, small grain, and hay. Undrained areas are better suited to wildlife habitat and limited pasture than to most other uses. Surface runoff is slow. Small depressions retain water long enough to interfere with tillage. These soils are slow to warm in spring and quick to cool in fall. They are also subject to flooding. The major concerns of management are reducing wetness, reducing the hazard of flooding, maintaining or improving tilth and fertility, and raising the soil temperature. If these soils are cultivated, a drainage system is needed. Diversions that intercept runoff from higher lying areas are helpful. Surface drains help to remove ponded water. Most areas of these soils are improved by a complete system of open-ditch drains that lower the water table.

Representative profile of Marshan silt loam in ditch-

bank, 100 yards south of intersection of stream and County Trunk A, NE¼NE¼ sec. 23, T. 5 N., R. 7 E.:

Ap—0 to 9 inches, black (10YR 2/1) silt loam; moderate, very fine, granular structure; very friable; few roots; slightly acid; abrupt, smooth boundary.

A12—9 to 13 inches, black (N 2/0) silt loam; common, fine, distinct, dark-brown (7.5YR 3/2) mottles; moderate, very fine, subangular blocky structure; firm; few roots; slightly acid; clear, wavy boundary.

B1g—13 to 18 inches, dark-gray (N 4/0) silty clay loam; common, medium, distinct, dark-brown (7.5YR 3/2) mottles; moderate, fine, angular blocky structure; very firm; few roots; neutral; clear, wavy boundary.

B2g—18 to 24 inches, gray (N 5/0) clay loam; common, coarse, prominent, brown (7.5YR 4/4) mottles; weak, medium, prismatic structure parting to weak, fine, subangular blocky; firm; moderately alkaline; clear, wavy boundary.

IIB3g—24 to 33 inches, light brownish-gray (2.5Y 6/2) loamy sand; common, medium, prominent, dark-brown (7.5YR 4/4) mottles; weak, medium, subangular blocky structure; friable; moderately alkaline; gradual, wavy boundary.

IIC—33 to 60 inches, pinkish-gray (7.5YR 7/2) and brownish-yellow (10YR 6/6) sand; single grained; loose; moderately alkaline.

The A horizon ranges from black (10YR 2/1) to very dark gray (10YR 3/1) in color and from 10 to 20 inches in thickness. The silt mantle, where present, ranges from 10 to 20 inches in thickness. The thin upper part of the B horizon is silt loam or silty clay loam. The lower part ranges from loamy sand to clay loam in texture and from 8 to 18 inches in thickness. The depth to sand outwash is 24 to 40 inches. The reaction of the outwash ranges from slightly acid to moderately alkaline.

Marshan soils are near Sable, Dells, Hayfield, Adrian, Palms, Dresden, Granby and Houghton soils. They have a thinner silt mantle than Sable soils, which formed mainly in silt. They are more poorly drained than Dells and Hayfield soils. They formed in loam over sand, whereas Adrian soils formed in organic material over sand. They are finer textured than Granby soils. Marshan soils lack the organic overburden that the Palms and Houghton soils have.

Marshan silt loam (Mc).—This soil is on low benches. Areas of this soil are irregularly shaped tracts 40 to 480 acres in size. Some small areas of this soil pond water. Slopes are 0 to 2 percent. In cultivated areas, the surface layer is nearly uniformly black.

Included with this soil in mapping are areas, mostly south of Oregon, of soils that have a silt mantle 20 to 36 inches thick. Also included are some small areas of Sable soils, Hayfield soils, and soils that have a loam surface layer.

If this soil is adequately drained, it is suited to row crops, small grain, and hay. The major limitations to the use of this soil are wetness and medium fertility. Wetness causes the soil to warm slowly in spring and to cool quickly in fall. The major concerns of management are removing excess water, increasing fertility, maintaining high organic-matter content, and practicing timely tillage. Capability unit IIw–5; woodland suitability group 4w5.

McHenry Series

The McHenry series consists of deep, well-drained, gently sloping to moderately steep soils on glacial uplands. These soils formed in thin loess and sandy loam glacial till under thin stands of mixed hardwoods. The loess is 10 to 15 inches thick over till that is 5 to 20 feet or more thick. The depth to calcareous glacial till is 24 to 40 inches.

In a representative profile in a cultivated area, the surface layer is very dark grayish-brown silt loam about 7 inches thick. The subsoil is about 26 inches thick. The upper part of the subsoil is brown silty clay loam, the middle part is dark yellowish-brown silty clay loam, and the lower part is dark-brown sandy clay loam. The underlying material is calcareous, light yellowish-brown sandy loam till.

These soils have a medium level of fertility. The available water capacity is medium, and permeability is moderate. The water table is at a depth of more than 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat. If they are used for crops, conservation of moisture, control of erosion, and maintenance of tilth and organic-matter content are helpful management practices.

Representative profile of McHenry silt loam, 6 to 12 percent slopes, eroded, in cultivated area, 200 feet west of county line and 50 feet south of road, NW¼NE¼-NE¼ sec. 13, T. 9 N., R. 12 E.

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) silt loam, light brownish-gray (10YR 6/2) dry; moderate, very fine, granular structure; very friable; many roots; neutral; abrupt, smooth boundary.

B21t—7 to 13 inches, brown (10YR 4/3) silty clay loam; moderate, fine, subangular blocky structure; firm; many roots; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, smooth boundary.

B22t—13 to 18 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm; as much as 10 percent coarse fragments; few roots; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; medium acid; abrupt, smooth boundary.

IIB3t—18 to 33 inches, dark-brown (7.5YR 4/4) light sandy clay loam; moderate, medium, subangular blocky structure; firm; as much as 10 percent coarse fragments; few roots; patchy, dark-brown (7.5YR 3/2) clay films on all faces of peds; medium acid; gradual, wavy boundary.

IIC—33 to 60 inches, light yellowish-brown (10YR 6/4) sandy loam; weak, thick, platy structure; friable; as much as 20 percent coarse fragments; strong effervescence; moderately alkaline.

The Ap horizon ranges from very dark grayish brown to brown. In some areas the A2 horizon has been completely incorporated into the Ap horizon by plowing. The silt mantle is 10 to 20 inches thick. The B2t horizon is silty clay loam, clay loam, or sandy clay loam. The IIB3t horizon is light sandy clay loam or sandy loam. The underlying calcareous till is heavy sandy loam to loamy sand. The calcium carbonate equivalent of the till ranges from 15 to 32 percent. The till is brown (7.5YR 5/4, 10YR 5/3), yellowish brown (10YR 5/4), light yellowish brown (10YR 6/4), or strong brown (7.5YR 5/6).

McHenry soils are near Virgil, Kidder, Griswold, and Dodge soils. They have a thinner silt mantle and are better drained than Virgil soils. They have a B horizon that formed in silt and sandy loam glacial till, whereas Kidder soils formed entirely in sandy loam glacial till. They have a thinner A horizon than Griswold soils. McHenry soils have a thinner silt mantle than Dodge soils.

McHenry silt loam, 2 to 6 percent slopes (MdB).—This soil is on the top of ridges and on upper side slopes. Areas of this soil are elongated tracts 25 to 265

acres in size. Slope segments are 150 to 250 feet long.

This soil has a profile similar to the one described as representative for the series, but it is slightly deeper to calcareous till. In cultivated areas the surface layer is mostly dark grayish brown, and in a few areas it is dark gray.

Included with this soil in mapping are areas where this soil is eroded and has poorer tilth and lower organic-matter content. Also included are small areas of a Dodge silt loam and areas of soils that have a mantle of loess 10 to 15 inches thick.

If this soil is properly managed, it is well suited to all crops commonly grown in the country. The limitations to the use of this soil are a medium available water capacity and a moderate hazard of erosion. The major concerns of management are improving organic-matter content and tilth, conserving moisture, raising the level of fertility, and controlling erosion. Capability unit IIe–1; woodland suitability group 2o1.

McHenry silt loam, 6 to 12 percent slopes, eroded (MdC2).—This soil is on nearly uniformly shaped middle side slopes. Areas of this soil are ribbonlike tracts 40 to 125 acres in size. These areas are characterized by a few narrow drainageways. Slopes are slightly convex. Slope segments are 100 to 150 feet long.

This soil has the profile described as representative for the series. In cultivated areas the surface layer is generally very dark grayish-brown and is 6 to 8 inches thick. In a few places it is brown.

Included with this soil in mapping are small areas of Dodge silt loam, areas of a Kidder loam, and areas of soils that have a loess mantle 10 to 15 inches thick. Also included are areas of eroded soils that have poorer tilth and are more difficult to manage.

If this soil is properly managed, it is suited to all crops commonly grown in the county. Some areas are in timber. The limitations of this soil are a severe hazard of erosion and a medium available water capacity. The major concerns of management are controlling erosion, conserving moisture, improving the organic-matter content and tilth of the surface layer, and increasing fertility. Capability unit IIIe–1; woodland suitability group 2o1.

McHenry silt loam, 12 to 20 percent slopes, eroded (MdD2).—This soil is on lower side slopes. Areas of this soil are 20 to 180 acres in size. These areas are characterized by a few narrow drainageways. Slope segments mainly are 80 to 130 feet long.

This soil has a profile similar to the one described as representative for the series, but the loess mantle is not so thick and the depth to calcareous till is less. About 2 to 8 inches of the surface layer has been lost through water erosion, and the present surface layer is brown; in some areas material from the surface layer is mixed with that from the brown subsoil, and the plow layer is less friable, lower in organic-matter content and fertility, and more difficult to keep in good tilth.

Included with this soil in mapping are small areas of soils that have slopes of more than 20 percent or less than 12 percent. Also included are small areas of soils that have a loam surface layer and areas of soils that have loess 8 to 15 inches thick.

Many areas of this soil are in pasture or trees. Some areas are in timber. This soil has a very severe hazard of erosion. It has medium available water capacity. The major concerns of management are improving organic-matter content, conserving moisture, maintaining tilth, increasing fertility, and controlling erosion. Capability unit IVe–1; woodland suitability group 2r2.

Meridian Series

The Meridian series consists of well-drained, nearly level and gently sloping soils on benches in large stream valleys. These soils formed in moderately deep, loamy outwash and deep, acid, sandy outwash under mixed hardwoods.

In a representative profile the surface layer is very dark brown loam about 8 inches thick. The subsoil is about 28 inches thick. The upper part of the subsoil is dark-brown clay loam, the middle part is dark yellowish-brown sandy clay loam, and the lower part is brown sandy loam and loamy sand. The underlying material is loose, yellowish-brown medium sand.

These soils have medium fertility. The available water capacity is medium, and permeability is moderate in the subsoil and rapid in the substratum. The seasonal high water table is at a depth of 5 feet or more.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. If these soils are cultivated, the control of soil blowing and water erosion and maintenance of tilth and organic-matter content are helpful conservation practices.

Representative profile of Meridian loam, 0 to 2 percent slopes, in cultivated area, in the northeast corner of sec. 34, T. 5 N., R. 8 E.:

Ap—0 to 8 inches, very dark brown (10YR 2/2) loam; moderate, fine, subangular blocky structure; friable; common roots; neutral; abrupt, smooth boundary.

B21t—8 to 17 inches, dark-brown (10YR 4/3) clay loam; moderate, fine, subangular blocky structure; firm; common roots; thin, patchy, very dark grayish-brown (10YR 3/2) clay films; slightly acid; clear, smooth boundary.

B22t—17 to 24 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; weak, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; slightly acid; gradual, wavy boundary.

B31t—24 to 31 inches, brown (7.5YR 4/4) sandy loam; weak, medium, subangular blocky structure; friable; clay bridging between sand grains; slightly acid; clear, smooth boundary.

IIB32—31 to 36 inches, brown (7.5YR 4/4) loamy sand; weak, medium, subangular blocky structure; very friable; medium acid; clear, wavy boundary.

IIC—36 to 60 inches, yellowish-brown (10YR 5/4) medium sand; single grained; loose; medium acid.

The A horizon ranges from black (10YR 2/1) to dark brown (10YR 3/3) and from 6 to 10 inches in thickness. The B horizon is sandy clay loam or clay loam in the upper part and sandy loam or loamy sand in the lower part. The depth to loose sand outwash is 20 to 40 inches. The reaction of the sandy outwash ranges from strongly acid to slightly acid. Strong-brown (7.5YR 4/6) to dark-brown (7.5YR 4/4) bands of loamy sand and sandy loam ¼ to ¾ inch thick are at a depth of 36 to 60 inches in many places. The

cumulative thickness of these bands above a depth of 5 feet is less than 6 inches.

Meridian soils are near Hayfield, Dells, and Dickinson soils. They are better drained than Hayfield soils. They are better drained than Dells soils and they do not have the silt mantle of Dells soils. They have a finer textured solum than Dickinson soils.

Meridian loam, 0 to 2 percent slopes (MeA).—This soil is in areas on benchlands. Areas of this soil are irregularly shaped tracts 40 to 460 acres in size. This soil has the profile described as representative for the series.

Included with this soil in mapping are small areas of soils that have been moderately eroded by soil blowing. Also included are some small areas of Hayfield soils, areas of moderately well drained soils, some areas of soils that have a sandy loam surface layer, and areas of Dickinson soils.

If this soil is properly managed, it is suited to all crops commonly grown in the county. If supplemental irrigation is practiced, this soil is well suited to specialty crops such as potatoes, tomatoes, beans, green peppers, and cucumbers. The major limitations to the use of this soil are medium available water capacity and a moderate hazard of soil blowing. Some concerns of management are conserving moisture, controlling soil blowing, maintaining organic-matter content and tilth of the surface layer, and increasing fertility. Capability unit IIs–1; woodland suitability group 2o1.

Meridian loam, 2 to 6 percent slopes (MeB).—This soil is on benchlands. Areas of this soil are elongated tracts 30 to 100 acres in size. Slopes are convex. Segments are 200 to 300 feet long.

This soil has a profile similar to the one described as representative for the series, but it has a lighter colored surface layer and is shallower to loose outwash. In a few areas of concave slopes, the surface layer is darker colored.

Included with this soil in mapping are some small areas of soils that have mottles in the lower part of the subsoil. Also included are small areas of soils that have a sandy loam surface layer and small areas of Dickinson soils.

If this soil is properly managed, it is suited to all crops commonly grown in the county. If supplemental irrigation is practiced, this soil is well suited to specialty crops such as potatoes, tomatoes, beans, and green peppers. Limitations to the use of this soil are a medium available water capacity and moderate hazards of soil blowing and water erosion. The major concerns of management are conserving moisture, controlling soil blowing and water erosion, and maintaining the organic-matter content of the surface layer. Capability unit IIe–2; woodland suitability group 2o1.

Military Series

The Military series consists of moderately deep, well-drained, sloping to steep soils on glaciated uplands. These soils are in areas of shallow glacial drift where sandstone bedrock is exposed (fig. 7). They formed in sandy loam glacial till and sandstone bedrock. The upper part of the soils formed in weathered glacial till about 28 inches thick. The lower part formed in residuum weathered from sandstone.

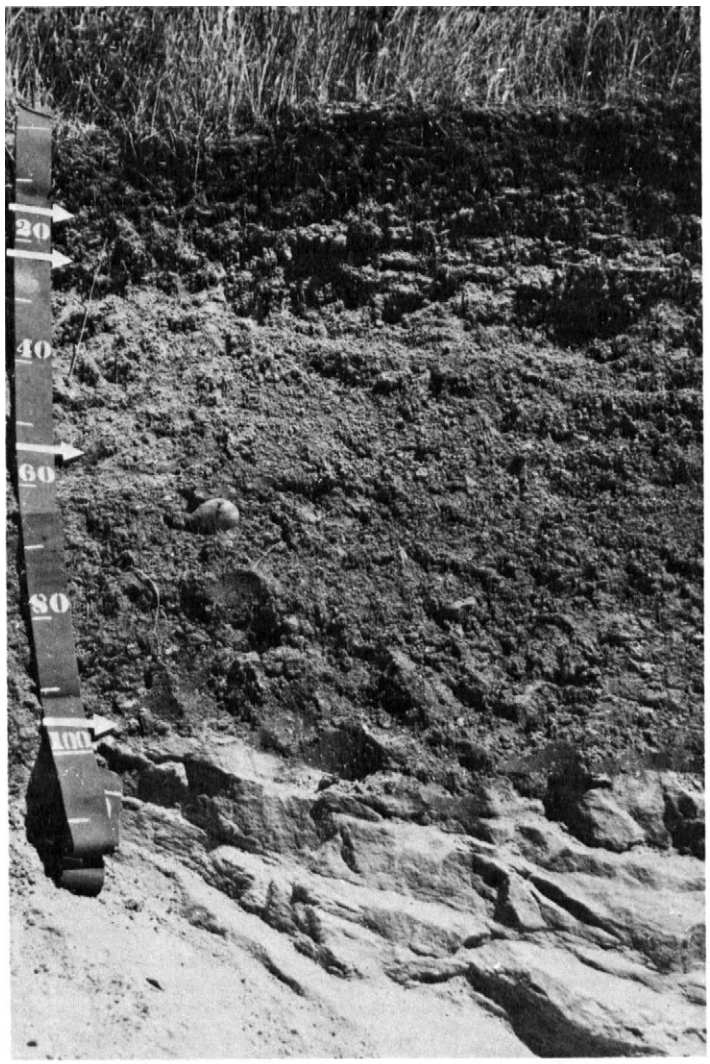

Figure 7.—**Profile of a Military loam. Platy sandstone is at a depth of about 38 inches. (Rule is in centimeters.)**

In a representative profile the surface layer is dark grayish-brown loam about 5 inches thick. The subsurface layer is brown loam about 4 inches thick. The subsoil is about 24 inches thick. The upper part is brown loam, the middle part is brown sandy clay loam, and the lower part is strong-brown sandy loam. The underlying material is yellowish-brown sandstone bedrock. In some places this sandstone bedrock is strongly cemented.

These soils have medium fertility. The available water capacity is medium or low, and permeability is moderate. The root zone is slightly restricted because of the depth of these soils, which ranges from 20 to 40 inches. The water table is at a depth of more than 5 feet.

These soils are suited to most crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture,

woodland, and wildlife habitat. If these soils are cultivated, conservation practices help to control erosion and conserve moisture.

Representative profile of Military loam, 6 to 12 percent slopes, eroded, in road cut in undisturbed area, 20 feet east of farm driveway, SE¼SE¼ sec. 13, T. 6 N., R. 12 E.:

A1—0 to 5 inches, dark grayish-brown (10YR 4/2) loam; moderate, medium, granular structure; very friable; common roots; neutral; abrupt, smooth boundary.

A2—5 to 9 inches, brown (10YR 5/3) loam; moderate, medium, platy structure; very friable; common roots; neutral; abrupt, smooth boundary.

B21t—9 to 16 inches, brown (7.5YR 4/4) heavy loam; moderate, fine, subangular blocky structure; friable; few roots; thin patchy clay films; many glacial pebbles; medium acid; clear, wavy boundary.

B22t—16 to 28 inches, brown (7.5YR 4/4) sandy clay loam; moderate, fine, subangular blocky structure; firm; few roots; thin, patchy, dark brown (7.5YR 3/2) clay films; many glacial pebbles; strongly acid; abrupt, wavy boundary.

B3—28 to 33 inches, strong-brown (7.5YR 5/6) sandy loam; weak, medium, subangular blocky structure; friable; few roots; many glacial pebbles; strongly acid; abrupt, smooth boundary.

R—33 to 60 inches, yellowish-brown (10YR 5/8), platy, weakly cemented sandstone bedrock; slightly acid.

The solum ranges from 20 to 40 inches in thickness. The Ap horizon, where present, is 6 to 8 inches thick and is very dark grayish brown (10YR 3/2) to brown (10YR 4/3). The Bt horizon is loam, sandy clay loam, and clay loam.

Military soils are near Elkmound, Rockton, and Whalan soils. They are deeper to sandstone bedrock and have a finer textured B horizon than Elkmound soils. They have a thinner and lighter colored A horizon than Rockton soils. Military soils are underlain by sandstone, whereas Whalan soils are underlain by dolomite.

Military loam, 6 to 12 percent slopes, eroded (MhC2).—This soil is on middle and lower side slopes on uplands. Areas of this soil are long and narrow. This soil has the profile described as representative for the series.

Included with this soil in mapping are a few small areas of severely eroded soils that have poor tilth and low organic-matter content and that are difficult to cultivate. Also included are small areas of soils that have a silt loam surface layer and a few areas of soils that have slopes of 2 to 6 percent.

If conservation practices are used, this soil is suited to row crops, small grain, and hay. The major limitations to the use of this soil are a severe hazard of erosion and medium available water capacity. Capability unit IIIe–2; woodland suitability group 2o1.

Military loam, 12 to 20 percent slopes, eroded (MhD2).—This soil is on lower side slopes on uplands. Areas of this soil are long and narrow. Slope segments are 50 to 100 feet long.

This soil has a profile similar to the one described as representative for the series, but it is shallower to sandstone. Where this soil is cultivated, the surface layer is dark grayish brown or dark brown.

Included with this soil in mapping are small areas of an Elkmound loam. Also included are some small areas of Dodge and St. Charles soils at the base of slopes and in drainageways.

This soil is better suited to small grain, forage crops, timber, and wildlife habitat than to most other uses. The major limitations are a very severe hazard of erosion and medium available water capacity. Careful management is needed to control erosion and conserve moisture. A large amount of rainfall runs off this soil because of its moderately steep slopes and reduced infiltration rate. The large amount of runoff results in a very severe hazard of erosion. Capability unit IVe–2; woodland suitability group 2r2.

Military loam, 20 to 30 percent slopes, eroded (MhE2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 10 to 145 acres in size. These areas are characterized by drainageways. Some topsoil material has accumulated at the base of slopes. Slope segments are 75 to 125 feet long.

This soil has a profile similar to the one described as representative for the series, but in areas of timber it is 20 to 26 inches deep to sandstone. Also, the available water capacity is low. Where this soil is cultivated, the surface layer is brown.

Included with this soil in mapping are small areas of Elkmound soils and Stony and rocky land. Also included are areas of soils that have a severely eroded surface layer and some small areas of Dodge and St. Charles soils at the base of slopes and in drainageways.

This soil is better suited to pasture, woodland, and wildlife habitat than to most other uses. The major limitations of this soil are steepness, a very severe hazard of erosion, and low available water capacity. Management practices such as pasture renovation, tree planting, and plantings for wildlife habitat are helpful. Capability unit VIe–2; woodland suitability group 2r2.

Montgomery Series

The Montgomery series consists of deep, poorly drained, nearly level soils in old lake basins on outwash plains. These soils formed in silty and clayey lake-laid sediment under sedges.

In a representative profile the surface layer is silty clay loam about 17 inches thick; the upper 14 inches is black, and the lower 3 inches is very dark gray. The subsoil is 28 inches thick. The upper 8 inches of the subsoil is dark-gray silty clay, and the lower 20 inches is gray clay. The underlying material is laminated, pinkish-gray silty clay loam.

These soils have medium fertility. The available water capacity is medium and high, and permeability is moderately slow in the subsoil and slow in the substratum. Runoff is slow, and ponding is common. The seasonal high water table is at a depth of 0 to 1 foot.

Areas of these soils that are not drained are better suited to limited pasture or wildlife habitat than to most other uses. Both surface and subsurface drainage are needed to achieve successful production of crops. Tile drains are satisfactory if installed properly. Because free lime is throughout the soil, it is difficult to attain a level of fertility adequate for crops.

Representative profile of Montgomery silty clay loam, 0 to 3 percent slopes, in cultivated area, 100 yards south of barn, SW¼NW¼ sec. 12, T. 5 N., R. 12 E.:

Ap—0 to 10 inches, black (N 2/0) silty clay loam; weak, very fine, subangular blocky structure; firm; mildly alkaline; abrupt, smooth boundary.

A12—10 to 14 inches, black (N 2/0) silty clay loam; moderate, fine, granular structure; friable; moderately alkaline; strong effervescence; abrupt, smooth boundary.

A3g—14 to 17 inches, very dark gray (N 3/0) silty clay loam; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, fine, granular structure; strong effervescence; firm; moderately alkaline; clear, smooth boundary.

B21g—17 to 25 inches, dark gray (N 4/0) silty clay; many, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, very fine, subangular blocky structure; firm; patchy clay films on vertical faces; strong effervescence; moderately alkaline; clear, smooth boundary.

B22g—25 to 32 inches, gray (N 5/0) clay; common, medium, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, angular blocky structure; firm; strong effervescence; moderately alkaline; clear, smooth boundary.

B31g—32 to 45 inches, gray (N 6/0) clay; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles; moderate, medium, prismatic structure; very firm; strong effervescence; moderately alkaline; clear, smooth boundary.

Cg—45 to 60 inches, pinkish-gray (7.5YR 6/2) silty clay loam; common, coarse, distinct, yellowish-brown (10YR 5/6) mottles; laminated; very firm; strong effervescence; moderately alkaline.

The solum ranges from 26 to 48 inches in thickness. In many areas the A horizon is calcareous. The B horizon is silty clay loam, silty clay, and clay. The substratum is stratified silt and clay. Depth to free carbonates is 10 to 15 inches.

Montgomery soils in this survey area have free carbonates at a depth of 10 to 15 inches, which is shallower than is defined for the series, but this difference does not affect the usefulness or behavior of the soils.

Montgomery soils are near Del Rey, Sable, and Colwood soils and Salter soils, wet variant. They are more poorly drained than Del Rey soils. They are finer textured than Sable and Colwood soils. They are finer textured and more poorly drained than Salter soils, wet variant.

Montgomery silty clay loam, 0 to 3 percent slopes (MoA).—This soil is on low benches in stream valleys. Areas of this soil are irregularly shaped tracts 80 to 240 acres in size. Water ponds in concave areas.

Included with this soil in mapping are areas of soils that have a mucky surface layer and areas of soils that are slightly better drained and have a lighter colored and thinner surface layer.

If this soil is properly drained, fair production of the crops commonly grown in the county can be expected. If not drained, this soil is better suited to limited pasture and wildlife habitat than to most other uses. The major limitations to the use of this soil are poor surface drainage and poor internal drainage. Adequate drainage of this soil is difficult. A high level of management includes artificial drainage, maintenance of the tilth of the surface layer, and an amelioration of fertility problems by reducing the amount of lime in both the surface layer and the subsoil. Open-ditch and tile drainage systems remove excess water. The spacing of tile lines must be quite narrow to achieve efficient drainage. Proper tillage practices are also very important. If this soil is cultivated when wet, the structure of the surface soil is broken down and subsequent tillage is very difficult. Capability unit IIw–1; woodland suitability group 3w5.

NewGlarus Series

The NewGlarus series consists of moderately deep, well-drained, gently sloping to steep soils on uplands. These soils formed in moderately thin loess and red clayey residuum underlain at a depth of 20 to 40 inches by fractured dolomite.

In a representative profile the surface layer is very dark grayish-brown silt loam 6 inches thick. It is a distinctive gray color when dry. The subsurface layer is brown, friable silt loam about 2 inches thick. The subsoil is about 27 inches thick. The upper 9 inches is dark yellowish-brown, firm silty clay loam, the middle 11 inches is dark yellowish-brown silty clay, and the lower 7 inches is reddish-brown, extremely firm clay. The underlying material is fractured dolomite, the cracks of which are filled with material from the subsoil. In some places the dolomite is very sandy.

These soils have medium fertility. The available water capacity is low and medium, and permeability is moderate in the upper part and moderately slow in the lower part. The water table is below a depth of 5 feet.

If properly managed, most of these soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are suited to pasture, woodland, and wildlife habitat. Many of the steeper soils are in timber. If these soils are cultivated, conservation practices help to control erosion and conserve moisture.

Representative profile of NewGlarus silt loam, 2 to 6 percent slopes, eroded, in a cultivated area, in the southeast corner of sec. 13, T. 7 N., R. 7 E.:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry; moderate, very fine, subangular blocky structure; friable; few roots; neutral; abrupt, smooth boundary.

A2—6 to 8 inches, brown (10YR 4/3) silt loam; moderate, thin, platy structure; friable; few roots; neutral; abrupt, smooth boundary.

B21t—8 to 17 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, medium, subangular blocky structure; firm; few roots; thick clean silt coats; thin, discontinuous, dark yellowish-brown (10YR 3/4) clay films; slightly acid; clear, smooth boundary.

IIB22t—17 to 28 inches, dark yellowish-brown (10YR 4/4) silty clay; moderate, fine, angular blocky structure; very firm; few roots; many iron and manganese concretions; thin, discontinuous, dark brown (7.5YR 4/4) clay films; medium acid; clear, smooth boundary.

IIB23t—28 to 35 inches, reddish-brown (5YR 4/4) clay; moderate, fine, angular blocky structure; extremely firm; few roots; continuous, dark reddish-brown (5YR 3/2) clay films; slightly acid; clear, smooth boundary.

R—35 to 60 inches, partially shattered and disintegrated dolomite.

The A horizon ranges from 2 to 9 inches in thickness and is very dark brown (10YR 2/2), very dark grayish brown (10YR 3/2), dark grayish brown (10YR 4/2), or brown (10YR 4/3). In severely eroded areas the A horizon is brown (10YR 4/3) to dark yellowish-brown (10YR 4/4) silt loam to silty clay. The part of the profile that formed in clayey residuum is 10 to 20 inches thick. The loess mantle is 15 to 30 inches thick. The depth to dolomite is 20 to 40 inches.

NewGlarus soils are near Dodgeville, Dunbarton, and Sogn soils. They have a thinner and lighter colored surface layer than Dodgeville soils. They have a thicker loess mantle than Dunbarton soils. They formed partly in clayey residuum, which Sogn soils did not.

NewGlarus silt loam, 2 to 6 percent slopes, eroded

(NeB2).—This soil is on the top of broad ridges and on upper side slopes on uplands. Areas of this soil are 75 to 165 acres in size. Slopes are smooth and convex. Slope segments are 150 to 200 feet long. This soil has the profile described as representative for the series.

Included with this soil in mapping are small areas of soils that are deeper than 40 inches to dolomite. Also included are some small areas of soils that have slopes of 6 to 8 percent and that are subject to a severe hazard of erosion.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The slope and reduced infiltration rate of this soil contribute to its erodibility. Conservation practices help to control erosion. It is important to conserve moisture because of the medium available water capacity of this soil. Capability unit IIe–2; woodland suitability group 2o1.

NewGlarus silt loam, 6 to 12 percent slopes, eroded (NeC2).—This soil is on middle side slopes. Areas of this soil are ribbonlike tracts 40 to 100 acres in size. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. Slope segments are 100 to 175 feet long.

This soil has a profile similar to the one described as representative for the series, but it is slightly shallower to dolomite. In eroded areas the surface layer is brown.

Included with this soil in mapping are areas of Sogn and Dunbarton soils.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The major limitations to the use of this soil are slope and medium available water capacity. Because of the medium available water capacity, severe hazard of erosion, and moderate depth to bedrock, it is important to conserve moisture and control erosion. Capability unit IIIe–2; woodland suitability group 2o1.

NewGlarus silt loam, 12 to 20 percent slopes, eroded (NeD2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 40 to 125 acres in size. These areas are characterized by small drainageways. Some topsoil material has accumulated at the base of slopes. Slope segments are 50 to 100 feet long.

This soil has a profile similar to the one described as representative for the series, but it has a brown or dark grayish-brown surface layer 5 or 6 inches thick. Some material from the subsoil is incorporated in the surface layer where this soil is cultivated. The depth to dolomite is 20 to 30 inches.

Included with this soil in mapping are areas of Dunbarton and Sogn soils. Also included are some small areas of Seaton and Chaseburg soils at the base of slopes and in small drainageways.

This soil is better suited to meadow, pasture, woodland, and wildlife habitat than to most other uses. Under good management some row crops can be safely grown. The major limitations to the use of this soil are moderate steepness, a very severe hazard of erosion, and low available water capacity. Conservation practices help to control erosion and conserve moisture. Capability unit IVe–2; woodland suitability group 2r2.

NewGlarus silt loam, 20 to 30 percent slopes, eroded (NeE2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 20 to 145 acres in size. These areas are characterized by small drainageways. Some topsoil material has accumulated at the base of slopes. Slope segments are 50 to 100 feet long.

This soil has a profile similar to the one described as representative for the series, but it is 20 to 26 inches deep to dolomite. Where this soil is cultivated, it has a brown surface layer 5 to 7 inches thick.

Included with this soil in mapping are small areas of Dunbarton and Sogn soils. Also included are areas of soils that are severely eroded. These soils have low organic-matter content and poor tilth. Also included are some small areas of Seaton and Chaseburg soils at the base of slopes and in small drainageways.

This soil is better suited to pasture, woodland, and wildlife habitat than to most other uses. Some areas are in timber. The major limitations to the use of this soil are steepness, a very severe hazard of erosion, and low available water capacity. If this soil is used for pasture, renovation is helpful. Capability unit VIe–2; woodland suitability group 2r2.

Orion Series

The Orion series consists of deep, somewhat poorly drained, nearly level soils on flood plains and narrow stream bottoms. These soils formed in moderately thick, recent silty alluvium and deep, dark-colored, older silty alluvium under mixed hardwoods. The recent alluvium is dark grayish brown and grayish brown because that is the color of the source material that is eroding from higher lying areas. Flooding is frequent, and sediment is continuously deposited on the surface of these soils.

In a representative profile the surface layer is dark grayish-brown silt loam about 4 inches thick. The next 27 inches is dark grayish-brown and grayish-brown, friable silt loam. At a depth of 31 inches is buried older alluvium that is neutral, black, friable silt loam in the upper 6 inches and very dark grayish brown silt loam that has a gritty feel in the next 7 inches. This is underlain by dark-gray silt loam. Common dark reddish-brown and reddish-brown mottles are present in the buried soil.

These soils have high fertility. The available water capacity is high or very high, and permeability is moderate. The water table is at a depth of 1 to 3 feet in spring. These soils hold about 12 inches of water available in the upper 5 feet.

If these soils are properly managed, they are suited to all crops commonly grown in the county except alfalfa. Cultivation of these soils is difficult because of frequent flooding and the ponding that follows floods or prolonged rainfall. Surface drainage and subsurface drainage commonly are needed for maximum crop production. If these soils are protected from flooding and adequate drainage is provided, good crop production can be expected. If drainage is not feasible, the soils are better suited to pasture, woodland, or wildlife habitat than to most other uses. Tile drainage generally is not feasible. Surface and open-ditch drainage systems commonly are adequate to remove excess water. Flooding can be reduced by using dikes and by deepening the stream channel.

Representative profile of Orion silt loam, in ditch-

bank in undisturbed area, where field road crosses creek, NW¼SW¼ sec. 20, T. 7 N., R. 6 E.:

A1—0 to 4 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, fine, subangular blocky structure; very friable; common roots; mildly alkaline; clear, smooth boundary.
C1—4 to 15 inches, dark grayish-brown (10YR 4/2) silt loam; common, fine, distinct, strong-brown (7.5YR 5/8) and brown (10YR 5/3) mottles; moderate, very thin, platy structure; friable; common roots; mildly alkaline; abrupt, smooth boundary.
C2—15 to 31 inches, laminated, thin lenses of dark grayish-brown (10YR 4/2), grayish-brown (10YR 5/2), and very dark brown (10YR 2/2) silt loam; common, medium, distinct, dark-brown (7.5YR 4/4) mottles; friable; mildly alkaline; abrupt, smooth boundary.
A11b—31 to 37 inches, black (N 2/0) silt loam that has a gritty feel; common, medium, distinct, dark reddish-brown (5YR 3/2) mottles; weak, medium, subangular blocky structure; friable; neutral; clear, smooth boundary.
A12b—37 to 44 inches; very dark grayish-brown (2.5Y 3/2) silt loam that has a gritty feel; common, medium, prominent, reddish-brown (5YR 4/4) mottles; weak, coarse, subangular blocky structure; firm; neutral; clear, smooth boundary.
C3—44 to 60 inches, dark-gray (5Y 4/1) silt loam; common, coarse, prominent, dark reddish-brown (5YR 3/4) mottles; massive; very firm; neutral.

The recently deposited dark grayish-brown silt loam is 20 to 40 inches thick. The color is derived from the mineral grain color of the parent material. In places thin layers of fine sand occur in these layers. Mottling normally occurs at a depth of 8 to 18 inches. The thickness and arrangement of the horizons vary somewhat because of stratification.

Orion soils are near Huntsville soils. Orion soils are similar to Otter soils. They have a lighter colored A horizon and are better drained than Otter soils. They are lighter colored and more poorly drained than Huntsville soils.

Orion silt loam (Or).—This soil is on stream flood plains. Areas of this soil are elongated tracts 20 to 200 acres in size. Slopes are 0 to 2 percent.

This soil has the profile described as representative for the series. Where this soil is cultivated, the surface layer is nearly uniformly dark grayish brown. In a few areas where water is ponded, the surface layer is darker.

Included with this soil in mapping are small areas of Orion silt loam, wet, and Chaseburg soils. Also included are a few areas of soils that are better drained.

If this soil is adequately drained, it is suited to row crops, small grain, and hay. If undrained, it is better suited to pasture and wildlife habitat than to most other uses. The major limitations to the use of this soil are excess water and frequent flooding. The major concerns of management are removing excess water, controlling flooding, and maintaining the organic-matter content and tilth of the surface layer. Capability unit IIw–13; woodland suitability group 3o1.

Orion silt loam, wet (Os).—This soil is on low bottoms of stream valleys. Areas of this soil are elongated tracts 60 to 200 acres in size. Slopes are 0 to 2 percent. Water ponds in concave areas.

This soil has a profile similar to the one described as representative for the series, but it is grayer in the upper part and the seasonal high water table is at a depth of 0 to 1 foot. Color and thickness of the surface layer vary slightly according to the kind of alluvium.

Included with this soil in mapping are a few small areas of Wacousta, Sable, and Otter soils.

This soil is better suited to pasture, woodland, and wildlife habitat than to most other uses. The major limitations are a very high water table, slope, and a very severe hazard of flooding. Capability unit IIIw–3; woodland suitability group 3o1.

Otter Series

The Otter series consists of deep, poorly drained, nearly level soils on stream bottoms. These soils formed in moderately deep recent silty alluvium and buried older silty alluvium under prairie grasses. The upper part of these soils is dark-colored material that eroded from higher lying areas.

In a representative profile the surface layer is very dark gray silt loam about 10 inches thick. The next layer is black silt loam about 43 inches thick. The underlying material is very dark gray, light olive-brown, and dark grayish-brown silt loam alluvium.

These soils have high fertility. Available water capacity is very high, and permeability is moderately slow. The water table is at a depth of less than 1 foot in spring.

If these soils are adequately drained, they are suited to all crops commonly grown in the county. In undrained areas, these soils are suited to limited pasture and wildlife habitat. Adequate drainage for the production of row crops is difficult because of the moderately slow permeability of these soils. The seasonal high water table delays tillage in spring. These soils are subject to long, frequent floods. If maximum crop production is desired, drainage is needed. Diversions that intercept runoff from higher lying soils and surface drains that drain ponded areas help to provide adequate drainage. Straightening the stream channel and diking help to reduce flooding. Open-ditch drains and closely spaced tile drains, minimum tillage, return of crop residue, and timely tillage, along with other practices that maintain tilth and fertility, are important management practices.

Representative profile of Otter silt loam, in cultivated area, 50 feet west of road, 100 feet south of creek, NE¼SW¼NE¼, sec. 15, T. 5 N, R. 7 E.:

Ap—0 to 10 inches, very dark gray (N 3/0) silt loam; weak, fine, subangular blocky structure; friable; many roots; neutral; abrupt, smooth boundary.
A12—10 to 20 inches, black (N 2/0) silt loam; weak, fine, granular structure; firm; many roots; neutral; gradual, smooth boundary.
A13—20 to 30 inches, black (N 2/0) silt loam; weak, fine, subangular blocky structure; firm; mildly alkaline; gradual, smooth boundary.
A14—30 to 53 inches, black (N 2/0) silt loam; weak, medium, subangular blocky structure; firm; mildly alkaline; gradual, wavy boundary.
C1—53 to 59 inches, very dark gray (N 3/0) heavy silt loam; common, fine, distinct, dark grayish-brown (2.5Y 4/2) and gray (5Y 5/1) mottles; massive; very firm; mildly alkaline; gradual, wavy boundary.
C2—59 to 65 inches, variegated light olive-brown (2.5Y 5/4) and dark grayish-brown (2.5Y 4/2) heavy silt loam; common, fine, distinct, light olive-gray (5Y 6/2) mottles; massive; very firm; moderately alkaline.

In most places the more recent deposits of dark-colored

silty material are more than 40 inches thick. The lower horizons are silt loam or silty clay loam.

Otter soils are near Huntsville soils. Otter soils are similar to Orion soils, wet. They are more poorly drained than Huntsville soils. They are darker colored than Orion soils, wet.

Otter silt loam (Ot).—This soil is on low bottoms next to streams. Areas of this soil are elongated tracts 25 to 200 acres in size. These areas are characterized by small seeps or springs. Some areas of this soil pond water. Slopes are 0 to 2 percent.

Included with this soil in mapping are small areas of Sable, Wacousta, and Palms soils. Also included are a few areas of soils that are lighter in color.

If this soil is protected from flooding and adequately drained, it is well suited to all crops commonly grown in the county except alfalfa. If drainage is not feasible or if the soil is in accessible to tillage, this soil is better suited to pasture or wildlife habitat than to most other uses. The major limitations of this soil are moderately slow permeability, a high water table, and frequent flooding. The major concerns of management are removing excess water, preventing flooding, and maintaining the organic-matter content and tilth of the surface layer. Capability unit IIw–1; woodland suitability group 1w5.

Palms Series

The Palms series consists of deep, very poorly drained, nearly level organic soils on low benches in stream valleys. These soils formed in partially decayed organic material under sedge grasses. The organic material is about 31 inches thick. Beneath the organic material is water-deposited silty material.

In a representative profile the surface layer is black muck about 10 inches thick. The next layer is black, very friable muck about 21 inches thick. The underlying mineral material is massive, gray silt loam and fine sand.

These soils have a medium level of fertility. The available water capacity is very high, and permeability is moderately rapid in the organic part. The seasonal high water table is above a depth of 1 foot in spring.

If these soils are drained and protected from flooding, they are suited to row crops, small grain, and clover hay. Undrained areas are well suited to wildlife habitat and limited pasture. Open-ditch drains and tile drains are better suited to the removal of excess water from these soils than are most other drainage systems. Soil blowing is a moderate hazard if the soils are drained.

Representative profile of Palms muck in cultivated area, 50 feet north of junction of field road and ditch, NE¼NE¼ sec. 27, T. 7 N., R. 12 E.:

Oap—0 to 10 inches, dark-gray (N 4/0) sapric material; 5 percent fiber when unrubbed, a trace when rubbed; moderate, very fine granular structure; very friable; few roots; mildly alkaline, abrupt, smooth boundary.

Oa2—10 to 18 inches, black (N 2/0) sapric material; 10 percent fiber when unrubbed, a trace when rubbed; weak, fine, subangular blocky structure; very friable; few roots; neutral; clear, smooth boundary.

Oa3—18 to 31 inches, very dark brown (10YR 2/2) sapric material; 10 percent fiber when unrubbed, a trace when rubbed; layered; very friable; slightly acid; clear, smooth boundary.

IIC1g—31 to 37 inches, dark grayish-brown (2.5Y 4/2) coarse silt loam; many, coarse, distinct, light olive-brown (2.5Y 5/4) mottles; weak, thick, platy structure; very firm; mildly alkaline; abrupt, smooth boundary.

IIC2g—37 to 48 inches, gray (N 5/0) coarse silt loam; many, coarse, distinct, light olive-brown (2.5Y 5/4) mottles; massive; very firm; slight effervescence; moderately alkaline; abrupt, smooth boundary.

IIC3g—48 to 60 inches, gray (5Y 5/1) fine sand; few, coarse, prominent, yellowish-brown (10YR 5/8) mottles; single grained; loose; strong effervescence; moderately alkaline.

The Oa horizon ranges from 16 to 40 inches in thickness, from muck to mucky peat in texture, and from black (N 2/0) to dark gray (N 4/0). The C horizon is sandy loam, loam, silt loam, or silty clay loam over water-laid silt and fine sand.

Palms soils are near Houghton, Adrian, Elvers, Wacousta, and Marshan soils. They are shallower to the underlying mineral material than Houghton soils. They are underlain by loam, whereas Adrian soils are underlain by sand. They do not have the silty alluvial overburden of Elvers soils. Palms soils have an organic overburden that Wacousta and Marshan soils lack.

Palms muck (Pa).—This nearly level soil is on low benches. Areas of this soil are irregularly shaped tracts 20 to 280 acres in size. Water ponds in concave areas.

Included with this soil in mapping are areas of soils that have a mucky peat or peaty muck surface layer. Also included are some small areas of Houghton soils, some areas of soils that are 40 to 51 inches deep to mineral material, and some small areas of soils that have slopes of 2 to 4 percent.

If this soil is adequately drained, it is suited to all crops commonly grown in the county except alfalfa. If it is not drained, this soil is better suited to pasture and marsh meadow than to most other uses. In ponded areas of this soil, cattails and reeds grow well. The major limitation of this soil is a very high water table. The major concerns of management are providing artificial drainage and raising the level of fertility. Capability unit IIw–8; not placed in a woodland suitability group.

Pecatonica Series

The Pecatonica series consists of deep, well-drained, gently sloping and sloping soils on glaciated uplands and high benches in stream valleys. These soils formed in moderately deep loess and sandy loam glacial till under mixed hardwoods. The loess is 15 to 25 inches thick over deeply weathered till that is 3 feet to 8 feet or more thick.

In a representative profile the surface layer is very dark grayish-brown silt loam 8 inches thick. The subsurface layer is brown, friable silt loam about 2 inches thick. The subsoil is about 62 inches thick. The upper 11 inches is dark yellowish-brown silty clay loam; the next 16 inches is firm, brown sandy clay loam; and the lower 35 inches is friable, reddish-brown sandy loam. The underlying material is massive, calcareous, brown sandy loam till.

These soils have high fertility. The available water capacity is high, and permeability is moderate. Where they are not limed, these soils are strongly acid to

slightly acid except near the calcareous sandy loam till. The water table is below a depth of 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat. If these soils are cultivated, controlling erosion and maintaining tilth and organic-matter content are helpful conservation practices.

Representative profile of Pecatonica silt loam, 6 to 12 percent slopes, eroded, 150 feet west of lane and 50 feet south of County Trunk M, NE¼SE¼ sec. 32, T. 6 N., R. 9 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, granular structure; very friable; neutral; abrupt, smooth boundary.

A2—8 to 10 inches, brown (10YR 5/3) silt loam; weak, medium, platy structure; friable; neutral; abrupt, smooth boundary.

B21t—10 to 15 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, very fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; slightly acid; clear, wavy boundary.

B22t—15 to 21 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, very fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; slightly acid; clear, wavy boundary.

IIB23t—21 to 37 inches, brown (7.5YR 4/4) light sandy clay loam; moderate, medium, subangular blocky structure; friable; thin, patchy, dark reddish-brown (5YR 3/3) clay films on all faces of peds; strongly acid; clear, wavy boundary.

IIB31—37 to 52 inches, reddish-brown (5YR 4/4) sandy loam; weak, coarse, subangular blocky structure; friable; few, thin, patchy clay films; slightly acid; clear, wavy boundary.

IIB32—52 to 72 inches, reddish-brown (5YR 4/4) sandy loam; weak, fine, subangular blocky structure; friable; as much as 10 percent coarse fragments; moderately alkaline; gradual, wavy boundary.

IIC—72 to 80 inches, brown (7.5YR 5/4) sandy loam; massive; friable; as much as 20 percent coarse fragments; slight effervescence; moderately alkaline.

The silty sediment ranges from 15 to 25 inches in thickness. The Ap horizon ranges from brown (10YR 4/3) to very dark grayish-brown (10YR 3/2). The upper part of the B horizon is heavy silt loam or silty clay loam. The lower part ranges from sandy loam to clay loam. Depth to calcareous sandy loam till generally ranges from 48 to 90 inches, but in some places it is as much as 100 inches. The calcium carbonate equivalent of the till ranges from 15 to 32 percent.

Pecatonica soils are near Westville, Whalan, and Dodge soils. They do not have dolomite above a depth of 40 inches as Whalan soils do. They have a thicker solum than Dodge soils. They have a thicker part of their solum that formed in silt than Westville soils do.

Pecatonica silt loam, 2 to 6 percent slopes (PeB).—This soil is on ridgetops and upper side slopes. Areas of this soil are elongated tracts 45 to 260 acres in size. Slope segments are 150 to 250 feet long.

This soil has a profile similar to the one described as representative of the series, but in cultivated areas the surface layer is mostly dark grayish brown. In a few cultivated areas it is very dark grayish brown.

Included with this soil in mapping are small areas of Westville soils. Also included are areas of soils in which the silt mantle is 25 to 36 inches thick.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation of this soil is the moderate hazard of erosion. The major concerns of management are improving the organic-matter content and tilth, maintaining the level of fertility, and controlling erosion. Capability unit IIe–1; woodland suitability group 2o1.

Pecatonica silt loam, 6 to 12 percent slopes, eroded (PeC2).—This soil is on nearly uniformly shaped middle side slopes. Areas of this soil are ribbonlike tracts 40 to 150 acres in size. These areas are characterized by a few narrow drainageways. Slopes are slightly convex. Slope segments are 125 to 200 feet long.

This soil has the profile described as representative of the series. In some places the surface layer is darker than described. In cultivated areas the surface layer is very dark grayish brown and is 6 to 8 inches thick. In a few places it is dark grayish brown or brown.

Included with this soil in mapping are small areas of a Westville silt loam.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation to the use of this soil is a severe hazard of erosion caused by slope. The major concerns of management are controlling erosion, improving organic-matter content and tilth of the surface layer, and maintaining fertility. Capability unit IIIe–1; woodland suitability group 2o1.

Plainfield Series

The Plainfield series consists of deep, gently sloping, excessively drained soils on foot slopes and benches in stream valleys. These soils formed in deep sand outwash under black oak timber (fig. 8).

In a representative profile the surface layer is single-grained, loose, black and brown sand about 8 inches thick. The subsoil is single-grained sand about 15 inches thick. The upper part is strong brown, and the lower part is yellowish brown. The underlying material is loose, light yellowish-brown sand.

These soils have very low fertility. The available water capacity is very low, and permeability is rapid. The soils hold about 2.4 inches of water available in the upper 5 feet. The water table is below a depth of 5 feet.

These soils are better suited to timber and wildlife habitat than to most other uses. If supplemental irrigation is applied, these soils are suited to specialty crops such as green peppers, snap beans, cucumbers, and potatoes. The major concerns of management are controlling soil blowing and water erosion and conserving moisture. Because of the very low available water capacity, these soils dry out quickly.

Representative profile of Plainfield sand, 1 to 6 percent slopes, in undisturbed area, NW½NE¼SW¼ sec. 5, T. 8 N., R. 6 E.:

A1—0 to 1 inch, black (10YR 2/1) sand; weak, fine, granular structure; very friable; common roots; neutral; abrupt, smooth boundary.

A3—1 to 8 inches, brown (10YR 4/3) sand; single grained; loose; few roots; slightly acid; abrupt, smooth boundary.

B2—8 to 15 inches, strong brown (7.5YR 5/6) sand; single grained; loose; few roots; slightly acid; clear, wavy boundary.

B3—15 to 23 inches, yellowish-brown (10YR 5/6) sand; single grained; loose; medium acid; gradual, wavy boundary.

C—23 to 60 inches, light yellowish-brown (10YR 6/4) sand; single grained; loose; medium acid.

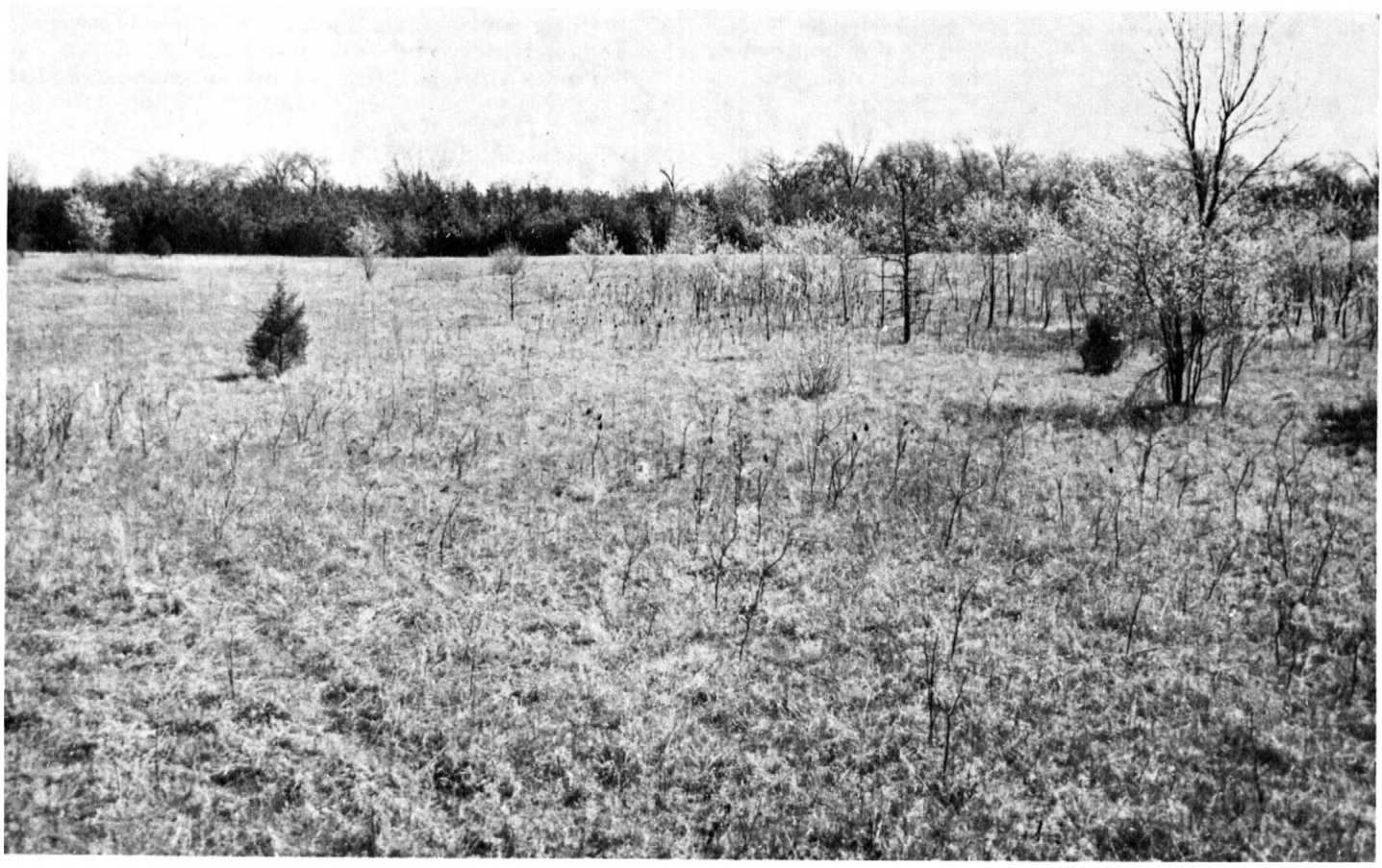

Figure 8.—**Undisturbed area of Plainfield sand, 1 to 6 percent slopes.**

The A horizon ranges from brown (10YR 4/3) and dark grayish brown (10YR 4/2) to black (10YR 2/1). The sand ranges from very strongly acid to slightly acid in reaction.

Plainfield soils in Dane County that have horizons that are slightly acid or medium acid are outside the defined range for the series.

Plainfield soils are near Dickinson soils, sandy variant, and Dickinson and Brems soils. They are coarser textured than Dickinson soils, sandy variant. They have a thinner A horizon and a coarser textured B horizon than Dickinson soils. They are better drained than Brems soils.

Plainfield sand, 1 to 6 percent slopes (PfB).—This soil is in irregularly shaped areas on outwash plains. Areas of this soil are 25 to 440 acres in size. Slope segments are commonly 175 to 325 feet long.

In cultivated areas the surface layer is mostly brown. In a few concave areas it is darker.

Included with this soil in mapping are a few small areas of Brems soils and some areas of Dickinson soils, sandy variant. Also included are small areas of soils that are less or more sloping than this soil.

This soil is well suited to timber and wildlife habitat. It is limited by very low available water capacity. The hazard of erosion is moderate. Row crops may be grown most of the time if supplemental irrigation is applied and if soil blowing and water erosion are controlled. Capability unit VIs–9; woodland suitability group 4s1.

Plano Series

The Plano series consists of deep, well drained and moderately well drained, nearly level to sloping soils on glaciated uplands. These soils formed in 40 to 60 inches of loess and sandy loam glacial till or sand and gravel outwash under prairie grasses (fig. 9).

In a representative profile the surface layer is very dark brown and very dark grayish-brown silt loam about 11 inches thick. The subsoil is about 35 inches thick. The upper 5 inches is dark-brown silt loam, the next 25 inches is dark yellowish-brown silty clay loam and silt loam, and the lower 5 inches is dark-brown loam. The underlying material is massive, calcareous, light yellowish-brown sandy loam till.

These soils have high fertility. Available water capacity is high, and permeability is moderate. The water table is generally below a depth of 5 feet but at times rises to a depth of 3 feet in some places.

These soils are well suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture and wildlife habitat. If the soils are cultivated, controlling erosion and maintaining tilth and organic-matter content are helpful conservation practices.

Representative profile of Plano silt loam, 2 to 6 per-

Figure 9.—**Profile of Plano silt loam, 2 to 6 percent slopes.**

cent slopes, in cultivated area, on east side of road 300 feet north of forty line, SW¼NW¼ sec. 35, T. 6 N., R. 12 E.:

Ap—0 to 8 inches, very dark brown (10YR 2/2) silt loam; moderate, very fine, subangular blocky structure; friable; many roots; neutral; abrupt, smooth boundary.

A12—8 to 11 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, very fine, subangular blocky structure; friable; many roots; neutral; clear, wavy boundary.

B1—11 to 16 inches, dark-brown (10YR 3/3) heavy silt loam; moderate, fine, subangular blocky structure; friable; common roots; slightly acid; clear, wavy boundary.

B21t—16 to 26 inches, dark yellowish-brown (10YR 4/4) silty clay loam; weak, coarse, prismatic structure parting to moderate, fine and medium, subangular blocky; firm; common roots; thin, continuous, very dark grayish-brown (10YR 3/2) clay films; strongly acid; clear, wavy boundary.

B22t—26 to 33 inches, dark yellowish-brown (10YR 4/4) silty clay loam; weak, coarse, prismatic structure parting to moderate, fine, subangular blocky; firm; common roots; thin, patchy, very dark grayish-brown (10YR 3/2) clay films; medium acid; clear, wavy boundary.

B31t—33 to 41 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; moderate, medium, subangular blocky structure; friable; common roots; few, thin, patchy, very dark grayish-brown (10YR 3/2) clay films; medium acid; clear, wavy boundary.

IIB32t—41 to 46 inches, dark-brown (10YR 3/3) loam; weak, medium, subangular blocky structure; friable; as much as 10 percent coarse fragments; common roots; few, thick, patchy clay films and clay bridging; neutral; clear, wavy boundary.

IIC—46 to 60 inches, light yellowish-brown (10YR 6/4) sandy loam; fragmental, massive; friable; as much as 20 percent coarse fragments; few alfalfa roots; strong effervescence; moderately alkaline.

The loess ranges from 40 to 60 inches in thickness. The A horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). The upper part of the B horizon is heavy silt loam or silty clay loam. The lower part is loam, sandy clay loam, or clay loam. In some places the lower part of the B horizon is mottled. Depth to calcareous loamy sand or sandy loam till ranges from 44 to 70 inches. The calcium carbonate equivalent of the till ranges from 15 to 32 percent.

Plano soils are near St. Charles, Elburn, Batavia, Griswold, and Ringwood soils. They have a thicker and darker colored A horizon than St. Charles soils. They are better drained than Elburn soils. They have a thicker A horizon than Batavia soils. They have a thicker solum than Griswold and Ringwood soils. They have a B horizon that formed in loess and glacial till, whereas that of Griswold soils formed entirely in glacial till. They have a thicker part of the B horizon that formed in loess than Ringwood soils.

Plano silt loam, 0 to 2 percent slopes (PnA).—This soil is on crests of ridges in glaciated valleys. Areas of this soil are irregularly shaped tracts 50 to 120 acres in size. Slopes are convex.

This soil has a profile similar to the one described as representative of the series, but the loess mantle is thicker. In cultivated areas the surface layer is nearly uniformly black. Most of the soils on concave or plane slopes are moderately well drained.

Included with this soil in mapping are some small areas of soils that have slopes of 3 or 4 percent. Also included are a few areas of somewhat poorly drained Elburn soils.

This soil is well suited to all crops commonly grown in the county. It can be farmed intensively if fertility is maintained. Capability unit I–3; not placed in a woodland suitability group.

Plano silt loam, 2 to 6 percent slopes (PnB).—This soil is on ridgetops and upper side slopes. Areas of this soil are elongated tracts 75 to 265 acres in size. Slope segments are 200 to 300 feet long.

This soil has the profile described as representative of the series. In cultivated areas the surface layer is mostly very dark brown, but in a few areas it is darker.

Included with this soil in mapping are a few small areas of soils that have a silt mantle thicker than 70 inches and small areas of a Ringwood silt loam. Also included are areas of eroded soils in which tilth is poorer and organic-matter content is lower and areas of moderately well drained, concave soils on foot slopes.

If this soil is properly managed, it is well suited to all crops commonly grown in the county. If this soil is cultivated, it has a moderate hazard of erosion. The major concerns of management are maintaining organic-matter content and tilth, increasing fertility, and controlling erosion. Capability unit IIe–1; not placed in a woodland suitability group.

Plano silt loam, 6 to 12 percent slopes, eroded (PnC2).—This soil is on uniformly shaped side slopes. Areas of this soil are ribbonlike tracts 40 to 285 acres in size. These areas are characterized by a few narrow drainageways. Slopes are slightly convex. Slope segments are 200 to 250 feet long.

This soil has a profile similar to the one described as representative of the series, but depth to loamy glacial till is 44 to 50 inches. In cultivated areas the surface layer is generally dark grayish brown and is 6 to 8 inches thick. In a few places it is dark brown.

Included with this soil in mapping are small areas of a Ringwood silt loam.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation is a severe hazard of erosion. The major concerns of management are controlling erosion, maintaining organic-matter content and tilth of the surface layer, and increasing fertility. Capability unit IIIe–1; not placed in a woodland suitability group.

Plano silt loam, gravelly substratum, 0 to 2 percent slopes (PoA).—This soil is on benches in stream valleys. Areas of this soil are irregularly shaped tracts 80 to 660 acres in size.

This soil has a profile similar to the one described as representative of the series, but it is underlain by calcareous sand and gravel outwash at a depth of 44 to 70 inches. In cultivated areas the surface layer is nearly uniformly black. In a few concave areas the surface layer is thicker.

Included with this soil in mapping are some small areas of soils that have slopes of 3 or 4 percent and a few small areas of soils that are underlain by water-laid silt and fine sand. Also included are some areas of moderately well drained soils and of the somewhat poorly drained Elburn soils, gravelly substratum.

This soil is well suited to all crops commonly grown in the county. Legumes require lime for maximum growth. This soil can be farmed intensively if fertility is maintained. Capability unit I–3; not placed in a woodland suitability group.

Plano silt loam, gravelly substratum, 2 to 6 percent slopes (PoB).—This soil is on benches in stream valleys. Areas of this soil are 60 to 735 acres in size. Slopes are irregularly shaped. Slope segments are commonly 125 to 200 feet long.

This soil has a profile similar to the one described as representative of the series, but it is underlain by calcareous sand and gravel outwash at a depth of 44 to 70 inches. In cultivated areas the surface layer is nearly uniformly very dark brown, but in a few concave areas it is darker.

Included with this soil in mapping are a few small areas of moderately well drained soils and small areas of soils that are less or more sloping than this soil. Also included are some areas of soils in which the lower part of the subsoil formed in water-laid silt and sand.

This soil is well suited to all crops commonly grown in the county. The hazard of erosion is moderate. If erosion is controlled, row crops may be grown most of the time under intensive management. Capability unit IIe–1; not placed in a woodland suitability group.

Plano silt loam, gravelly substratum, 6 to 12 percent slopes, eroded (PoC2).—This soil is on middle side slopes of outwash plains. Areas of this soil are elongated tracts 50 to 125 acres in size. These areas are characterized by a few narrow drainageways. Slope segments are 100 to 200 feet long.

This soil has a profile similar to the one described as representative of the series, but 4 to 6 inches of the original surface layer has been lost to water erosion and the soil is underlain by sand and gravel at a depth of 44 to 70 inches. Also, the surface layer of this soil is less friable, lower in organic-matter content, and more difficult to keep in good tilth than if uneroded. The present surface layer is very dark grayish brown, and in most areas dark yellowish-brown material from the subsoil has been mixed into it.

Included with this soil in mapping are some small areas of soils that are less or more sloping than this soil. Also included are areas of Kegonsa soils, which make up less than 5 percent of the area mapped as this Plano soils.

Under good management this soil is productive. It is suited to all crops commonly grown in the county. The hazard of erosion is severe. Controlling erosion and maintaining tilth and fertility are helpful management practices. Capability unit IIIe–1; not placed in a woodland suitability group.

Port Byron Series

The Port Byron series consists of deep, moderately well drained, gently sloping and sloping soils on colluvial valley foot slopes. These soils are in areas below very steep soils. Most areas of Port Byron soils are in long, narrow, ribbonlike tracts. They formed under prairie grasses in deep, silty loess that continuously receives a small amount of soil from higher lying areas (figs. 10 and 11).

In a representative profile the surface layer is silt loam 22 inches thick. The upper 9 inches is black, the next 6 inches is very dark brown, and the lower 7 inches is very dark grayish brown. The subsoil is brown silt loam about 26 inches thick and is mottled throughout. The underlying material is massive, yellowish-brown silt loam that has varicolored mottles.

These soils have high fertility. Available water capacity is high and very high, and permeability is moderate in the subsoil and moderately slow in the underlying material. The seasonal high water table is at a depth of 3 to 5 feet. This zone of saturation is caused by seepage from higher lying areas of soils underlain by impermeable sandstone and shale bedrock.

If slope is favorable and erosion is controlled, these soils are well suited to cultivated crops such as corn, oats, and alfalfa.

Representative profile of Port Byron silt loam, 6 to 12 percent slopes, in cultivated area, 300 feet west and 100 feet south of intersection of field lane and township road, SE¼NE¼ sec. 31, T. 7 N., R. 7 E.:

Ap—0 to 9 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; very friable; common roots; slightly acid; abrupt, smooth boundary.

A12—9 to 15 inches, very dark brown (10YR 2/2) silt loam; weak, fine, subangular blocky structure parting to weak, fine, granular; friable; common roots; medium acid; clear, smooth boundary.

A3—15 to 22 inches, very dark grayish-brown (10YR 3/2)

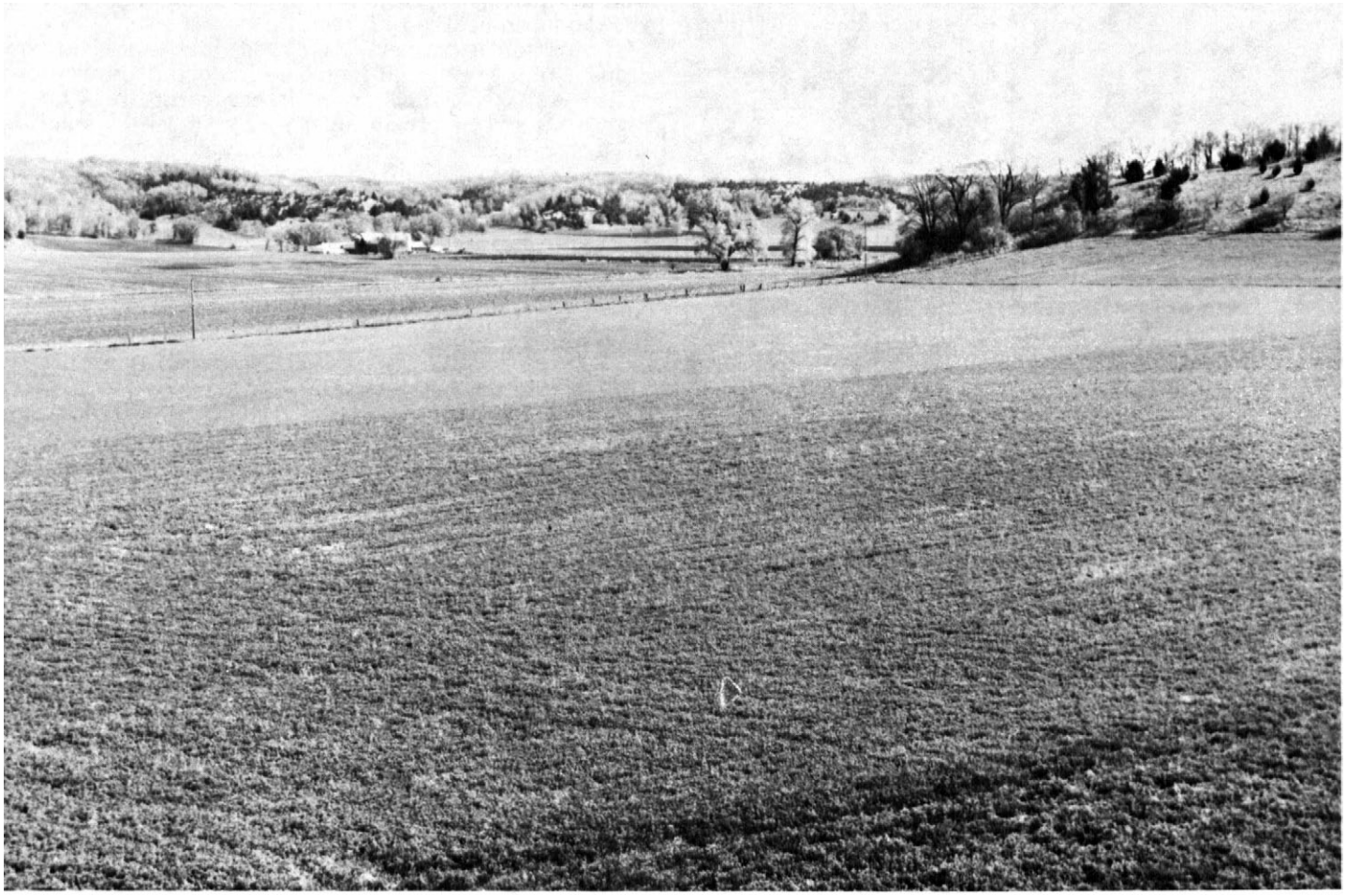

Figure 10.—**Alfalfa in area of Port Byron silt loam, 2 to 6 percent slopes.**

silt loam; moderate, fine, subangular blocky structure; firm; light-gray (10YR 7/2) clean silt coats on faces of peds; strongly acid; gradual, wavy boundary.

B21—22 to 33 inches, brown (10YR 4/3) heavy silt loam; few, fine, faint, yellowish-brown (10YR 5/8) mottles; weak, medium, prismatic structure parting to moderate, fine, subangular blocky; firm; thin, discontinuous, dark-brown (7.5YR 3/2) coatings and organic stains; medium acid; gradual, wavy boundary.

B22—33 to 40 inches, brown (10YR 4/3) heavy silt loam; few, fine, prominent, grayish-brown (10YR 5/2) and dark-brown (7.5YR 3/2) mottles; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; firm; thin, discontinuous, and thick, patchy, very dark grayish-brown (10YR 3/2) coatings on faces of peds; strongly acid; gradual, wavy boundary.

B3—40 to 48 inches, brown (10YR 5/3) silt loam; few, fine, prominent, grayish-brown (10YR 5/2) and dark-brown (7.5YR 3/2) mottles; weak, coarse, prismatic structure parting to weak, coarse, subangular blocky; firm; clay flows in pores and old root channels; medium acid; clear, wavy boundary.

C—48 to 60 inches, yellowish-brown (10YR 5/4) silt loam; few, fine, distinct, dark-gray (10YR 4/1) and strong-brown (7.5YR 5/6) mottles; massive; very firm; few organic stains or clay flows on pressure faces and in some pores; medium acid.

The solum ranges from 40 to 56 inches in thickness. In some places the profile contains a small amount of chert cobblestones and coarse-textured material that has moved down from higher lying areas. The A horizon commonly is very dark brown (10YR 2/2) or black (10YR 2/1), but in some cultivated and eroded areas the A horizon is very dark grayish brown (10YR 3/2) or dark brown (10YR 3/3). It is 10 to 24 inches thick. The B horizon is silt loam or heavy silt loam. Depth to and intensity of mottling vary somewhat from place to place.

Port Byron soils are near Seaton, Plano, and Dells soils. They have a thicker and darker colored A horizon than Seaton soils. They have less development and are coarser textured throughout than Plano soils. They are better drained and have a thicker silt mantle than Dells soils.

Port Byron silt loam, 2 to 6 percent slopes (PrB).—This soil is on valley sides. Areas of this soil are ribbonlike tracts 30 to 180 acres in size. These areas are just below steeper soils and receive runoff from them. Slopes are concave. Slope segments are commonly 150 to 200 feet long.

Included with this soil in mapping are a few areas of soils that have a thin surface layer of sandy loam. Also included are a few small areas of Troxel soils and areas of well-drained soils.

If this soil is properly managed, it is suited to row

Figure 11.—**Profile of Port Byron silt loam, 2 to 6 percent slopes.**

crops, small grain, and hay. The important limitations of this soil are runoff from higher lying areas and a moderate hazard of erosion caused by slope. This soil is subject to sheet erosion, and in areas adjacent to drainageways it is susceptible to gullying. Major concerns of management are controlling erosion and maintaining tilth and organic-matter content of the surface layer. Capability unit IIe–1; not placed in a woodland suitability group.

Port Byron silt loam, 6 to 12 percent slopes (PrC).—This soil is on valley sides. Areas of this soil are ribbonlike tracts 30 to 180 acres in size. These areas are below steeper soils and receive runoff water from them. Slopes are concave. Slope segments are commonly 125 to 175 feet long. This soil has the profile described as representative of the series.

Included with this soil in mapping are a few areas of soils that have a thin surface layer of sandy loam and some small areas of soils that have a lighter colored surface layer. Also included are some small areas of well-drained soils. In a few places sandstone bedrock is at a depth of 3½ to 5 feet.

If this soil is properly managed, it is suited to row crops, small grain, and hay. The important limitations of this soil are runoff from higher lying areas and a severe hazard of erosion caused by slope. This soil is subject to sheet erosion, and areas adjacent to drainageways are susceptible to gullying. The major concerns of management are control of erosion and maintenance of tilth and organic-matter content of the surface layer. Capability unit IIIe–1; not placed in a woodland suitability group.

Radford Series

The Radford series consists of deep, somewhat poorly drained, nearly level and gently undulating alluvial soils in low drainageways and stream channels. These soils formed under prairie grasses in moderately deep, recent, silty alluvium overlying a buried, poorly drained, silty soil. The recent silty alluvium, which overlies the dark-colored soil, has come from nearby eroded uplands.

In a representative profile the surface layer is very dark brown silt loam 9 inches thick. The next layer is very dark gray silt loam about 14 inches thick. The buried surface layer and subsoil are mostly silty clay loam. The buried surface layer is black, and the subsoil is light brownish gray and olive gray. The underlying material is massive, olive-gray silt loam.

Radford soils have high fertility. Available water capacity is very high or high, and permeability is moderate. The water table is at a depth of 1 to 3 feet in spring.

If these soils are adequately drained and protected from flooding, they are suited to all crops commonly grown in the county. Most crops, especially alfalfa, grow poorly in undrained areas. The high water table delays tillage in spring. Flooding is frequent but short.

Representative profile of Radford silt loam, 0 to 3 percent slopes, 200 feet west and 150 feet south of the intersection of Erge Road and County Trunk C, in the northeast corner of sec. 26, T. 9 N., R. 10 E.:

Ap—0 to 9 inches, very dark brown (10YR 2/2) silt loam; weak, medium, subangular blocky structure; firm; few roots; neutral; abrupt, wavy boundary.

C—9 to 23 inches, very dark gray (10YR 3/1) silt loam; weak, medium, platy structure parting to weak, very fine, subangular blocky; firm; few roots; neutral; abrupt, wavy boundary.

IIA11b—23 to 29 inches, black (N 2/0) silt loam; very fine, granular structure; friable; faint organic stains or mottles on faces of peds; slightly acid; clear, wavy boundary.

IIA12b—29 to 36 inches, black (N 2/0) silty clay loam; faint mottles on faces of peds; moderate, very fine, subangular blocky structure; friable; slightly acid; abrupt, wavy boundary.

IIB1g—36 to 41 inches, light brownish-gray (2.5Y 6/2) silty clay loam; few, fine, faint mottles; weak, very fine, subangular blocky structure; firm; neutral; clear, wavy boundary.

IIB2g—41 to 50 inches, light brownish-gray (2.5Y 6/2) silty clay loam; few, fine, faint mottles; moderate, fine, subangular blocky structure; firm; neutral; clear, wavy boundary.

IIB3g—50 to 56 inches, olive-gray (5Y 5/2) silty clay loam; few, fine, prominent, strong-brown (7.5YR 5/6) mottles; weak, fine, subangular blocky structure;

very firm; mildly alkaline; clear, wavy boundary.
IIC—56 to 60 inches, olive-gray (5Y 5/2) silt loam; few, fine, prominent, strong-brown (7.5YR 5/6) mottles; massive; very firm; moderately alkaline.

The recent silty alluvium ranges from 20 to 40 inches in thickness. The solum ranges from 50 to 80 inches in thickness. In some places the A horizon is more than 30 inches thick. Some thin layers in some of the upper horizons are very fine sand and silt. The lower horizons are silt loam and silty clay loam.

Radford soils are near Troxel, Otter, Wacousta, and Sable soils. They are more poorly drained than Troxel soils. They are better drained than Sable, Wacousta, and Otter soils.

Radford silt loam, 0 to 3 percent slopes (RaA).—This soil is on low bottoms near streams. Areas of this soil are elongated tracts 25 to 100 acres in size. Slopes are nearly level and gently undulating. Water ponds in some areas.

Included with this soil in mapping are small areas of Sable and Otter soils, which are more poorly drained than this soil and are severely limited by wetness. Also included are areas of soils that are 40 to 60 inches thick over sand and gravel.

If this soil is protected from flooding and adequately drained, all crops commonly grown in the county produce well. If drainage is not feasible or if areas are inaccessible for tillage, this soil is better suited to pasture or wildlife habitat. This soil is limited by a seasonal high water table at a depth of 1 to 3 feet and by frequent flooding. The major concerns of management are removing excess water, preventing flooding, and maintaining the organic-matter content and tilth of the surface layer. Capability unit IIw–2; woodland suitability group 4w5.

Ringwood Series

The Ringwood series consists of deep, well-drained, gently sloping and sloping soils on glaciated uplands. These soils formed in 15 to 30 inches of loess and sandy loam glacial till under prairie grasses.

In a representative profile the surface layer is very dark grayish-brown and dark-brown silt loam about 12 inches thick. The subsoil is about 24 inches thick. The upper part is dark yellowish-brown silt loam and silty clay loam, the middle part is dark-brown clay loam, and the lower part is brown sandy clay loam. The underlying material is massive, calcareous, yellowish-brown sandy loam till.

These soils have high fertility. The available water capacity is high, and permeability is moderate. The water table is below a depth of 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. The soils are also suited to pasture and wildilfe habitat. If these soils are cultivated, controlling erosion and maintaining tilth and organic-matter content are helpful conservation practices.

Representative profile of Ringwood silt loam, 6 to 12 percent slopes, eroded, in cultivated area, 25 feet north of road, in SW¼SE¼SW¼ sec. 2, T. 5 N., R. 12 E.:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very friable; common roots; neutral; abrupt, smooth boundary.
A3—9 to 12 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; friable; common roots; slightly acid; clear, wavy boundary.
B1—12 to 17 inches, dark yellowish-brown (10YR 3/4) silt loam; moderate, fine, subangular blocky structure; firm; common roots; slightly acid; clear, wavy boundary.
B21t—17 to 22 inches, dark yellowish-brown (10YR 4/4) silty clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark-brown (10YR 3/3) clay films; slightly acid; clear, wavy boundary.
IIB22t—22 to 26 inches, dark-brown (10YR 4/3) clay loam; moderate, medium, subangular blocky structure; firm; as much as 10 percent coarse fragments; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; strongly acid; clear, wavy boundary.
IIB3t—26 to 36 inches, brown (7.5YR 4/4) light sandy clay loam; weak, medium, subangular blocky structure; firm; as much as 15 percent coarse fragments; a few patchy clay films or organic stains on all faces of peds; medium acid; gradual, wavy boundary.
IIC—36 to 60 inches, yellowish-brown (10YR 5/4) sandy loam; massive; friable; as much as 20 percent coarse fragments; strong effervescence; moderately alkaline; calcium carbonate equivalent is 24 percent.

The layer of loess ranges from 15 to 30 inches in thickness. The A horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). The upper part of the B horizon formed in loess and is silt loam or silty clay loam. The lower part of the B horizon formed in calcareous till and is loamy sand to clay loam. The depth to calcareous till ranges from 24 to 40 inches. The calcium carbonate equivalent ranges from 15 to 32 percent. The till is commonly sandy loam.

Ringwood soils are near Griswold, Plano, and Elburn soils. They have a thicker silt mantle than Griswold soils and a thinner silt mantle than Plano soils. They are better drained and have a thinner silt mantle than Elburn soils.

Ringwood silt loam, 2 to 6 percent slopes (RnB).—This soil is on ridgetops and upper side slopes. Areas of this soil are elongated tracts 125 to 295 acres in size. Slope segments are 150 to 250 feet long.

This soil has a profile similar to the one described as representative of the series, but in cultivated areas the surface layer is nearly uniformly black. In a few areas it is lighter in color.

Included with this soil in mapping are eroded areas in which tilth is poorer and organic-matter content is lower. Also included are small areas of Plano soils and a few areas of soils that are underlain by loamy sand till.

If this soil is properly managed, it is well suited to all crops commonly grown in the county. If this soil is cultivated, the only limitation is the moderate hazard of erosion. The major concerns of management are maintaining organic-matter content and tilth, maintaining the level of fertility, and controlling erosion. Capability unit IIe–1; not placed in a woodland suitability group.

Ringwood silt loam, 6 to 12 percent slopes, eroded (RnC2).—This soil has nearly uniformly shaped slopes. Areas of this soil are ribbonlike tracts 20 to 275 acres in size. These areas are characterized by a few narrow drainageways. Slopes are slightly convex. Segments are 100 to 150 feet long.

This soil has the profile described as representative of the series. The surface layer is darker in uneroded areas.

Included with this soil in mapping are small areas of

Griswold and Plano soils. Also included are a few areas of soils that are underlain by loamy sand till.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation is a severe hazard of erosion. The major concerns of management are controlling erosion, maintaining organic-matter content and tilth of the surface layer, and raising the level of fertility. Capability unit IIIe–1; not placed in a woodland suitability group.

Rockton Series

The Rockton series consists of moderately deep, well-drained, gently sloping to moderately steep soils on dolomite-controlled uplands. These soils formed in moderately thin loess and loamy glacial till under prairie grasses. Beneath the till at a depth of about 32 inches is fractured dolomite bedrock.

In a representative profile the surface layer is very dark grayish-brown and dark-brown silt loam about 14 inches thick. The subsoil is about 18 inches thick. The upper 9 inches is dark yellowish-brown silt loam and clay loam, and the lower 9 inches is firm, brown sandy clay loam. The underlying material is fractured dolomite bedrock. Material from the subsoil fills the cracks in the dolomite.

Rockton soils have a medium level of fertility. The available water capacity is low and medium, and permeability is moderate. The water table is below a depth of 5 feet.

If these soils are properly managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. If these soils are cultivated, controlling erosion and conserving moisture are useful conservation practices. These soils are also suited to pasture and wildlife habitat.

Representative profile of Rockton silt loam, 6 to 12 percent slopes, eroded, in undisturbed area in quarry, north of road, NW¼NE¼ sec. 34, T. 9 N., R. 11 E.:

Ap—0 to 9 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, fine, granular structure; very friable; many roots; neutral; clear, smooth boundary.

A3—9 to 14 inches, dark-brown (10YR 3/3) silt loam; moderate, fine, granular structure; very friable; common roots; neutral; clear, smooth boundary.

B1—14 to 18 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, fine, subangular blocky structure; friable; common roots; patchy, dark yellowish-brown (10YR 3/4) clay films on vertical faces only; slightly acid; abrupt, smooth boundary.

IIB21t—18 to 23 inches, dark yellowish-brown (10YR 4/4) clay loam; moderate, fine, subangular blocky structure; firm; common roots; thin, discontinuous, dark-brown (10YR 3/3) clay films; medium acid; clear, smooth boundary.

IIB22t—23 to 32 inches, brown (7.5YR 4/4) sandy clay loam; weak, medium, subangular blocky structure; firm; as much as 10 percent coarse fragments; few roots; thin, patchy, dark-brown (7.5YR 3/2) clay films on all faces of peds; slightly acid; abrupt, wavy boundary.

IIIR—32 to 60 inches, fissured dolomite bedrock.

The silt mantle ranges from 15 to 20 inches in thickness. The Ap horizon ranges from 6 to 9 inches in thickness and from black (10YR 2/1) to dark brown (10YR 3/3) in color. The upper part of the B horizon is silt loam or silty clay loam that has a high content of sand. The lower part is sandy clay loam, clay loam, or clay. The B horizon ranges from dark yellowish brown (10YR 4/4) to reddish brown (5YR 4/4). In some places clayey residuum from weathered dolomite is present below the weathered till and above the dolomite, but in most places it is absent. Dolomite is at a depth of 24 to 40 inches.

Soils that have 20 to 30 inches of silt are outside the range defined for the Rockton series.

Rockton soils are near Ringwood, Edmund, and Sogn soils. They are moderately deep over dolomite, whereas Ringwood soils are deep over sandy loam glacial till. They are deeper to bedrock than Edmund and Sogn soils.

Rockton silt loam, 2 to 6 percent slopes (RoB).—This soil is on broad ridgetops and upper side slopes in dolomite-controlled uplands. Areas of this soil are 65 to 150 acres in size. Slopes are smooth and convex. Slope segments are 150 to 200 feet long.

This soil has a profile similar to the one described as representative of the series, but it is slightly deeper over dolomite.

Included with this soil in mapping are some small areas of soils that have slopes of 0 to 2 percent. Also included are some small areas of soils that have slopes of 6 to 8 percent. These soils have a severe hazard of erosion. There are also small areas of soils that are thicker than 40 inches over dolomite.

If this soil is properly managed, it is well suited to all crops commonly grown in the county except timber. Because of slope and a reduced infiltration rate, erosion control is useful. Because of the medium available water capacity, conserving moisture is important. Maintaining or improving tilth and organic-matter content are helpful practices. Capability unit IIe–2; not placed in a woodland suitability group.

Rockton silt loam, 6 to 12 percent slopes, eroded (RoC2).—This soil is on middle side slopes. Areas of this soil are ribbonlike tracts 40 to 285 acres in size. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. Segments are 100 to 175 feet long. This soil has the profile described as representative of the series.

Included with this soil in mapping are areas of Edmund and Griswold soils. Also included are areas of eroded soils in which the surface layer is thinner and dark brown.

If this soil is properly managed, it is suited to all crops commonly grown in the county except timber. The important limitations of this soil are slope and medium available water capacity. Because of the medium available water capacity, a severe hazard of erosion, and moderate depth to bedrock, conserving moisture and controlling erosion are important. Capability unit IIIe–2; not placed in a woodland suitability group.

Rockton silt loam, 12 to 30 percent slopes, eroded (RoD2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 40 to 185 acres in size. These areas are characterized by small drainageways. Slope segments are 75 to 125 feet long.

This soil has a profile similar to the one described as representative of the series, but it is shallower over dolomite. The silt loam surface layer is very dark grayish brown. Some material from the topsoil has accumulated at the base of slopes.

Included with this soil in mapping are small areas of Edmund and Griswold soils. Also included are areas of soils that have a severely eroded plow layer, low

organic-matter content, and poor tilth. Some areas of Plano soils are included at the base of slopes and in drainageways.

If this soil is properly managed, it is suited to row crops, small grain, forage, pasture, and wildlife habitat. The major limitations are moderately steep slopes, low available water capacity, a very severe hazard of erosion, and limited thickness over bedrock. If this soil is cultivated, controlling erosion and conserving moisture are useful conservation practices. Capability unit IVe–2; not placed in a woodland suitability group.

Rodman Series

The Rodman series consists of excessively drained, moderately steep and steep soils on side slopes of benches in stream valleys. These soils are very shallow over sand and gravel. They formed in sand and gravel under thin stands of black oak and an understory of prairie grasses.

In a representative profile the surface layer is black sandy loam about 5 inches thick. The subsoil is dark yellowish-brown gravelly sandy loam about 8 inches thick. The underlying material is calcareous, yellowish-brown stratified sand and gravel.

These soils have very low fertility. The available water capacity is very low, and permeability is moderately rapid in the upper part and very rapid in the lower part. The seasonal high water table is below a depth of 5 feet.

Because Rodman soils are very droughty and have very low available water capacity and fertility, a good plant cover is difficult to maintain on them. The soils are better suited to limited pasture or wildlife habitat than to most other uses. Moisture conservation, pasture renovation, and fertilization help to increase forage production. The soils are generally a good source of sand and gravel.

Representative profile of Rodman sandy loam, 12 to 35 percent slopes, in undisturbed area, SE¼NW¼ NE¼ sec. 32, T. 6 N., R. 11 E.:

A—0 to 5 inches, black (10YR 2/1) sandy loam; moderate, fine, granular structure; very friable; few roots; neutral; clear, wavy boundary.

B—5 to 13 inches, dark yellowish-brown (10YR 3/4) gravelly sandy loam; weak, fine, granular structure; very friable; neutral; clear, wavy boundary.

C—13 to 60 inches, yellowish-brown (10YR 5/6) sand and gravel; single grained; strong effervescence; loose; mildly alkaline.

The solum ranges from 8 to 15 inches in thickness. The A horizon ranges from black (10YR 2/1) to dark brown (10YR 3/3). The B horizon is sandy loam or loamy sand.

Rodman soils are near Dresden, Boyer, and Kegonsa soils. They lack the subsoil development of Dresden, Boyer, and Kegonsa soils.

Rodman sandy loam, 12 to 35 percent slopes (RpE).—This soil is on side slopes and knobs of outwash plains. Areas of this soil are 10 to 30 acres in size. These areas are characterized by a few drainageways.

Included with this soil in mapping are a few small areas of Boyer soils. Also included are eroded areas in which the surface layer is very dark grayish brown.

This soil is better suited to wildlife habitat than to most other uses. It is very droughty and has a very severe hazard of erosion. It has a very low level of fertility. The main concerns in management are conservation of moisture, control of erosion, and maintenance of a good sod. Capability unit VIIs–5; woodland suitability group 4f2.

Sable Series

The Sable series consists of deep, nearly level and gently sloping, poorly drained soils on low benches in stream valleys. These soils formed under sedges in deep silty material more than 4 feet thick. Neutral sandy outwash underlies the silt in most places.

In a representative profile the surface layer is black silty clay loam about 19 inches thick. The subsoil is about 23 inches thick. The upper part is dark-gray silty clay loam that has strong-brown mottles, and the lower part is gray silty clay loam that has strong-brown mottles. The underlying material is massive, gray silt loam.

Sable soils have high fertility. The available water capacity is high, and permeability is moderate. The seasonal high water table is between the surface and a depth of 1 foot.

If these soils are drained, they are suited to row crops, small grain, and clover hay. If not drained, they provide good wildlife habitat and limited pasture. Open-ditch and tile drains are suited to removing excess water on these soils. These soils are slow to warm in spring and quick to cool in fall. The surface layer puddles easily if tilled when wet.

Representative profile of Sable silty clay loam in cultivated area, 25 yards south of road, NW¼NW¼ NE¼ sec. 17, T. 9 N., R. 11 E.:

Ap—0 to 6 inches, black (N 2/0) silty clay loam; weak, medium, granular structure; very friable; many roots; slightly acid; abrupt, smooth boundary.

A12—6 to 13 inches, black (N 2/0) silty clay loam; weak, medium, subangular blocky structure parting to moderate, medium, granular; friable; many roots; medium acid; clear, smooth boundary.

A13—13 to 19 inches, black (N 2/0) silty clay loam; moderate, very fine, subangular blocky structure; friable; many roots; medium acid; clear, smooth boundary.

B1g—19 to 25 inches, dark-gray (5Y 4/1) silty clay loam; few, fine, prominent, strong-brown (7.5YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; few roots; very dark gray (N 3/0) organic stains on all faces of peds and in root channels; slightly acid; clear, smooth boundary.

B2g—25 to 32 inches, gray (5Y 5/1) silty clay loam; few, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, prismatic structure parting to weak, medium, subangular blocky; firm; few roots; very dark gray (N 3/0) organic stains on vertical faces of peds and in root channels; mildly alkaline; gradual, wavy boundary.

B3g—32 to 42 inches, gray (5Y 5/1) silty clay loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, prismatic structure; firm; very few roots; very dark gray (N 3/0) organic stains in root channels; mildly alkaline; diffuse, wavy boundary.

Cg—42 to 60 inches, gray (5Y 5/1) silt loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; massive; firm; very dark gray (N 3/0) organic stains in root channels; mildly alkaline.

The solum ranges from 36 to 50 inches in thickness. The A horizon is black (N 2/0) or very dark brown (10YR 2/2). The B horizon ranges from brown (10YR 5/2) to olive gray (5Y 5/2).

Sable soils are near Elburn, Virgil, Hayfield, Wacousta,

Marshan, and Orion soils. They are more poorly drained than Elburn, Orion, Virgil, and Hayfield soils. They have a thicker solum and finer texture than Wacousta soils. They lack the sand and gravel C horizon of Marshan soils.

Sable silty clay loam, 0 to 3 percent slopes (SaA).—This soil is on low benches in stream valleys. Areas of this soil are irregularly shaped tracts 80 to 440 acres in size. Water ponds in concave areas.

Included with this soil in mapping are areas of soils that have a mucky surface layer, areas of soils that are 26 to 36 inches thick over massive silt, and areas of soils 40 to 60 inches thick over loose sand. Also included are small areas of Elburn, Virgil, and Wacousta soils.

If this soil is properly drained, it is suited to row crops, small grain, and clover hay. If not drained, it is better suited to wildlife habitat and limited pasture. Poor surface and internal drainage must be overcome if row crops are to be grown. A high level of management includes artificial drainage, maintenance of the tilth of the surface layer, and maintenance of the level of fertility. Capability unit IIw–1; woodland suitability group 4w5.

St. Charles Series

The St. Charles series consists of deep, nearly level to moderately steep, well drained and moderately well drained soils on glaciated uplands. These soils formed in deep loess and loamy glacial till under mixed hardwoods.

In a representative profile the surface layer is dark grayish-brown silt loam about 6 inches thick. It dries to a distinctive gray color. The subsurface layer is brown, friable silt loam about 3 inches thick. The subsoil is about 41 inches thick. The upper 32 inches is firm, yellowish-brown silt loam and silty clay loam; and the lower 9 inches is friable, brown loam. The underlying material is massive, calcareous, brown sandy loam till.

These soils have high fertility. The available water capacity is high, and permeability is moderate. The seasonal high water table is below a depth of 3 feet, and it usually is below a depth of 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat. If these soils are cultivated, controlling erosion and maintaining tilth and organic-matter content are helpful conservation practices.

Representative profile of St. Charles silt loam, 2 to 6 percent slopes, in cultivated area, 500 feet north of bend in field lane, NE¼NE¼ sec. 15, T. 5 N., R. 10 E.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, very fine, granular structure; friable; common roots; neutral; abrupt, smooth boundary.

A2—6 to 9 inches, brown (10YR 5/3) silt loam; moderate, thin, platy structure; friable; common roots; neutral; abrupt, smooth boundary.

B1—9 to 15 inches, yellowish-brown (10YR 5/4) heavy silt loam; weak, very fine, subangular blocky structure; firm; common roots; slightly acid; clear, smooth boundary.

B21t—15 to 25 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, fine, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown (10YR 4/3) clay films; medium acid; clear, smooth boundary.

B22t—25 to 33 inches, yellowish-brown (10YR 5/4) silty clay loam; moderate, medium, subangular blocky structure; firm; few roots; thin, discontinuous, dark-brown (10YR 3/3) films; strongly acid; clear, smooth boundary.

B31—33 to 41 inches, yellowish-brown (10YR 5/4) silt loam; weak, coarse, prismatic structure parting to weak, coarse, subangular blocky; firm; few roots; thin, patchy, dark-brown (10YR 4/3) clay films on vertical faces of peds; medium acid; clear, smooth boundary.

IIB32—41 to 50 inches, brown (10YR 5/3) loam; weak, coarse, subangular blocky structure; friable; as much as 20 percent coarse fragments; slightly acid; clear, smooth boundary.

IIC—50 to 60 inches, brown (7.5YR 5/4) light sandy loam; massive; friable; as much as 20 percent coarse fragments; strong effervescence; moderately alkaline.

The silty sediment ranges from 40 to 60 inches in thickness. The Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark brown (10YR 4/3). The very dark grayish-brown (10YR 3/2) material dries to light brownish gray (10YR 6/2). The upper part of the B horizon ranges from heavy silt loam to silty clay loam in texture. The part of the B horizon that formed in till ranges from heavy sandy loam to clay loam in texture and from 4 to 10 inches in thickness. Where these soils are near wetter soils, the lower part of the B2t horizon is mottled. Depth to calcareous sandy loam till generally ranges from 44 to 68 inches, but in some places it is as deep as 72 inches. The calcium carbonate equivalent of the till ranges from 15 to 32 percent.

St. Charles soils are near Plano, Dodge, Kidder, Whalan, and Virgil soils. St. Charles soils have a lighter colored A horizon than Plano soils. They have more of the B horizon formed in loessal silt than Dodge and Kidder soils. St. Charles soils lack bedrock below the solum, which Whalan soils have. They are better drained than Virgil soils.

St. Charles silt loam, 0 to 2 percent slopes (ScA).—This soil is on ridgetops of glaciated uplands. Areas of this soil are irregularly shaped tracts 80 to 340 acres in size. Slopes are convex.

This soil has a profile similar to the one described as representative of the series, but the silt mantle is thicker. In cultivated areas the surface layer is nearly uniformly very dark grayish brown, but in concave areas it is darker.

Included with this soil in mapping are some small areas of soils that have slopes of 3 or 4 percent and a few small areas of Virgil soils. Also included are some small areas of soils that have a silt mantle 60 to 80 inches thick.

This soil is well suited to all crops commonly grown in the county. It can be farmed intensively if fertility is maintained. Capability unit I–3; woodland suitability group 1o1.

St. Charles silt loam, 2 to 6 percent slopes (ScB).—This soil is on ridgetops and upper side slopes. Areas of this soil are elongated tracts 85 to 260 acres in size. Slope segments are 150 to 250 feet long.

This soil has the profile described as representative of the series. In cultivated areas the surface layer is almost uniformly dark grayish brown. In a few areas it is very dark grayish brown.

Included with this soil in mapping are small areas of a Dodge silt loam and some small areas of soils that have a silt mantle 60 to 80 inches thick. Also included

are eroded areas in which tilth is poorer and organic-matter content is lower.

If this soil is properly managed, it is well suited to all crops commonly grown in the county. The only limitation to the use of this soil is the moderate hazard of erosion. The major concerns of management are improving the organic-matter content and tilth, increasing fertility, and controlling erosion. Capability unit IIe–1; woodland suitability group 1o1.

St. Charles silt loam, 6 to 12 percent slopes, eroded (ScC2).—This soil is on nearly uniformly shaped middle side slopes. Areas of this soil are ribbonlike tracts 100 to 150 acres in size. These areas are characterized by a few narrow drainageways. Slopes are slightly convex. Slope segments are 125 to 200 feet long.

This soil has a profile similar to the one described as representative of the series, but the surface layer is 6 to 8 inches thick and is generally dark brown. In a few places the surface layer is very dark grayish brown or brown. Tilth is poorer and fertility is lower than in uneroded areas.

Included with this soil in mapping are small areas of Dodge soils.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation is a severe hazard of erosion caused by slope. The major concerns of management are controlling erosion, improving organic-matter content and tilth of the surface layer, and increasing fertility. Capability unit IIIe–1; woodland suitability group 1o1.

St. Charles silt loam, 12 to 20 percent slopes, eroded (ScD2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 40 to 100 acres in size. These areas are characterized by small drainageways. Slopes are concave or convex. Slope segments are 80 to 120 feet long.

This soil has a profile similar to the one described as representative of the series, but the loess is 40 to 44 inches thick over till in most places. In cultivated areas the surface layer is brown. Some material from the surface layer has accumulated at the base of slopes.

Included with this soil in mapping are small areas of Dodge soils. Also included are areas of soils in which the plow layer is severely eroded and that have low organic-matter content and poor tilth.

This soil is better suited to small grain, forage, pasture, timber, and wildlife habitat than to most other uses. Some row crops may be grown if the level of management is high. The moderately steep slope causes a very severe hazard of erosion. If this soil is cultivated, controlling erosion and conserving moisture are useful conservation practices. Capability unit IVe–1; woodland suitability group 1r2.

Salter Series

The Salter series consists of gently sloping and sloping, well drained and moderately well drained soils on benches in old lake basins. They are moderately deep over stratified silt. These soils formed in water-laid silt and fine sand under mixed hardwoods and an understory of prairie grasses.

In a representative profile the surface layer is very dark grayish-brown sandy loam about 8 inches thick. The subsoil is dark yellowish brown and is about 34 inches thick. The upper 19 inches is friable sandy loam, the next 11 inches is very friable loamy sand, and the lower 4 inches is friable silt loam that has strong-brown and grayish-brown mottles. The underlying material is stratified, yellowish-brown silt that has strong-brown and grayish-brown mottles.

Salter soils have medium fertility. Available water capacity is medium. Permeability is moderately rapid in the upper part of these soils and moderately slow in the lower part. The seasonal high water table is below a depth of 3 feet, and it is usually below a depth of 5 feet.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to woodland, pasture, and wildlife habitat.

Representative profile of Salter sandy loam, 2 to 6 percent slopes, in cultivated area, 50 feet south of road and 100 feet west of house, NE¼NE¼NW¼ sec. 33, T. 5 N., R. 11 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) sandy loam; weak, very fine, subangular blocky structure; very friable; many roots; mildly alkaline; clear, smooth boundary.

B1—8 to 10 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, fine, subangular blocky structure; friable; many roots; mildly alkaline; clear, smooth boundary.

B2—10 to 17 inches, dark yellowish-brown (10YR 4/4) heavy sandy loam; moderate, fine, subangular blocky structure; friable; many roots; few, thin, patchy, dark-brown (10YR 3/3) clay films on horizontal faces of peds; mildly alkaline; gradual, smooth boundary.

B31—17 to 27 inches, dark yellowish-brown (10YR 4/4) sandy loam; weak, medium, subangular blocky structure; friable; many roots; thin, patchy, very dark grayish-brown (10YR 3/2) clay films; mildly alkaline; clear, smooth boundary.

B32—27 to 38 inches, yellowish-brown (10YR 5/4) loamy sand; weak, medium, subangular blocky structure; very friable; thin, patchy, dark-brown (10YR 3/3) clay films on vertical faces; mildly alkaline; clear, smooth boundary.

IIB33—38 to 42 inches, dark-brown (10YR 4/3) silt loam; common, medium, distinct, strong-brown (7.5YR 5/8) and grayish-brown (10YR 5/2) mottles; weak, medium, prismatic structure parting to weak, medium, subangular blocky; friable; few, thin, patchy clay films; slightly acid; abrupt, smooth boundary.

IIC—42 to 60 inches, yellowish-brown (10YR 5/4), stratified silt loam; common, medium, distinct, grayish-brown (10YR 5/2) and strong-brown (7.5YR 5/8) mottles; weak, medium, platy structure; friable, firm; slightly acid.

The solum ranges from 30 to 50 inches in thickness. It generally extends into the silty sediment. The A horizon is silt loam or sandy loam. The upper part of the B horizon is loam or sandy loam, and the middle part is loamy sand or sand. The IIB3 horizon formed in the underlying silt and is silt loam. Reaction of the IIB3 and IIC horizons ranges from slightly acid to strongly acid. Where the loamy upper part of the solum is thicker, the lower part is coarser and the contrast between the IB3 and IIB3 horizons is greater.

Salter soils in Dane County are outside the defined range for the series in that they have a darker surface layer and lack free carbonates above a depth of 40 inches, but these differences do not alter their usefulness or behavior.

Salter soils are similar to Boyer and Grays soils. They are coarser textured throughout than Grays soils. The lower part of the B horizon of Salter soils formed in silt,

whereas that of Boyer soils formed in outwash sand and gravel.

Salter sandy loam, 2 to 6 percent slopes (SeB).—This soil is on broad benches of old lake basins. Areas of this soil are 45 to 265 acres in size. Slopes are smooth and convex. Slope segments are 150 to 200 feet long.

This soil has the profile described as representative of the series. The surface layer is very dark brown and very dark grayish brown.

Included with this soil in mapping are some small areas of soils that have slopes of 0 to 2 percent and a few small areas of soils that have a surface layer of silt loam.

If this soil is properly managed, it is suited to all crops commonly grown in the county. Because of the gentle slope and medium available water capacity, practices to control erosion and conserve moisture are useful. Maintaining or improving tilth and organic-matter content are also helpful. Capability unit IIIs–4; woodland suitability group 1o1.

Salter sandy loam, 6 to 12 percent slopes, eroded (SeC2).—This soil has nearly uniformly shaped slopes. Areas of this soil are irregular tracts 40 to 80 acres in size. These areas are characterized by a few narrow drainageways. Slopes are slightly convex. Slope segments are 100 to 150 feet long.

This soil has a profile similar to the one described as representative of the series, but it is shallower to the underlying silt. In cultivated areas the surface layer is generally very dark grayish brown and is 6 to 8 inches thick. In a few places it is very dark brown or dark brown.

Included with this soil in mapping are small areas of Boyer soils. Also included are some small areas of Dresden soils.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The major limitations to the use of this soil are a severe hazard of erosion and medium available water capacity. The major concerns of management are controlling erosion, conserving moisture, improving the organic-matter content and tilth of the surface layer, and increasing fertility. Capability unit IIIe–7; woodland suitability group 1o1.

Salter silt loam, 0 to 2 percent slopes (SfA).—This soil is on benches in old lake basins. Areas of this soil are irregularly shaped tracts 80 to 260 acres in size. Slopes are convex.

This soil has a profile similar to the one described as representative of the series, but it is slightly thicker and has a silt loam surface layer. In cultivated areas the surface layer is almost uniformly very dark grayish brown. In a few concave areas it is darker.

Included with this soil in mapping are some small areas of soils that have slopes of 3 to 4 percent.

This soil is well suited to all crops commonly grown in the county. It can be farmed intensively if fertility is maintained. Capability unit I–4; woodland suitability group 1o1.

Salter silt loam, 2 to 6 percent slopes, eroded (SfB2).—This soil is on irregularly shaped benches in old lake basins. Areas of this soil are 145 to 185 acres in size. Slope segments are generally 175 to 225 feet long. Runoff is medium.

In cultivated areas the surface layer is almost uniformly dark grayish brown. In a few concave areas it is darker.

Included with this soil in mapping are small areas of soils that have slopes of less than 2 percent or more than 6 percent.

This soil is well suited to all crops commonly grown in the county. If this soil is cultivated, the hazard of erosion is moderate. If erosion is controlled, row crops can be grown under intensive management. Capability unit IIe–1; woodland suitability group 1o1.

Salter Series, Wet Variant

The Salter series, wet variant, consists of deep, somewhat poorly drained, nearly level and gently sloping soils on low benches in old lake basins. They formed under mixed hardwoods in water-laid silt and sand that are more than 5 feet thick.

In a representative profile the surface layer is dark grayish-brown sandy loam about 6 inches thick. The subsurface layer is friable, grayish-brown sandy loam about 4 inches thick. The subsoil is about 29 inches thick; is light brownish gray, grayish brown, and pale brown; and has yellowish-brown mottles. It is loam in the upper part and loamy sand in the lower part. The underlying material is varicolored, strongly acid, stratified, lake-laid loam, sandy loam, loamy sand, and silt loam.

These soils have medium fertility. The available water capacity is medium, and permeability is moderate in the subsoil and moderately slow in the substratum. The seasonal high water table is at a depth of 1 to 3 feet in spring.

If these soils are drained, they are suited to all crops commonly grown in the county. Artificial drainage is needed for maximum crop production. These soils are better suited to surface drainage systems. Diversions that intercept runoff from higher lying areas are also helpful. Salter soils, wet variant, are also suited to woodland and wildlife habitat. Maintaining the moderately high organic-matter content and good tilth of the surface layer is beneficial.

Representative profile of Salter sandy loam, wet variant, 0 to 3 percent slopes, 150 feet southwest of barn, SE¼NE¼ sec. 23, T. 5 N., R. 9 E.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) sandy loam; weak, very fine, subangular blocky structure; friable; slightly acid; abrupt, smooth boundary.

A2—6 to 10 inches, grayish-brown (10YR 5/2) sandy loam; weak, thick, platy structure parting to weak, very fine, subangular blocky; friable; medium acid; abrupt, smooth boundary.

B21—10 to 26 inches, light brownish-gray (2.5Y 6/2) loam; common, medium, prominent, yellowish-brown (10YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; patchy, dark grayish-brown (10YR 4/2) clay films; strongly acid; clear, wavy boundary.

B22—26 to 31 inches, pale-brown (10YR 6/3) loamy sand; common, fine, distinct, yellowish-brown (10YR 5/6) and common, medium, prominent, light-gray (10YR 7/2) mottles; weak, medium, subangular blocky structure; friable; clay bridging between some sand grains; strongly acid; clear, wavy boundary.

B23—31 to 39 inches, grayish-brown (10YR 5/2) loamy sand; common, fine, distinct, yellowish-brown (10YR 5/6) mottles; weak, fine, subangular blocky structure; firm; patchy clay films and

organic stains on some faces of peds; strongly acid; abrupt, wavy boundary.

C—39 to 60 inches, stratified loam, sandy loam, loamy sand, and silt loam that are dark grayish brown (10YR 4/2), dark brown (10YR 4/3), brown (10YR 5/3), and pale brown (10YR 6/3); common, medium, distinct, yellowish-brown (10YR 5/8) mottles; weak, medium, platy structure; friable; strongly acid.

The solum ranges from 24 to 40 inches in thickness. The Ap horizon ranges from black (10YR 2/1) to dark grayish-brown (10YR 4/2). The platy A2 horizon is light brownish gray, grayish brown, or dark grayish brown and is 2 to 6 inches thick. The B horizon ranges from 10 to 30 inches in thickness. The C horizon ranges from strongly acid to slightly acid. Layers in the C horizon are 2 to 6 inches thick.

Salter soils, wet variant, are near Salter and Grays soils. Salter soils, wet variant, are similar to Colwood soils. They are more poorly drained than Salter and Grays soils. They are better drained than Colwood soils.

Salter sandy loam, wet variant, 0 to 3 percent slopes (ShA).—This soil is on low benches. Areas of this soil are irregularly shaped tracts 15 to 185 acres in size. Water ponds in some areas.

Included with this soil in mapping are small areas of the better drained Salter soils and the more poorly drained Wacousta and Colwood soils. Also included are areas of soils that have a surface layer of silt loam, loam, or fine sandy loam.

If this soil is drained, it is suited to all crops commonly grown in the county. In undrained areas alfalfa is much less likely to survive in winter. Drainage can be provided by intercepting and diverting runoff from higher lying areas. Installing open ditches and tile drains provides surface and subsurface drainage. Cultivating only when the soil has the proper moisture content, tilling the minimum, returning crop residue to the soil, applying lime and fertilizer according to soil test results, and applying barnyard manure are helpful management practices. Capability unit IIw–2; woodland suitability group 1o1.

Seaton Series

The Seaton series consists of deep, moderately well drained, sloping to steep soils on glaciated uplands. These soils are on high benches and foot slopes below high, bedrock-controlled ridges. They formed in deep, moderately coarse silt under mixed hardwoods. The depth to calcareous till is about 60 inches (fig. 12).

In a representative profile the surface layer is dark grayish-brown silt loam about 6 inches thick. The silt loam subsoil is about 47 inches thick. The upper part is dark yellowish brown, and the lower part is pale brown and brown and has common, distinct, strong-brown mottles. The underlying material is massive, mottled grayish-brown silt loam and light brownish-gray sandy loam.

These soils have high fertility. The available water capacity is high and very high, and permeability is moderate. These soils receive seepage water from higher lying, bedrock-controlled uplands. The seasonal high water table is at a depth of 3 to 5 feet for moderate periods, especially in spring.

If these soils are properly managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. Seaton soils are well suited to pasture, woodland, and wildlife habitat.

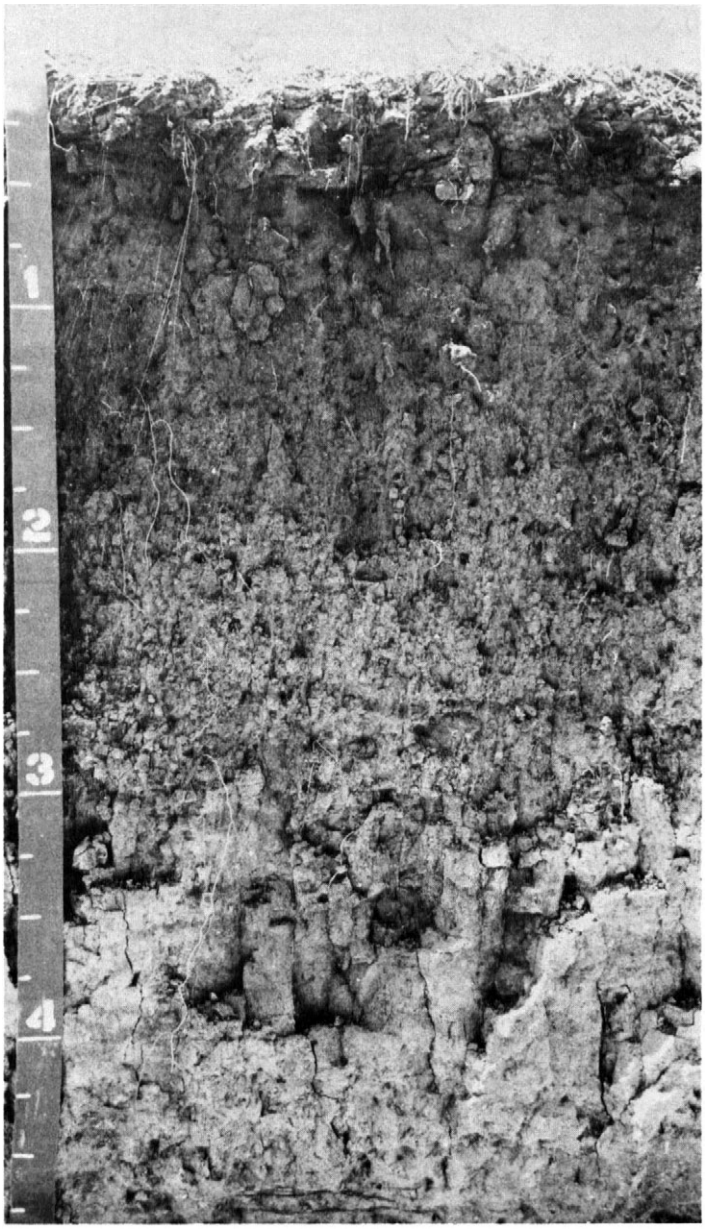

Figure 12.—**Profile of Seaton silt loam, 2 to 6 percent slopes.**

Representative profile of Seaton silt loam, 6 to 12 percent slopes, eroded, in cultivated area, 50 feet southwest of farm buildings, NW¼NE¼ sec. 28, T. 9 N., R. 7 E.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam; weak, very fine, subangular blocky structure; friable; common roots; neutral; abrupt, smooth boundary.

B1—6 to 11 inches, dark yellowish-brown (10YR 4/4) silt loam; weak, very fine subangular blocky structure; firm; few roots; medium acid; clear, smooth boundary.

B21t—11 to 17 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, very fine, subangular blocky structure; firm; few roots; clean, light brownish-

gray (10YR 6/2) silt coats; thin, discontinuous, brown (7.5YR 4/2) clay films; strongly acid; gradual, wavy boundary.

B22t—17 to 28 inches, dark yellowish-brown (10YR 4/4) silt loam; few, fine, faint, strong-brown (7.5YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; few roots; clean, light brownish-gray (10YR 6/2) silt coats; thin, discontinuous, brown (7.5YR 4/2) clay films; strongly acid; clear, wavy boundary.

B31—28 to 41 inches, pale-brown (10YR 6/3) silt loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; weak, coarse, subangular blocky structure; firm; few roots; few patchy clay films on vertical faces only; vesicular; strongly acid; clear, wavy boundary.

B32—41 to 53 inches, brown (7.5YR 4/2) silt loam; few, medium, distinct, strong-brown (7.5YR 5/6) mottles; moderate, medium, prismatic structure; firm; few patchy clay films on vertical faces only; slightly acid; clear, wavy boundary.

C1—53 to 60 inches, grayish-brown (10YR 5/2) silt loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; massive; firm; vesicular; mildly alkaline; clear, wavy boundary.

IIC2—60 to 90 inches, light brownish-gray (2.5Y 6/2) sandy loam; common, medium, faint, yellowish-brown (10YR 5/8) mottles; massive; firm; moderately alkaline.

The loess ranges from 55 to 100 inches or more in thickness. The B horizon is dark-brown (7.5YR 4/2) to pale-brown (10YR 6/3) silt loam. Depth to mottles, and their color, vary slightly from place to place.

Seaton soils are near Dells, Port Byron, and St. Charles soils and Seaton soils, loamy variant. They have a thicker silt mantle and are better drained than Dells soils. They have a lighter colored A horizon than Port Byron soils. They have a thicker silt mantle and are deeper over the underlying material than St. Charles soils. They lack the loamy material in the upper part of the profile that Seaton soils, loamy variant, have.

Seaton silt loam, 2 to 6 percent slopes (SmB).—This soil is in irregularly shaped areas on hillsides and benches. Areas of this soil are 75 to 235 acres in size. Slopes are concave on the hillsides and convex on the benches. Slope segments generally are 150 to 255 feet long.

This soil has a profile similar to the one described as representative of the series, but the surface layer is slightly thicker. In cultivated areas the surface layer is almost uniformly dark grayish brown. In a few concave areas it is darker.

Included with this soil in mapping are a few small areas of somewhat poorly drained Elburn and Virgil soils and small areas of soils that have a silty clay loam subsoil. Also included are small areas of soils that have slopes of less than 2 percent or more than 6 percent.

This soil is well suited to all crops commonly grown in the county. The only limitation is a moderate hazard of erosion. If erosion is controlled, row crops can be grown most of the time under intensive management. Capability unit IIe–1; woodland suitability group 1o1.

Seaton silt loam, 6 to 12 percent slopes, eroded (SmC2).—This soil is on nearly uniformly shaped lower side slopes in valleys and on side slopes on benches. Areas of this soil are 68 to 125 acres in size. These areas are characterized by a few narrow drainageways. Slopes are concave in the valleys and convex on the benches. Slope segments are 100 to 200 feet long Runoff is moderately rapid.

This soil has the profile described as representative of the series. The surface layer is dark grayish brown, and in some areas dark yellowish-brown material from the subsoil is mixed with it.

Included with this soil in mapping are some small areas of soils that have slopes of less than 6 percent or more than 12 percent, small areas of well-drained soils, and a few small areas of soils that have a subsoil of silty clay loam. Also included are a limited acreage of St. Charles soils and some areas of soils that are underlain by sandy loam glacial till at a depth of 5 to 8 feet.

This soil produces well under good management. It is suited to all crops commonly grown in the county. Practices that reduce the severe hazard of erosion are useful. Capability unit IIIe–1; woodland suitability group 1o1.

Seaton silt loam, 12 to 20 percent slopes, eroded (SmD2).—This soil is in smooth areas below steeper soils. Areas of this soil are ribbonlike tracts 20 to 80 acres in size. These areas are characterized by a few narrow drainageways. Slopes are concave. Slope segments are generally 75 to 150 feet long. Runoff is rapid. This soil receives water from higher lying soils.

This soil has a profile similar to the one described as representative of the series, but the surface layer is slightly thinner and lighter colored. The surface layer is brown, and in many areas dark yellowish-brown material from the subsoil is mixed with it.

Included with this soil in mapping are small areas of soils that have slopes of less than 12 percent or more than 20 percent. Also included are some areas of Chaseburg soils in narrow drainageways and some areas of soils that are underlain by sandy loam glacial till at a depth of 5 to 8 feet.

Under a high level of management, this soil is suited to all crops commonly grown in the county. Much of this soil is in meadow, pasture, or trees. The hazard of erosion is very severe. Gullying is a severe problem. The potential for many timber species is good. This soil is especially well suited to walnut and oak. The warmer south- and southwest-facing slopes have less potential than the other slopes for trees. Capability unit IVe–1; woodland suitability group 1r2.

Seaton silt loam, 20 to 30 percent slopes, eroded (SmE2).—This soil is on lower side slopes. Areas of this soil are ribbonlike tracts 10 to 45 acres in size. These areas are characterized by narrow drainageways. Slope segments are 50 to 100 feet long.

This soil has a profile similar to the one described as representative of the series, but it is 45 to 55 inches thick over the underlying silt. The surface layer is dark grayish brown or brown. Some material from the surface layer has accumulated at the base of the slopes.

Included with this soil in mapping are small areas of Whalan and Military soils and some areas of soils that are underlain by sandy loam glacial till at a depth of 5 to 8 feet. Also included are areas of soils in which the plow layer is severely eroded and that have low organic-matter content and poor tilth.

This soil is better suited to forage, pasture, woodland, and wildlife habitat than to most other uses. The main limitations are steepness and a very severe hazard of erosion. Pasture renovation, tree planting (especially of wanut), and wildlife habitat improvement are helpful practices. Capability unit VIe–1; woodland suitability group 1r2.

Seaton Series, Loamy Variant

The Seaton series, loamy variant, consists of deep, well-drained, sloping to steep soils on lower valley side slopes. These soils formed in loamy colluvium and wind-laid silt under mixed hardwoods (fig. 13).

In a representative profile the surface layer is very dark grayish-brown fine sandy loam about 6 inches thick. The next layer is dark-brown fine sandy loam 3 inches thick. The upper part of the subsoil is firm, dark-brown fine sandy loam about 10 inches thick, and the lower part is firm, brown silt loam about 22 inches thick. The underlying material is brown silt loam.

These soils have medium fertility. Available water capacity is high, and permeability is moderate. Seepage water from higher-lying bedrock formations keeps this soil saturated at a depth of 3 to 5 feet for short periods, especially in spring.

These soils are better suited to small grain, hay, pasture, timber, and wildlife habitat than to most other uses. If the level of management is kept high, some row crops can be grown safely on the soils that are not too steep. The major concerns of management are controlling erosion and increasing fertility.

Representative profile of Seaton fine sandy loam, loamy variant, 20 to 30 percent slopes, 1,000 feet south of farm road and 50 feet east of county road, NE¼ SE¼ sec. 23, T. 8 N., R. 6 E.:

A1—0 to 6 inches, very dark grayish-brown (10YR 3/2) fine sandy loam, light brownish gray (10YR 6/2) dry; moderate, very fine, granular structure; very friable; many roots; slightly acid; clear, wavy boundary.

AB—6 to 9 inches, dark-brown (7.5YR 4/4) fine sandy loam; moderate, very fine, subangular blocky structure; very friable; many roots; few, thin, patchy, dark-brown (7.5YR 3/2) organic stains; many very dark grayish-brown (10YR 3/2) worm casts; slightly acid; clear, wavy boundary.

B1—9 to 12 inches, dark-brown (7.5YR 4/4) fine sandy loam; weak, very fine, subangular blocky structure; friable; many roots; slightly acid; clear, wavy boundary.

B2—12 to 19 inches, dark-brown (7.5YR 4/4) loam; weak, very fine, subangular blocky structure; firm; many roots; strongly acid; clear, wavy boundary.

IIB31—19 to 30 inches, brown (10YR 5/3) silt loam; weak,

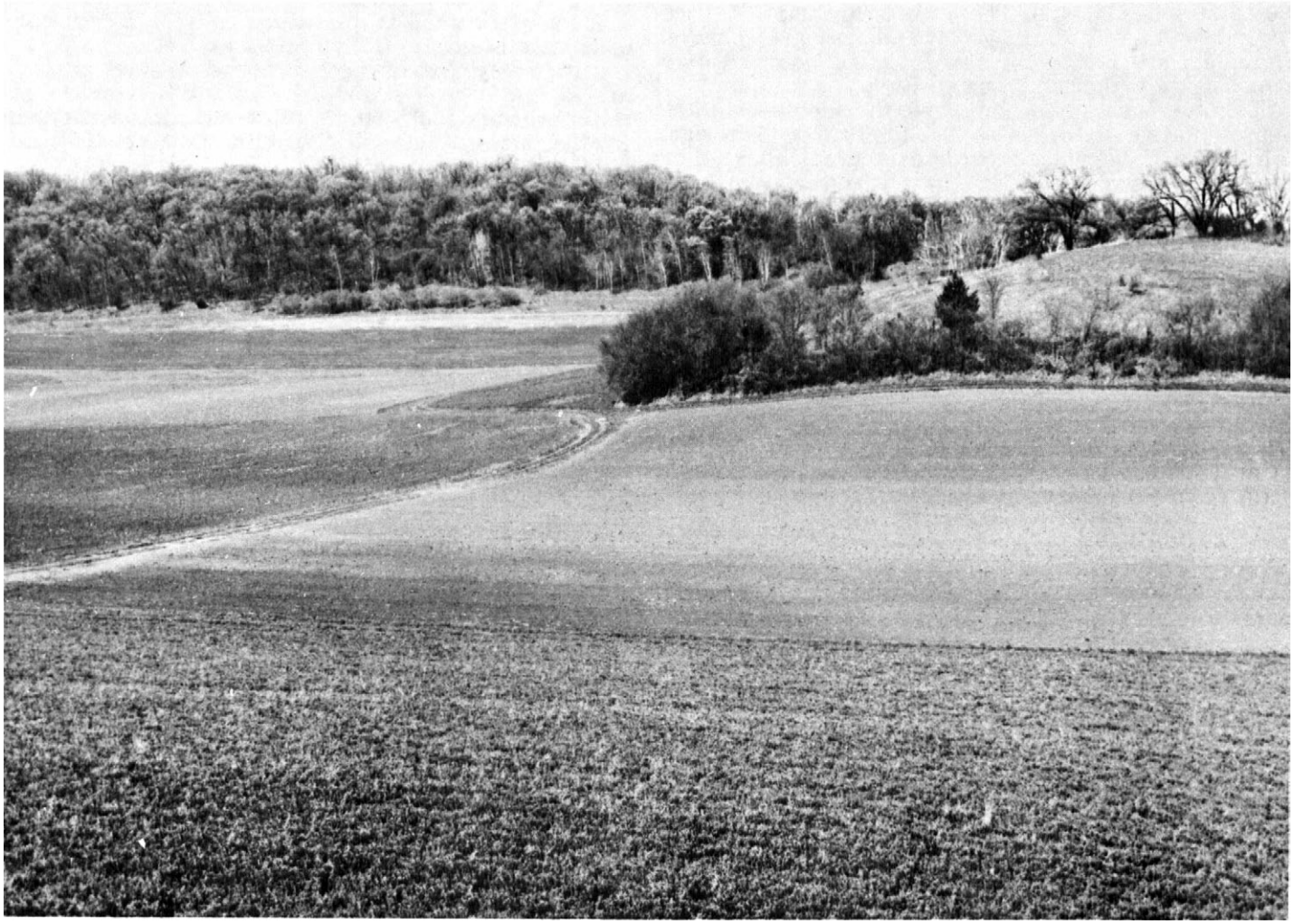

Figure 13.—**Area of Seaton fine sandy loam, loamy variant, 6 to 12 percent slopes, eroded. This soil provides excellent food and cover for small game and some birds.**

very fine, subangular blocky structure; firm; few roots; very strongly acid; clear, wavy boundary.
IIB32—30 to 41 inches, brown (10YR 5/3) silt loam; weak, very fine, subangular blocky structure; firm; few roots; very strongly acid; clear, wavy boundary.
IIC—41 to 60 inches, brown (10YR 5/3) silt loam; common, fine, distinct, strong-brown (7.5YR 5/6) mottles; massive; firm; some organic stains on walls of pores; common iron and manganese concretions; very strongly acid.

The loamy overburden ranges from 14 to 36 inches in thickness. It is sandy loam, fine sandy loam, loam, sandy clay loam, and fine sandy clay loam. Color ranges from yellowish brown (10YR 5/6) to strong brown (7.5YR 5/6) and dark brown (7.5YR 4/4). The material below the loamy overburden is brown (10YR 5/3) to yellowish brown (10YR 5/8). Depth to mottles and the color of the mottles vary slightly from place to place.

Seaton soils, loamy variant, are near Hixton, Port Byron, and Seaton soils and Stony and rocky land. They are underlain by silt, whereas Hixton soils are underlain by sandstone bedrock. They have a thinner, coarser textured, and lighter colored A horizon than Port Byron soils. They have less development in the B horizon and coarser texture in the solum than Seaton soils.

Seaton fine sandy loam, loamy variant, 6 to 12 percent slopes, eroded (SnC2).—This soil is on lower foot slopes in valleys. Areas of this soil are ribbonlike tracts 20 to 50 acres in size. These areas are characterized by a few narrow drainageways. Slopes are concave. Segments are 100 to 150 feet long. This soil receives runoff from higher lying areas. Runoff is medium.

This soil has a profile similar to the one described as representative of the series, but the loamy upper part is thicker. The surface layer is dark grayish brown or brown, and over most of the area it consists partly of dark yellowish-brown material from the subsoil. The plow layer is less friable, lower in organic matter content and fertility, and more difficult to keep in good tilth than the original surface layer.

Included with this soil in mapping are some small areas of soils that have slopes of less than 6 percent or more than 12 percent. Also included are a few small areas of Hixton and Seaton soils.

This soil responds to good management. It is suited to all crops commonly grown in the county. The hazard of erosion is severe. Because this soil receives runoff from higher lying areas, gullies form easily. Practices that reduce this hazard are useful. Capability unit IIIe–1; woodland suitability group 1o1.

Seaton fine sandy loam, loamy variant, 12 to 20 percent slopes, eroded (SnD2).—This soil is on lower side slopes. Areas of this soil are ribbon-like tracts 20 to 60 acres in size. These areas are characterized by a few narrow drainageways. Slopes are concave. Segments are generally 75 to 150 feet long. This soil receives runoff from higher lying areas. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but the loamy upper part is slightly thicker and 2 to 8 inches of the surface layer has been lost through water erosion. The plow layer is less friable, lower in organic matter content and fertility, and more difficult to keep in good tilth than the original surface layer.

Included with this soil in mapping are small areas of soils that have slopes of more than 20 percent or less than 12 percent. Also included are small areas of Stony and rocky land and small areas of Chaseburg soils along drainageways.

Much of this soil is in tame hay meadow, pasture, and trees. The crops commonly grown in the county respond well to a high level of management. The hazard of erosion is very severe. Gullying is a very severe problem. The potential for many timber species is good. Walnut and oak are especially well suited. The potential for trees is much less in the warmer south- and southwest-facing areas than in other areas of this soil. Capability unit IVe–1; woodland suitability group 1r2.

Seaton fine sandy loam, loamy variant, 20 to 30 percent slopes (SnE).—This soil is below steeper soils. Areas of this soil are ribbonlike tracts 20 to 80 acres in size. These areas are characterized by a few downslope drainageways. Slopes are smooth and concave. Segments are mainly 75 to 150 feet long. This soil receives runoff from higher lying areas. Runoff is rapid. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of soils that have slopes of more than 30 percent or less than 20 percent. Also included are small areas of Seaton and Chaseburg soils in narrow drainageways and a few small areas of Hixton and Elkmound soils.

Much of this soil is in pasture or trees. The hazard of erosion is severe. Gullying is a problem. The potential for many timber species is good. Walnut and oak are especially well suited. The potential is much less in the warmer south- and southwest-facing areas than in other areas of this soil. Capability unit VIe–1; woodland suitability group 1r2.

Sogn Series

The Sogn series consists of very shallow, excessively drained, gently sloping to very steep soils on dolomite-controlled uplands. These soils formed in very thin loess under prairie grasses. Below the silt is fractured dolomite bedrock at a depth of 4 to 12 inches.

In a representative profile the surface layer is silt loam about 7 inches thick. The underlying material is fractured dolomite bedrock. Some cracks in the bedrock are filled by material from the surface layer.

Sogn soils have very low fertility. The available water capacity is very low, and permeability is moderate. These soils hold about 1.4 inches of water available in the upper 5 feet. The water table is below a depth of 5 feet.

These soils are better suited to pasture or wildlife habitat than to most other uses. Trees could be planted in some areas, but growth is extremely slow. Many areas of Sogn soils provide crushed rock. If these soils are used for pasture or wildlife habitat, pasture renovation and special plantings are helpful.

Representative profile of Sogn silt loam, 2 to 20 percent slopes, in undisturbed area, 75 feet south of intersection, 50 feet west of road, NE¼SW¼ sec. 19, T. 5 N., R. 7 E.:

A1—0 to 7 inches, black (10YR 2/1) silt loam; moderate, fine, granular structure; very friable; common roots; mildly alkaline; abrupt, smooth boundary.
R1—7 to 48 inches, shattered dolomite; fissures filled with material from A horizon.
R2—48 to 60 inches, dolomite bedrock.

The A horizon ranges from 4 to 12 inches in thickness.

In some places dark reddish-brown clayey residuum is in the cracks in the dolomite. In many places rocks, such as chert, are on the surface and throughout the profile.

Sogn soils are near Dunbarton, Edmund, and NewGlarus soils and Stony and rocky land. They have a thicker and darker colored A horizon than Dunbarton soils. They lack the clayey B horizon of Dunbarton, Edmund, and NewGlarus soils.

Sogn silt loam, 2 to 20 percent slopes (SoD).—This soil is on middle and upper side slopes in dolomite-controlled uplands. Areas of this soil are 25 to 65 acres in size. Slopes are smooth and convex. Slope segments are 150 to 200 feet long. This soil has the profile described as representative of the series.

Included with this soil in mapping are small areas of Edmund and Dunbarton soils, which have higher available water capacity and fertility than this Sogn soil. Also included are some small areas of Ashdale, Port Byron, and Seaton soils at the base of slopes and in narrow drainageways.

If this soil is properly managed, it is suited to pasture and wildlife habitat. Pasture renovation and special plantings are helpful practices. Capability unit VIs–5; woodland suitability group 5d2.

Sogn silt loam, 20 to 35 percent slopes (SoE).—This soil is on lower side slopes. Areas of this soil are characterized by narrow drainageways. Slope segments are 50 to 100 feet long.

This soil has a profile similar to the one described as representative of the series, but it is thinner over dolomite. The surface layer is very dark grayish brown. Some material from the topsoil has accumulated at the base of slopes.

Included with this soil in mapping are small areas of Dunbarton and Edmund soils, which are 10 to 20 inches thick over dolomite. Also included are some small areas of Plano, St. Charles, Port Byron, and Seaton soils at the base of slopes and in downslope drainageways.

This soil is better suited to limited pasture and wildlife habitat than to most other uses. The major concerns of management are steepness, a very severe hazard of erosion, and the very limited thickness over bedrock. Capability unit VIIs–5; woodland suitability group 5d2.

Spinks Series

The Spinks series consists of deep, excessively drained, gently sloping to steep soils. These soils formed in wind-laid sand under mixed hardwoods.

In a representative profile the surface layer is dark grayish-brown loamy sand about 6 inches thick. The subsoil is loose sand about 25 inches thick. It is strong brown in the upper part and yellowish brown in the lower part. Below this are thin bands of dark reddish-brown loamy sand and intervening layers of yellowish-brown sand. The loamy sand layers are friable and about one-half inch thick. The sand layers are loose, single grained, and 2 to 5 inches thick. The total thickness of the loamy sand layers is more than 6 inches, and in places they extend to a depth of more than 60 inches.

These soils have low fertility. The available water capacity is low, and permeability is rapid.

These soils are not well suited to cultivated crops. The major concerns of management are controlling soil blowing and water erosion and conserving moisture. Because of the low available water capacity, these soils dry out quickly. If row crops are grown, residue management, growing of cover crops, and wind stripcropping are useful practices. If practices to control soil blowing and water erosion are not applied, these soils are not suited to row crops.

Representative profile of Spinks loamy sand in area of Spinks and Plainfield loamy sands, 6 to 12 percent slopes, in cultivated area, 100 yards east of Highway 78 or driveway, SW¼SE¼ sec. 24, T. 9 N., R. 6 E.:

Ap—0 to 6 inches, dark grayish-brown (10YR 4/2) loamy sand; weak, fine, subangular blocky structure; very friable; few roots; slightly acid; abrupt, smooth boundary.

B11—6 to 15 inches, strong-brown (7.5YR 5/6) sand; weak, medium, subangular blocky structure; loose; few roots; medium acid; clear, smooth boundary.

B12—15 to 31 inches, yellowish-brown (10YR 5/6) sand; weak, medium, subangular blocky structure and single grained; loose; medium acid; abrupt, smooth boundary.

A&B—31 to 60 inches, yellowish-brown (10YR 5/6) sand (A2); single grained; loose; lamellae and bands (¼- to 1-inch thick) of dark reddish-brown (5YR 3/4) loamy sand (Bt); weak, fine, subangular blocky structure; friable; some clay bridging between sand grains; medium acid.

The A horizon is dark grayish brown (10YR 4/2) or brown (10YR 4/3). Reaction of the sands ranges from medium acid to neutral. The textural bands are loamy sand or sandy loam and are ¼ to 2½ inches thick. They total at least 6 inches in thickness above a depth of 5 feet.

Spinks soils are near Plainfield soils. They have a banded Bt horizon that Plainfield soils lack.

Spinks and Plainfield loamy sands, 2 to 6 percent slopes (SpB).—This undifferentiated group is on valley side slopes. Areas are irregularly shaped tracts 40 to 150 acres in size. The soils occur together at random because banding is variable. The surface layer is dark grayish brown or dark brown.

Included with these soils in mapping are areas of Dickinson soils, sandy variant, and Seaton soils, loamy variant.

These soils are not well suited to cultivated crops. Under a high level of management, however, some row crops can be grown safely. These soils are better suited to pasture, woodland, and wildlife habitat. Capability unit IVs–3; woodland suitability group 3s1.

Spinks and Plainfield loamy sands, 6 to 12 percent slopes (SpC).—This undifferentiated group is on foot slopes in valleys. Areas are ribbonlike tracts 20 to 80 acres in size. These areas are characterized by a few narrow drainageways. Slope segments are 100 to 250 feet long. The distribution of each soil in a mapped area is determined by the pattern of banding, which is random.

A Spinks soil in this unit has the profile described as representative of the series. In some places the surface layer is dark brown or brown.

Included with these soils in mapping are small areas of Seaton soils, loamy variant; Dickinson soils, sandy variant; and Kickapoo soils.

These soils are better suited to pasture, woodland, or wildlife habitat than to most other uses. The important limitations to management are low available water capacity and a severe hazard of erosion. Gully-

ing is especially difficult to control. Capability unit VIIs–3; woodland suitability group 3s1.

Spinks and Plainfield loamy sands, 12 to 25 percent slopes (SpD).—This undifferentiated group is below steep soils. Areas are ribbonlike tracts 20 to 60 acres in size. These areas are characterized by narrow drainageways. Slopes are concave or plane. Slope segments are 100 to 200 feet long. About half of the acreage of this mapping unit is Spinks soils, and half is Plainfield soils. Many areas receive runoff from higher lying areas.

The surface layer is brown in cultivated areas and black in undisturbed areas.

Included with this soil in mapping are some small areas of Port Byron, Hixton, and Elkmound soils and Seaton soils, loamy variant.

Many areas remain in timber, mostly black oak. These soils are better suited to limited pasture, woodland, and wildlife habitat than to most other uses. The important limitations to the use of these soils are a very severe hazard of erosion and low available water capacity. Controlling runoff from higher lying areas and controlling gullying are important. Capability unit VIIs–3; woodland suitability group 3s2.

Stony and Rocky Land

Stony and rocky land (St) includes steep to very steep land that has a thin layer of soil material and also outcrops of dolomite, shale, or sandstone. Most areas have a light cover of mixed hardwoods. Slopes are 30 to 65 percent.

The surface layer ranges from sandy loam to silt loam. Bedrock generally is above a depth of 10 inches, but in some small areas the soils are thicker. Eleva, Elkmound, and Hixton soils formed in sandstone; Dunbarton and Sogn soils formed in dolomite.

These soils have low fertility. The available water capacity is very low or low, and the rooting zone is very shallow. Runoff is rapid.

The soils in this land type are subject to erosion unless a plant cover is maintained. Overgrazed areas are subject to moderate sheet erosion and gullying. These soils are not suited to cultivation. The more gently sloping and slightly deeper soils produce good stands of timber, but the steeper and shallower soils support only stunted, widely spaced trees. Capability unit VIIs–6; woodland suitability group 4d2.

Troxel Series

The Troxel series consists of deep, gently sloping, well drained and moderately well drained soils in draws, on fans, and in drainageways. They are below steeper, silty soils. Most areas of these soils are long and narrow. These soils formed in moderately deep silty alluvium and buried, deep, silty soils under prairie grasses. Areas of these soils continuously receive small amounts of soil material from higher lying areas. Flooding is for only short periods and usually does not damage crops.

In a representative profile the surface layer is silt loam about 28 inches thick. The upper part is very dark brown, the middle part is black, and the lower part is very dark grayish brown. The subsoil is mostly dark yellowish brown and is about 32 inches thick. It is firm silty clay loam in the upper part and firm silt loam in the lower part. The underlying material is brown, massive silt loam.

Troxel soils have high fertility. The available water capacity is very high, and permeability is moderate. The soils are strongly acid to neutral. The water table is below a depth of 3 feet, and it is generally below a depth of 5 feet. Flooding is frequent.

If slope is favorable and erosion, especially gullying, is controlled, these soils are well suited to cultivated crops such as corn and oats. They are not well suited to alfalfa. They are also well suited to meadow, pasture, and wildlife habitat.

Representative profile of Troxel silt loam, 1 to 4 percent slopes, in undisturbed area, in the northeast corner of the NE¼NE¼SE¼ sec. 34, T. 9 N., R. 11 E.:

A11—0 to 18 inches, very dark brown (10YR 2/2) silt loam; weak, fine, subangular blocky structure; very friable; many roots; few thin lenses of light brownish-gray (10YR 6/2), bleached silt; neutral; clear, wavy boundary.

A12—18 to 25 inches, black (10YR 2/1) silt loam; moderate; very fine, granular structure; very friable; few roots; slightly acid; clear, wavy boundary.

A13—25 to 28 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, very fine, granular structure; very friable; few roots; medium acid; clear, wavy boundary.

B1—28 to 31 inches, dark yellowish-brown (10YR 3/4) silty clay loam; moderate, very fine, subangular blocky structure; friable; medium acid; clear, smooth boundary.

B21t—31 to 36 inches, dark brown (10YR 4/3) silty clay loam; moderate, very fine, subangular blocky structure; firm; thin, patchy, very dark grayish-brown (10YR 3/2) clay films; strongly acid; clear, smooth boundary.

B22t—36 to 43 inches, dark yellowish-brown (10YR 4/4) light silty clay loam; weak, fine, subangular blocky structure; firm; thin, patchy, dark-brown (10YR 3/3) clay films; strongly acid; clear, smooth boundary.

B3—43 to 60 inches, yellowish-brown (10YR 5/4) silt loam; weak, medium, subangular blocky structure; firm; thin, dark-brown (10YR 3/3) clay films on vertical faces only; strongly acid; gradual, smooth boundary.

C—60 to 75 inches, brown (10YR 4/3) silt loam; massive; very firm; vesicular; medium acid.

In some places the solum contains small amounts of chert and coarse-textured material that has moved down from higher lying areas. The A horizon ranges from 15 to 30 inches in thickness. The A horizon is very dark brown (10YR 2/2) or black (10YR 2/1) in most places, but where it is cultivated it is very dark grayish brown (10YR 3/2) or dark brown (10YR 3/3). The buried silty soil ranges from well drained to somewhat poorly drained.

Troxel soils are near Dodge, St. Charles, Plano, Ringwood, Sable, and Radford soils. They have a thicker and darker colored A horizon than Dodge and St. Charles soils. They have a thicker A horizon than Plano, Ringwood, and Sable soils. They are better drained than Radford soils.

Troxel silt loam, 1 to 4 percent slopes (TrB).—This soil is in drainageways and small draws. Areas of this soil are elongated tracts 3 to 35 acres in size.

Included with this soil in mapping are small areas of Plano, St. Charles, Radford, and Port Byron soils. Also included are some areas of soils that are dark grayish brown in the upper 2 to 3 feet.

This soil is suited to row crops, small grain, and hay. It is subject to frequent flooding of short duration. The

hazard of erosion is moderate. Gullying is especially difficult to control. The main concerns of management are control of flooding and erosion and maintenance of the organic-matter content and tilth of the surface layer. Grassed waterways or mechanical structures help to prevent gullying. Capability unit IIe–5; woodland suitability group 2o1.

Virgil Series

The Virgil series consists of deep, nearly level and gently sloping, somewhat poorly drained soils on low benches on uplands and in stream valleys. These soils formed in deep loess and glacial till or sand and gravel outwash under mixed hardwoods and an understory of grasses.

In a representative profile the surface layer is black silt loam about 6 inches thick. The subsurface layer is dark grayish-brown silt loam about 3 inches thick. The mottled subsoil is about 47 inches thick. The upper 42 inches is silt loam and silty clay loam, and the lower 5 inches is firm sandy clay loam. The upper part of the subsoil is dark yellowish brown, the middle part is grayish brown, and the lower part is variegated. The underlying material is yellowish-brown, massive, calcareous sandy loam glacial drift.

These soils have high fertility. The available water capacity is high, and permeability is moderately slow. The seasonal high water table is above a depth of 1 to 3 feet in spring.

If these soils are adequately drained, they are well suited to all crops commonly grown in the county, except alfalfa. The main crops are corn, oats, and clover. These soils also are suited to meadow, pasture, trees, and wildlife habitat. Drainage is needed for maximum crop production. Either tile or open-ditch drains are suitable. Areas adjacent to streams are subject to periodic short floods. Diversions that intercept runoff from higher lying areas and grassed waterways that channel the water help to control erosion and reduce wetness.

Representative profile of Virgil silt loam, 1 to 4 percent slopes, in undisturbed area, in the southwest corner of the NE¼ sec. 11, T. 8 N., R. 11 E.:

A1—0 to 6 inches, black (10YR 2/1) silt loam; weak, medium, granular structure; very friable; neutral; abrupt, wavy boundary.

A2—6 to 9 inches, dark grayish-brown (10YR 3/2) silt loam; weak, thin, platy structure; friable; medium acid; abrupt, wavy boundary.

B1—9 to 15 inches, dark yellowish-brown (10YR 4/4) silt loam; few, fine, distinct, dark grayish-brown (10YR 4/2) mottles; weak, medium, subangular blocky structure; firm; strongly acid; clear, wavy boundary.

B21t—15 to 30 inches, grayish-brown (10YR 5/2) silty clay loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; moderate, fine, subangular blocky structure; firm; thin, patchy, dark grayish-brown (10YR 4/2) clay films on all faces of peds; strongly acid; clear, wavy boundary.

B22t—30 to 44 inches, light brownish-gray (10YR 6/2) silty clay loam; common, medium, distinct, strong-brown (7.5YR 5/6) mottles; weak, medium, prismatic structure parting to moderate, fine, angular and subangular blocky; very firm; thin, discontinuous, dark grayish-brown (10YR 4/2) clay films on all faces of peds; strongly acid; clear, wavy boundary.

B31—44 to 51 inches, variegated 60 percent yellowish-brown (10YR 5/4) and 40 percent light brownish-gray (2.5Y 6/2) silt loam; weak, medium, subangular blocky structure; firm; patchy clay films; medium acid; abrupt, wavy boundary.

IIB32t—51 to 56 inches, variegated 70 percent dark grayish-brown (10YR 4/2) and 30 percent brown (7.5YR 5/4) sandy clay loam; weak, medium, subangular blocky structure; firm; slightly acid; clear, wavy boundary.

IIC—56 to 60 inches, yellowish-brown (10YR 5/6) sandy loam; massive; friable; strong effervescence; moderately alkaline.

The silt mantle ranges from 40 to 60 inches in thickness. The Ap horizon is black (10YR 2/1) to very dark grayish brown (10YR 3/2) and is 6 to 10 inches thick. The IIB horizon ranges from 2 to 10 inches in thickness. Depth to calcareous glacial till ranges from 42 to 70 inches. The calcium carbonate equivalent of the till ranges from 15 to 32 percent. In some places the IIC horizon is sand and gravel and is at a depth of 42 to 70 inches. Depth to mottles and their intensity vary slightly from place to place.

Virgil soils are near Sable, Wacousta, Dodge, and Kidder soils. They have a thinner silt mantle and are better drained than Sable and Wacousta soils. They have a thinner A horizon than Elburn soils. They have a much thicker silt mantle and are more poorly drained than Dodge and Kidder soils.

Virgil silt loam, 1 to 4 percent slopes (VrB).—This soil is on lower side slopes. Areas of this soil are elongated tracts 25 to 265 acres in size. Slope segments are 150 to 250 feet long.

This soil has the profile described as representative of the series. In cultivated areas the surface layer is nearly uniformly very dark grayish brown, but it is very dark brown in a few areas.

Included with this soil in mapping are areas of eroded soils in which tilth is poorer and organic-matter content is lower. Also included are small areas of Elburn soils and areas of St. Charles soils. In some areas are soils in which the silt mantle is 60 to 70 inches thick or 30 to 40 inches thick.

If this soil is properly managed, it is suited to all crops commonly grown in the county except alfalfa. The limitations to the use of this soil are a moderate hazard of erosion and moderate wetness. Protection from runoff from higher lying areas and removal of excess subsurface water help to control erosion and reduce wetness. Capability unit IIw–2; woodland suitability group 3o1.

Virgil silt loam, gravelly substratum, 0 to 3 percent slopes (VwA).—This soil is on convex benchlands on outwash plains. Areas of this soil are elongated tracts 70 to 240 acres in size.

This soil has a profile similar to the one described as representative of the series, but it is underlain by sand and gravel outwash at a depth of 50 to 70 inches. In cultivated areas the surface layer is almost uniformly very dark brown.

Included with this soil in mapping are some small areas of soils that have slopes of 4 or 5 percent. Also included are a few small areas of Batavia, Sable, and Elburn soils. In some places are soils in which the silt mantle is 60 to 80 inches thick.

If this soil is adequately drained, it is well suited to all crops commonly grown in the county, except alfalfa. This soil can be farmed intensively if fertility is maintained. Capability unit IIw–2; woodland suitability group 3o1.

Wacousta Series

The Wacousta series consists of deep, nearly level, poorly drained soils on low benches in old lake basins. These soils formed under sedges in silt that has a few very thin layers of very fine sand.

In a representative profile the surface layer is black and very dark gray silty clay loam about 12 inches thick. The subsoil is silt loam. The upper 5 inches is light brownish gray, and the lower 4 inches is light gray. The underlying material is massive, olive-gray silt loam that grades to laminated, olive-gray silt and fine sand with depth.

These soils have low fertility. Available water capacity is high, and permeability is moderately slow. The seasonal high water table is at a depth of 1 foot or less. Because these soils are alkaline throughout the profile, available phosphorus is deficient. Free lime is present at a depth of less than 20 inches. Runoff is slow.

If these soils are drained, they are suited to row crops, small grain, and clover hay. If not drained, they provide good wildlife habitat and limited pasture. All areas of these soils need artificial drainage and protection from flooding if they are to be cultivated. Open-ditch drains are suitable for removing excess surface water. Most areas may be tiled if the tiles are closely spaced at minimum depth. Use of tillage operations that maintain tilth is also extremely important.

Representative profile of Wacousta silty clay loam in cultivated area, NE¼NE¼NW¼ sec. 36, T. 7 N., R. 12 E.:

Ap—0 to 7 inches, black (N 2/0) silty clay loam; moderate, very fine, granular structure; very friable; common roots; mildly alkaline; abrupt, smooth boundary.

A12—7 to 12 inches, very dark gray (N 8/0) silty clay loam; moderate, very fine, granular structure; very friable; common roots; mildly alkaline; clear, smooth boundary.

B1g—12 to 17 inches, light brownish-gray (2.5Y 6/2) silt loam; common, fine, distinct, brown (7.5YR 4/4) mottles; weak, fine, subangular blocky structure; firm; few roots; mildly alkaline; clear, wavy boundary.

B2g—17 to 21 inches, light-gray (5Y 6/1) silt loam; common, fine, prominent, strong-brown (7.5YR 5/6) mottles; weak, fine, subangular blocky structure; firm; very few roots; few fine iron-manganese concretions; slight effervescence; moderately alkaline; clear, wavy boundary.

Cg—21 to 60 inches, olive-gray (5Y 5/2) silt loam; few, fine, prominent, strong-brown (7.5YR 5/6) mottles; massive; firm; many lime concretions; strong effervescence; moderately alkaline.

The solum ranges from 12 to 24 inches in thickness. The A horizon ranges from 8 to 12 inches in thickness. The B horizon ranges from 4 to 14 inches in thickness. Color of the B horizon is 10YR, 2.5Y, and 5Y in hue, 4 to 6 in value, and 1 to 4 in chroma. Depth to free carbonates ranges from 14 to 20 inches. Below the silt loam is stratified silt and fine sand.

Wacousta soils are near Colwood, Montgomery, Orion, and Sable soils. They formed in fine silt, whereas Colwood soils formed in coarse silt and fine sand. They are coarser textured throughout than Montgomery soils. They lack the silty alluvial overburden of Orion soils. They are coarser textured, have less clay, and have a thinner solum than Sable soils.

Wacousta silty clay loam (Wa).—This soil is on low benches in old lake basins. Areas of this soil are irregularly shaped tracts 90 to 350 acres in size. Slopes are 0 to 2 percent.

Included with this soil in mapping are some small areas of Salter soils, wet variant. Also included are some small areas of Sable, Colwood, and Marshan soils and areas of soils that have free lime throughout.

If this soil is adequately drained, it is suited to row crops, small grain, and forage. Other management practices that maintain tilth and fertility are also beneficial. Capability unit IIIw–3; woodland suitability group 3w5.

Warsaw Series

The Warsaw series consists of gently sloping and sloping, well-drained soils on benches in stream valleys. These soils formed in shallow loess, moderately deep loamy outwash, and sand and gravel outwash under prairie grasses. Loose, sandy and gravelly, calcareous outwash is at a depth of about 39 inches.

In a representative profile the surface layer is about 13 inches thick. The upper 10 inches is black silt loam, and the lower 3 inches is very dark grayish-brown loam. The subsoil is about 17 inches thick. The upper 13 inches is dark yellowish-brown sandy clay loam, and the lower 4 inches is dark-brown sandy loam. The underlying material is loose, single-grained, yellowish-brown sand and gravel.

Warsaw soils have medium fertility. Available water capacity is medium, and permeability is moderate. The seasonal high water table is below a depth of 5 feet.

Most areas of these soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture and wildlife habitat. Most areas of these soils are easy to irrigate. If these soils are cultivated, controlling erosion and conserving moisture are helpful management practices.

Representative profile of Warsaw silt loam, 2 to 6 percent slopes, in undisturbed area, 100 yards north of last house on road, SW¼SE¼ sec. 35, T. 6 N., R. 12 E.:

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

A3—10 to 13 inches, very dark grayish-brown (10YR 3/2) loam; weak, fine, granular structure; very friable; neutral; clear, smooth boundary.

B21t—13 to 18 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; moderate, very fine, subangular blocky structure; firm; thin, patchy, dark yellowish-brown (10YR 3/4) clay films on all faces; slightly acid; clear, smooth boundary.

B22t—18 to 26 inches, dark yellowish-brown (10YR 4/4) sandy clay loam; moderate, fine, subangular blocky structure; firm; thin, continuous, dark yellowish-brown (10YR 3/4) clay films; slightly acid; clear, smooth boundary.

B3—26 to 30 inches, dark-brown (7.5YR 4/4) sandy loam; weak, fine, subangular blocky structure; firm; medium acid; clear, wavy boundary.

IIC1—30 to 39 inches, yellowish-brown (10YR 5/6) sand; single grained; loose; slightly acid; clear, wavy boundary.

IIC2—39 to 60 inches, light yellowish-brown (10YR 6/4) and very pale brown (10YR 7/4) sand and gravel; single grained; loose; strong effervescence; moderately alkaline.

The silt mantle ranges from 8 to 18 inches in thickness. The A horizon ranges from black (10YR 2/1) to dark

brown (10YR 3/3). The B horizon is sandy loam, loam, sandy clay loam, or clay loam. The depth to sand and gravel outwash ranges from 20 to 40 inches.

Warsaw soils are near Hayfield, Marshan, Rodman, Dresden, and Boyer soils. They have a thicker A horizon and are better drained than Hayfield and Marshan soils. They have a B horizon, which Rodman soils lack. They have a thicker A horizon than Dresden soils. They have a darker colored A horizon and a thinner and finer textured B horizon than Boyer soils.

Warsaw silt loam, 2 to 6 percent slopes (WrB).—This soil is on outwash plains and benches. Areas of this soil are elongated tracts 40 to 100 acres in size. Slopes are convex. Slope segments are 150 to 250 feet long.

This soil has the profile described as representative of the series. In eroded areas the plow layer is dark brown and is 5 to 7 inches thick. This layer has lower fertility and organic-matter content and poorer tilth than that in uneroded areas.

Included with this soil in mapping are small areas of soils that have a surface layer of loam and areas of soils that are underlain by acid sand at a depth of 3 feet. Also included are a few small areas of Hayfield, Kegonsa, and Dresden soils.

This soil is suited to all crops commonly grown in the county. Because of the moderate depth to limy sand and gravel, available water capacity is medium. The hazard of erosion is moderate. Conserving moisture, improving tilth and organic-matter content of the surface layer, and controlling erosion are helpful practices. Capability unit IIe–2; not placed in a woodland suitability group.

Warsaw silt loam, 6 to 12 percent slopes, eroded (WrC2).—This soil is on outwash plains and benches in stream valleys. Areas of this soil are irregularly shaped tracts 25 to 160 acres in size. Slopes are convex. Segments are 75 to 150 feet long.

This soil has a profile similar to the one described as representative of the series, but it is shallower over sand and gravel. In cultivated and eroded areas, the plow layer is very dark grayish brown to dark brown and is about 7 inches thick.

Included with this soil in mapping are small areas of severely eroded soils and small areas of Dresden, Boyer, and Rodman soils. Also included are small areas of soils that have a surface layer of loam and areas of soils that are underlain by acid sand at a depth of 3 feet.

If this soil is properly managed, it is suited to row crops, small grain, and hay. The important limitations to the use of this soil are a moderate hazard of drought and a severe hazard of erosion. Management practices that reduce these limitations are helpful. Capability unit IIIe–2; not placed in a woodland suitability group.

Watseka Series

The Watseka series consists of deep, nearly level, somewhat poorly drained soils on low benches in stream valleys. These soils formed in deep sand outwash under sedges.

In a representative profile the surface layer is about 16 inches thick. The upper 11 inches is black loamy sand, and the lower 5 inches is very dark gray sand. The subsoil is loose sand about 11 inches thick. It is dark brown in the upper part, grayish brown in the middle part, and dark gray in the lower part. The underlying material is variegated light brownish-gray, grayish-brown, and pale-brown medium sand.

Watseka soils have very low and low fertility. Available water capacity is low or very low, and permeability is rapid. The seasonal high water table is at a depth of 1 to 3 feet in wet seasons.

A high level of management is necessary for satisfactory production of cultivated crops. Controlled open-ditch drainage and protection from flooding are necessary for satisfactory economic returns. After the soils have been drained and protected from flooding, tillage practices are useful. Undrained areas are better suited to meadow, pasture, and wildlife habitat than to most other uses. If these soils are cultivated, they are subject to soil blowing.

Representative profile of Watseka loamy sand in undisturbed area, 50 feet north of road and 75 feet west of tower, SW¼NW¼ sec. 13, T. 6 N., R. 10 E.:

A1—0 to 11 inches, black (N 2/0) loamy sand; weak, very fine, granular structure; very friable; common roots; mildly alkaline; clear, smooth boundary.

A3—11 to 16 inches, very dark gray (10YR 3/1) medium sand; weak, fine, subangular blocky structure; very friable; few roots; mildly alkaline; clear, smooth boundary.

B1—16 to 21 inches, dark-brown (10YR 4/3) medium sand; many, medium, distinct, grayish-brown (10YR 5/2) mottles and common, medium, distinct, brown (7.5YR 4/4) mottles; very weak, medium, subangular blocky structure; very friable; few roots; mildly alkaline; clear, smooth boundary.

B2—21 to 25 inches, variegated 50 percent grayish-brown (2.5Y 5/2), 40 percent pale-brown (10YR 6/3), and 10 percent brown (7.5 YR 4/4) medium sand; single grained; loose; few roots; mildly alkaline; abrupt, smooth boundary.

B3—25 to 27 inches, dark-gray (10YR 4/1) medium sand; single grained; loose; few roots; mildly alkaline; abrupt, smooth boundary.

C1—27 to 48 inches, variegated 70 percent light brownish-gray (10YR 6/2) and 30 percent grayish-brown (10YR 5/2) medium sand; single grained; loose; mildly alkaline; clear, smooth boundary.

C2—48 to 60 inches, pale-brown (10YR 6/3) medium sand; many, medium, distinct, grayish-brown (10YR 5/2) mottles and common, fine, prominent, brown (7.5YR 4/4) mottles; single grained; loose; mildly alkaline.

The A horizon ranges from black (10YR 2/1) to very dark gray (10YR 3/1). Depth to loose sand ranges from 10 to 20 inches. The reaction of the sandy outwash ranges from slightly acid to mildly alkaline.

Watseka soils are near Hayfield, Marshan, Houghton, and Adrian soils. They lack the Bt horizon of Hayfield soils. They are better drained than Marshan soils. They lack the organic overburden of Adrian and Houghton soils.

Watseka loamy sand (Wt).—This nearly level soil is on low benchlands. Areas of this soil are 30 to 280 acres in size. Water ponds in some areas.

Included with this soil in mapping are a few small areas of soils that have a surface layer of muck, sandy loam, or loam. Also included are small areas of Brems, Granby, and Marshan soils.

If this soil is adequately drained and protected from flooding, it is suited to row crops, small grain, and hay. The major concerns of management are providing adequate controlled drainage, protecting the soil from flooding, maintaining the organic-matter content, improving fertility, and protecting the soil from blowing. Capability unit IVw–5; woodland suitability group 3w4.

Westville Series

The Westville series consists of deep, gently sloping to moderately steep, well-drained soils on glaciated uplands and high benches in stream valleys. These soils formed in very thin loess and deeply weathered loamy glacial till under mixed hardwoods. The loess is about 10 inches thick over till that is more than 5 feet thick.

In a representative profile the surface layer is very dark grayish-brown silt loam about 5 inches thick. The subsurface layer is brown, friable silt loam about 5 inches thick. The subsoil is about 59 inches thick. The upper 6 inches is dark-brown heavy loam, the middle part is reddish-brown clay loam and sandy clay loam, and the lower part is reddish-brown sandy loam. The underlying material is weak platy, calcareous, brown sandy loam till.

These soils have medium fertility. Available water capacity is high, and permeability is moderate.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture, trees, and wildlife habitat. If these soils are cultivated, controlling erosion and maintaining tilth and organic-matter content are helpful conservation practices.

Representative profile of Westville silt loam, 6 to 12 percent slopes, eroded, in cultivated area, SW¼SW¼ SE¼ sec. 9, T. 5 N., R. 9 E.:

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) silt loam; moderate, medium, subangular blocky structure; friable; mildly alkaline; abrupt, smooth boundary.

A2—5 to 10 inches, brown (10YR 5/3) silt loam; moderate, thin, platy structure; friable; mildly alkaline; abrupt, smooth boundary.

B1—10 to 16 inches, dark-brown (7.5YR 4/4) heavy loam; moderate, medium, subangular blocky structure; friable; neutral; clear, wavy boundary.

B21t—16 to 28 inches, reddish-brown (5YR 5/4) clay loam; moderate, fine, subangular blocky structure; firm; thin, discontinuous, dark reddish-brown (5YR 3/4) clay films; medium acid; clear, wavy boundary.

B22t—28 to 40 inches, reddish-brown (5YR 4/4) clay loam; moderate, medium, subangular blocky structure; firm; thick, continuous, dark reddish-brown (5YR 3/3) clay films; strongly acid; gradual, wavy boundary.

B23t—40 to 55 inches, reddish-brown (5YR 5/4) sandy clay loam; moderate, coarse, subangular blocky structure; firm; thick, discontinuous, dark reddish-brown (5YR 3/4) clay films; strongly acid; gradual, wavy boundary.

B31—55 to 62 inches, reddish-brown (5YR 5/4) heavy sandy loam; weak, medium, subangular blocky structure; firm; clay flows in root pores; slightly acid; clear, wavy boundary.

B32—62 to 69 inches, reddish-brown (5YR 5/4) sandy loam; weak, medium, subangular blocky structure; friable; some slight evidence of organic-matter accumulation; mildly alkaline; clear, wavy boundary.

C—69 to 80 inches, brown (7.5YR 4/4) sandy loam; structureless or weak, thick, platy structure; friable; strong effervescence; moderately alkaline.

The silt mantle ranges from 6 to 15 inches in thickness. The Ap horizon ranges from 5 to 8 inches in thickness and from very dark grayish-brown (10YR 3/2) to brown (10YR 4/3) in color. The B2t horizon is reddish-brown (5YR 5/4), dark-brown (7.5YR 4/4), and dark yellowish-brown (10YR 4/4) sandy clay loam or clay loam. Depth to calcareous sandy loam till ranges from 40 to 70 inches or more. The calcium carbonate equivalent of the till ranges from 15 to 32 percent.

Westville soils are near Pecatonica soils and are similar to Kidder soils. They have only a small part or none of the B horizon formed in loessal silt, whereas Pecatonica soils have the upper part of the B horizon formed in such silt. They have a thicker solum than Kidder soils.

Westville silt loam, 2 to 6 percent slopes (WvB).—This soil is on ridgetops and upper side slopes. Areas of this soil are elongated tracts 85 to 265 acres in size. Slope segments are 150 to 250 feet long.

In cultivated areas the surface layer is almost uniformly dark grayish brown, but in a few areas it is very dark grayish brown. In eroded areas tilth is poorer and organic-matter content is lower than in uneroded areas.

Included with this soil in mapping are small areas of Pecatonica silt loam. Also included are areas of moderately well drained soils and some small areas of soils that have a surface layer of loam or sandy loam.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation to the use of this soil is the moderate hazard of erosion. The major concerns of management are improving the organic-matter content and tilth, increasing fertility, and controlling erosion. Capability unit IIe–1; woodland suitability group 1o1.

Westville silt loam, 6 to 12 percent slopes, eroded (WvC2).—This soil is on nearly uniformly shaped, slightly convex side slopes. Areas of this soil are ribbonlike tracts 60 to 125 acres in size. These areas are characterized by a few narrow drainageways. Slope segments are 100 to 150 feet long.

This soil has the profile described as representative of the series. In cultivated areas the surface layer is very dark grayish brown, dark grayish brown, or dark brown.

Included with this soil in mapping are small areas of Kidder and Pecatonica soils. Also included are small areas of soils that have a surface layer of loam or sandy loam.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The only limitation to the use of this soil is a severe hazard of erosion. The major concerns of management are controlling erosion, improving the organic-matter content and tilth of the surface layer, and increasing fertility. Capability unit IIIe–1; woodland suitability group 1o1.

Westville silt loam, 12 to 20 percent slopes, eroded (WvD2).—This soil is in almost uniformly shaped areas. These areas are ribbonlike tracts 20 to 90 acres in size. They are characterized by a few narrow drainageways. Slopes are slightly convex. Slope segments are 100 to 150 feet long.

This soil has a profile similar to the one described as representative of the series, but it is 42 to 52 inches thick over sandy loam glacial till. In cultivated areas the surface layer is dark grayish brown and is 6 to 8 inches thick. In eroded areas it is brown.

Included with this soil in mapping are small areas of soils that have a surface layer of sandy loam or loam. Also included are some small areas of Kidder soils and some areas of soils that are slightly steeper than this Westville soil.

Many areas of this soil are in pasture or trees. This soil is not well suited to row crops. The hazard of erosion is very severe. The potential for many species of timber is good. Walnut and oak are especially well

suited. The potential is less in south- and southwest-facing areas than in the rest. Capability unit IVe–1; woodland suitability group 1r2.

Whalan Series

The Whalan series consists of moderately deep, gently sloping to steep, well-drained soils on dolomite-controlled uplands. These soils formed in moderately deep glacial till over dolomite bedrock under mixed hardwoods.

In a representative profile in a cultivated field, the surface layer is dark grayish-brown silt loam about 5 inches thick. It dries to a distinctive gray color. The subsurface layer is brown, friable silt loam about 5 inches thick. The subsoil is firm, brown, and about 17 inches thick. The upper 6 inches is loam, and the lower 11 inches is sandy clay loam. The underlying material is fractured dolomite at a depth of about 27 inches. The cracks are filled with material from the subsoil.

Whalan soils have medium fertility. Available water capacity is low, and permeability is moderate. The seasonal high water table is below a depth of 5 feet.

If these soils are properly managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils also are suited to pasture, woodland, and wildlife habitat. If these soils are cultivated, controlling erosion and conserving moisture are helpful management practices.

Representative profile of Whalan silt loam, 6 to 12 percent slopes, eroded, 20 feet south and 300 feet east of northwest corner of sec. 34, T. 5 N., R. 9 E.:

Ap—0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, medium, granular structure; friable; common roots; mildly alkaline; abrupt, smooth boundary.

A2—5 to 10 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; common roots; neutral; abrupt, smooth boundary.

B1t—10 to 16 inches, brown (10YR 4/3) heavy loam; weak, fine, subangular blocky structure; firm; common roots; thin, patchy, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, wavy boundary.

B21t—16 to 21 inches, brown (7.5YR 4/4) sandy clay loam; moderate, medium, subangular blocky structure; firm; thin, discontinuous, dark-brown (7.5YR 3/2) clay films; slightly acid; clear, wavy boundary.

B22t—21 to 27 inches, brown (7.5YR 4/4) sandy clay loam; moderate, fine, subangular blocky structure; firm; a few dolomitic cobbles; thin, discontinuous, dark-brown (7.5YR 4/4) clay films; slightly acid; abrupt, wavy boundary.

IIR—27 to 60 inches, brownish-yellow (10YR 6/6) dolomite bedrock; thin lenses of clay residuum from dolomite at random above the dolomite.

The silt mantle ranges from 0 to 18 inches in thickness. The Ap horizon ranges from 6 to 8 inches in thickness and from very dark grayish brown (10YR 3/2) to brown (10YR 4/3) in color. Where the Ap horizon is very dark grayish brown, either it is less than 6 inches thick or it dries to a value of 6 or more. The B2t horizon is loam, sandy clay loam, or clay loam and formed in glacial till. It ranges from 10 to 34 inches in thickness. In some places a thin layer of clayey residum is below the weathered till and above the dolomite. Dolomite bedrock is at a depth of 20 to 40 inches.

Whalan soils are near Dunbarton, Sogn, Kidder, Westville, Pecatonica, and Rockton soils. They are deeper to dolomite bedrock than Dunbarton and Sogn soils. They are underlain by dolomite, whereas Kidder, Westville, and Pecatonica soils are underlain by sandy loam glacial till. They have a thinner and lighter colored A horizon than Rockton soils.

Whalan loam, 20 to 30 percent slopes, eroded (WwE2).—This soil is on convex side slopes. Areas of this soil are ribbonlike tracts 20 to 60 acres in size. These areas are characterized by a few narrow drainageways. Slope segments are mainly 100 to 150 feet long. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but 2 to 6 inches of the surface layer has been lost by water erosion. The surface layer is dark brown, and in most areas it contains brown material originally in the subsoil. The plow layer is less friable, lower in organic matter and fertility, and more difficult to keep in good tilth than that of Whalan silt loam, 6 to 12 percent slopes, eroded.

Included with this soil in mapping are small areas of soils that have slopes of less than 20 percent or more than 30 percent. Also included are small areas of Dunbarton soils and small areas of Seaton and Chaseburg soils.

If this soil is properly managed, it is suited to pasture, timber, and wildlife habitat. The major limitations to the use of this soil are moderate depth, low available water capacity, and steepness. Controlling erosion, minimizing runoff, conserving moisture, and maintaining or improving tilth and fertility are helpful management practices. Capability unit VIe–2; woodland suitability group 2r2.

Whalan silt loam, 2 to 6 percent slopes (WxB).—This soil is on broad ridgetops and upper side slopes on uplands. Areas of this soil are 75 to 185 acres in size. Slopes are smooth and convex. Slope segments are 150 to 200 feet long.

This soil has a profile similar to the one described as representative of the series, but it is thicker over dolomite. In cultivated areas the surface layer is dark grayish brown and is about 7 inches thick. In Montrose Township this soil formed in sandy dolomite rather than in glacial drift.

Included with this soil in mapping are small areas of Pecatonica, Kidder, and Westville soils. Also included are some small areas of soils that have slopes of 6 to 8 percent.

If this soil is properly managed, it is suited to all crops commonly grown in the county. Because of the gentle slope and a reduced infiltration rate, erosion control measures are helpful. Because available water capacity is low, conserving moisture and maintaining or improving tilth and organic-matter content are helpful. Capability unit IIe–2; woodland suitability group 2o1.

Whalan silt loam, 6 to 12 percent slopes, eroded (WxC2).—This soil is on middle side slopes. Areas of this soil are ribbonlike tracts 40 to 100 acres in size. These areas are characterized by a few narrow drainageways. Slopes are smooth and convex. Slope segments are 100 to 175 feet long.

This soil has the profile described as representative of the series. In cultivated areas the surface layer generally is brown. In a few areas it is darker. In Montrose Township this Whalan soil formed in sandy dolomite rather than in glacial drift.

Included with this soil in mapping are areas of Dunbarton soils that are 10 to 20 inches thick over dolomite.

If this soil is properly managed, it is suited to all crops commonly grown in the county. The important limitations to the use of this soil are slope and low available water capacity. Because of the low available water capacity, severe hazard of erosion, and moderate depth to bedrock, conserving moisture and controlling erosion are important. Capability unit IIIe–2; woodland suitability group 2o1.

Whalan silt loam, 12 to 20 percent slopes, eroded (WxD2).—This soil is on convex lower side slopes. Areas of this soil are ribbonlike tracts 20 to 60 acres in size. These areas are characterized by a few narrow drainageways. Slope segments are mainly 100 to 150 feet long. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but 2 to 6 inches of the surface layer has been lost by water erosion. The surface layer is dark grayish brown, and in most areas it contains brown material originally in the subsoil. The plow layer is less friable, lower in organic matter and fertility, and more difficult to keep in good tilth than that of Whalan silt loam, 6 to 12 percent slopes, eroded.

Included with this soil in mapping are small areas of soils that have slopes of less than 12 percent or more than 20 percent. Also included are small areas of Dunbarton soils; areas of soils that have a surface layer of loam; and small areas of Seaton and Chaseburg soils along narrow stream bottoms and on foot slopes.

If this soil is properly managed, it is suited to limited row crops, small grain, hay, pasture, timber, and wildlife habitat. The major limitations to the use of this soil are moderate depth, low available water capacity, and moderately steep topography. The hazard of erosion is very severe. Controlling erosion, minimizing runoff, conserving moisture, and maintaining or improving tilth and fertility are helpful management practices. Capability unit IVe–2; woodland suitability group 2r2.

Use and Management of the Soils

In this section a summary of basic practices of soil management is given; management of the soils for crops and pasture is described; the system of capability classification used by the Soil Conservation Service is explained, and the management of the soils by capability unit is discussed; the estimated yields of principal crops are listed; and the use and management of the soils for woodland, wildlife, recreation, and engineering are discussed.

Basic Soil Management Practices

In this subsection general management practices applicable to all the soils in the county are briefly described. In addition to the application of these general practices, good soil management requires that the farmer have specific knowledge about a particular soil to be used; take into account the livestock, machinery, and other farm equipment to be used; and be aware of other resources that are available.

Most soils in the county require practices that control erosion. Therefore, it is necessary to know what kinds of crops to grow to protect the soil and to know what kind of cropping system to use. Terracing, stripcropping, grassed waterways, and contour tillage are practices that protect the soil. It must also be determined whether the soils are to be used for crops or kept under a protective cover of grass or trees.

In order to avoid repeating throughout this subsection the management practices that fit all the soils that are suitable for crops, pasture, trees, or wildlife habitat, general practices that are to be employed in the management of the soils for crops and pasture are summarized in the following paragraphs and are not included in the description of each capability unit. These general practices of soil management should be considered along with the more specific practices suggested in the descriptions of the capability units.

Management of the soils for crops and pasture

Soils that are used for crops need management practices that maintain or improve their natural fertility, protect them from erosion, and keep them in good tilth.

Some of the soils in this county do not have enough phosphorus or potassium available to produce high yields of crops. Marshan, Dickinson, Dodgeville, Sable, and Plano soils have only moderate amounts of phosphorus and potassium. Other soils, such as Seaton, Chaseburg, NewGlarus, Gale, Hixton, Kidder, and Pecatonica soils, have relatively high amounts of phosphorus available but only moderate amounts of potassium. A high yield from these soils is obtained if commercial fertilizer is applied. The amount of fertilizer to be applied can be determined by a soil test. For information on taking soil samples and applying fertilizer and lime consult the local office of the Cooperative Extension Service or the Soil Conservation Service.

The soils most likely to be deficient in nitrogen are eroded soils on uplands, sandy soils, and soils that have been continuously planted to corn. During years when the amount of rainfull is more than average, it is possible to improve the yields of most crops by applying nitrogenous fertilizers. If legumes are frequently grown in the conservation cropping system, a part of the nitrogen needed by other crops is supplied.

Deep-rooted crops such as alfalfa may be used in the cropping system to improve soil structure, increase moisture penetration, and add organic material and nitrogen. Mixtures of alfalfa and bromegrass are generally grown for hay, but in areas where the forage is used for pasture, or where the hay crops will be cut for hay three times during the year, orchardgrass can be substituted for bromegrass. Ladino clover can also be added to the pasture mixture. The hay generally is more profitable as a part of a livestock enterprise than it is as a cash crop.

Most soils in Dane County require lime. The lime should be worked into the soil well in advance of seeding the legumes. Lime applied to the soil prior to the planting of corn in a corn-oats-hay rotation generally has sufficient time to raise the pH to a level suitable for legumes.

The greatest value from the application of manure, in order of importance, can be obtained by applying manure to areas used for corn; to areas used for oats where there is no problem of lodging; and to areas

used for grass sod. Manure should be used as a topdressing on good alfalfa sod only if there is no other place to apply it. The application of manure on good alfalfa generally is not recommended, because it encourages the growth of grass, tends to smother alfalfa if applied unevenly, and lowers the quality of the forage.

Manure is especially valuable in establishing grass in waterways and in eroded areas. In addition to supplying nutrients, it acts as a mulch and improves the physical condition of the soil. Crop residue should not be burned. This practice destroys organic matter that, if returned to the soil, would improve the fertility and tilth, help to maintain the structure of the soil, and keep the soil porous and permeable.

In many places in Dane County, soil blowing and erosion by water are serious problems in the management of the soils. The loss of any amount of soil from the surface layer reduces the supply of organic matter and plant nutrients and makes the soil less absorbent. Consequently, more water runs off, the rate of erosion increases, and the supply of available water decreases.

Water causes either sheet or gully erosion. The degree of water erosion depends upon the length and steepness of the slope; the texture, structure, and permeability of the soils; and the plant life on the soils.

Some practices that control water erosion are terracing land, if its slope does not exceed 12 percent; establishing suitable grasses in waterways and outlets; protecting erodible sites by diverting water that runs off from higher areas; tilling and planting on the contour or parallel to terraces; using crop residue; and installing dams, grade-stabilization structures, or other structures if they are needed.

The amount of soil blowing is determined by the erodibility of the soil, the smoothness of the surface of the soil, the velocity of the wind in relation to the moisture in the surface layer, the length of a field that is not protected by natural wind barriers or planted shelterbelts, and the kind and quantity of plant cover on the surface. Fields that face the wind increase in erodibility as the slope increases to as much as 10 percent.

In order to control soil blowing, vegetation, either a growing crop or crop residue such as corn stalks, must be kept on the soil at all times. If soil blowing begins on an unprotected field, it may be necessary to roughen the surface through emergency tillage in order to hold the soil until a crop can be established.

The principal aims of tillage are to prepare a seedbed, to prepare a root bed, and to eliminate competing vegetation. Frequent tillage destroys the structure of the soil and results in a powdery surface layer that does not absorb water readily and is easily eroded by soil blowing. Frequent tillage also destroys organic matter. Under normal circumstances, it is necessary to till only often enough to prepare a good seedbed and to control weeds and volunteer growth. If chemicals are used to control weeds, it is generally not necessary to till as often as it is if chemicals are not used.

Plow planting and wheel track planting are examples of methods of minimum tillage. Minimum tillage can be used on sloping or level soils in areas where spring plowing is done. Minimum tillage reduces labor and tillage costs. It reduces the amount of soil compaction, because fewer trips are made over the field. More rainfall is trapped in the rough surface of the soil, and, therefore, more water is available for use by crops. Weed control is also aided by minimum tillage.

More than 100,000 acres in Dane County is used for pasture. Much of the pasture on the steep soils can be made to produce two to three times as much as it now does if a program of renovation and good management is initiated. The area selected for renovation should be large enough to be handled as a definite part of the pasture program. The condition of the soil should be good enough to justify the cost of liming, fertilization, tillage, reseeding, and removal of obstructions.

Grazing management is important on both renovated and natural pasture. Overgrazing should be avoided. The number of livestock in a pasture should be adjusted to the expected forage production. The production of grasses and legumes generally is greater for the season if grazing is delayed in spring until the plants have made good growth. Legume pastures that are not grazed from early September until the first killing frost can be highly productive the following year.

Most of the phosphorus that a pasture of grass and legumes needs can be supplied at the time of renovation, but additional potassium has to be furnished by topdressing with fertilizer such as 0-15-45 or 0-0-60. No nitrogen is needed if there is at least one-third legumes in the forage, but if the pasture is mostly grass, an application of nitrogen early in spring is desirable.

Pasture free of weeds produces a better quality and a higher quantity of forage. Weeds and brush should be mowed before they produce seed, or they should be sprayed if that method is more economical.

Surface and tile drains should be used to improve soils that are normally wet. For those wet soils that cannot be tilled or ditched, crops that tolerate water should be grown, and adequate amounts of fertilizer should be used. Soils in lower areas should be protected from runoff from soils on uplands by means of diversions or waterways, or both.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The groups are made according to the limitations of the soils when used for field crops, the risk of damage when they are used, and the way they respond to treatment. The grouping does not take into account major and generally expensive landforming that would change slope, depth, or other characteristics of the soils; does not take into consideration possible but unlikely major reclamation projects; and does not apply to cranberries, horticultural crops, or other crops requiring special management.

Those familiar with the capability classification can infer from it much about the behavior of soils when used for other purposes, but this classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for forest trees or engineering.

In the capability system, all kinds of soil are grouped at three levels: the capability class, subclass, and unit. These are discussed in the following paragraphs.

CAPABILITY CLASSES, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use, 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, require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants, 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 largely to pasture, woodland, or wildlife.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture, woodland or wildlife.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or woodland or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife, water supply, or esthetic purposes.

CAPABILITY SUBCLASSES are soil groups within one class; they are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in some parts of the United States, but not in Dane County, shows that the chief limitation is climate that is too cold or too dry.

In class I there are no subclasses, because the soils of this class have few limitations. Class V can contain, at the most, only the subclasses indicated by *w*, *s*, and *c*, because the soils in class V are subject to little or no erosion, though they have other limitations that restrict their use largely to pasture, range, woodland, wildlife, or recreation.

CAPABILITY UNITS are soil groups within the subclasses. The soils in one capability unit are enough alike to be suited to the same crops and pasture plants, to require similar management, and to have similar productivity and other responses to management. Thus, the capability unit is a convenient grouping for making many statements about management of soils. Capability units are generally designated by adding an Arabic numeral to the subclass symbol, for example, IIe–2 or IIIe–6. Thus, in one symbol, the Roman numeral designates the capability class, or degree of limitation; the small letter indicates the subclass, or kind of limitation, as defined in the foregoing paragraph; and the Arabic numeral specifically identifies the capability unit within each subclass (*15*).

Management by capability units

In the following paragraphs, the capability units in Dane County are described. The numbering of these units is not consecutive, because not all the capability units used in Wisconsin are in this county.

In the descriptions of the capability units, the characteristics of the soil or soils in the unit are described, the limitations are summarized, suitable crops are given, and management practices are suggested.

Soils in the same capability unit have similar risks of damage and about the same limitations. The soils in one unit, therefore, need about the same kind of management, though they may have formed in different ways and in different kinds of parent material.

CAPABILITY UNIT I–3

This unit consists of nearly level, deep, well drained and moderately well drained, dark-colored to light-colored soils that have a surface layer of silt loam and a thick, moderately fine textured subsoil. These soils are on ground moraines and benches in valleys of stream bottoms.

The soils in this unit are easy to cultivate. Their fertility is medium or high. The available water capacity is high, and permeability is moderate. These soils have high organic-matter content. The major management concerns are the maintenance of organic-matter content and fertility and the improvement and maintenance of soil tilth.

These soils are well suited to all crops commonly grown in the county. The main crops are corn, soybeans, oats, and alfalfa. These soils are also suited to grasses. Stands of fast-growing hardwood timber are on the soils that have a light-colored surface layer.

These soils can be cultivated intensively in places where good soil structure is maintained. Row crops can be grown continuously if all crop residue is returned, minimum tillage is practiced, and a high level of fertility and good tilth are maintained. The dark-colored soils in this unit have a higher natural organic-matter content, are more permeable, and are easier to keep in good tilth than the lighter colored ones. If a high level of production is to be maintained, the nutrients that have been removed by crops and those that have been lost through erosion and leaching must be replaced.

CAPABILITY UNIT I–4

The only soil in this unit is Salter silt loam, 0 to 2 percent slopes. It is a moderately deep, well drained and moderately well drained, light-colored soil that has a surface layer of silt loam and a moderately thick, medium-textured subsoil. It is on benches in valleys and on stream bottoms.

The fertility of this soil is medium. The available water capacity is medium, and permeability is moderately rapid in the upper part of the soil and moderately slow in the lower part. This soil has a medium organic-matter content. This soil is easy to cultivate. The major concerns of management are the maintenance of organic-matter content and fertility and the improvement and maintenance of tilth.

This soil is well suited to all crops commonly grown in the county. The main crops are corn, soybeans, oats, and alfalfa. This soil is also suited to grasses or stands of fast-growing hardwood timber.

This soil can be cultivated intensively in places where good soil structure is maintained. Row crops can be grown continuously if all crop residue is returned, minimum tillage is practiced, and a high level of fertility and good tilth are maintained. If a high level of production is to be maintained, the nutrients that have been removed by crops and those that have been lost through erosion and leaching must be replaced.

CAPABILITY UNIT IIe-1

This unit consists of gently sloping, moderately deep to deep, well drained and moderately well drained, dark-colored and light-colored soils that have a surface layer of loam or silt loam and a thick, moderately fine textured subsoil. These soils are underlain by loam, loose outwash, sand, and gravel, or clay residuum weathered from limestone bedrock. They are moderately eroded in most areas. In areas where these soils are only slightly eroded, they have a slightly thicker surface layer and are easier to cultivate than in other areas.

The fertility is medium, high, or very high. The available water capacity is medium, high, or very high, and permeability is moderately rapid in the subsoil and moderately slow to rapid in the underlying material. These soils respond well to applications of fertilizer and manure. They are generally easy to keep in good tilth, but the soils that have a dark-colored surface layer are easier to keep in good tilth than the other soils in the unit. The major concerns of management are the control of erosion and the maintenance of organic-matter content and fertility.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also well suited to use as pasture and wildlife habitat. The light-colored soils are well suited to timber.

These soils are subject to damage by water erosion in areas where they are cultivated. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Diversions intercept runoff from higher lying soils, and grassed waterways remove excess water without gullying. Erosion control, accompanied by proper tillage practices, permits row crops to be safely grown for more years than would be possible without this form of management.

CAPABILITY UNIT IIe-2

This unit consists of gently sloping, moderately deep, well-drained, dark-colored, and light-colored soils that have a surface layer of silt loam or loam and a medium-textured subsoil. These soils are underlain at a depth of less than 40 inches by sand over sandstone bedrock, clay over limestone bedrock, loose sand, or sand and gravel. They are on uplands and benches in stream valleys. They are moderately eroded in most areas, but in many gently sloping areas they are only slightly eroded.

The fertility of these soils is medium. The available water capacity is medium or low, and permeability generally is moderate; however, permeability in some soils is rapid in the substratum. The soils in slightly eroded areas have better tilth than those in moderately eroded areas. The soils in this unit are slightly droughty. The major concerns of management are the control of erosion, conservation of moisture, and the maintenance or improvement of tilth, organic-matter content, and fertility.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture and wildlife habitat. The light-colored soils are suited to stands of fast-growing timber.

If these soils are used for crops, conservation practices are useful for the control of erosion and conservation of moisture. Contour farming, in conjunction with the use of diversions or terraces and grassed waterways, helps to control erosion. Minimum tillage, the return of crop residue, application of fertilizer according to soil tests, application of barnyard manure, and other practices also are helpful. If most or all of these practices are used, it is safe to use the soils for more years of row crops and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IIe-5

This unit consists of gently sloping, deep, well drained to moderately well drained soils that have a surface layer of silt loam. These soils formed in alluvium. They are in drainageways on uplands, on lower side slopes, and in fan-shaped draws.

The fertility of these soils is high. The available water capacity is very high, and permeability is moderate. The high water table is at a depth of 3 to 5 feet or more during the wet season. These soils are subject to frequent flooding of short duration. They are in areas that collect water and are, therefore, subject to gullying. They are subject to moderate erosion. These soils are easy to cultivate. The major concerns of management are the control of flooding, erosion, and gullying and the maintenance of fertility, tilth, and organic-matter content.

These soils are suited to all crops commonly grown in the county. The major crops are corn, oats, alfalfa, and bluegrass. These soils are also suited to pasture and wildlife habitat. The soil on side slopes is well suited to the production of timber.

If these soils are cultivated, they should be protected from runoff. Many areas of these soils can be protected by diversions that intercept runoff and channel it into grassed waterways. It is necessary to slope, shape, and seed the natural waterways in order to have efficient grassed waterways. Those areas that are inaccessible or frequently flooded should be left in pasture. Minimum tillage, the return of crop residue, fertilization, and other practices permit these soils to be safely planted to row crops for more years and to meadow for fewer years than would be possible without this form of management.

CAPABILITY UNIT IIe-6

This unit consists of gently sloping, moderately deep, well drained to moderately well drained soils that have a surface layer of silt loam and a finer textured sub-

soil. These soils are underlain by shale or stratified sandstone and shale bedrock. They are on uplands.

The fertility of these soils is medium. The available water capacity is medium or low, and permeability is slow. The organic-matter content is moderately low. A high amount of runoff occurs during periods of heavy rainfall. These soils are difficult to cultivate. The major concerns of management are the control of erosion and improvement or maintenance of permeability and tilth.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, alfalfa, and clover. These soils are also well suited to pasture, woodland, or wildlife habitat.

Use of minimum tillage, heavy applications of manure, return of crop residue to the soil, and plowing under of green-manure crops help to maintain or improve tilth and organic-matter content. These practices, as well as terraces, grassed waterways, diversions, and contour stripcropping help to control runoff and to reduce erosion. If these soils are intensively managed, they can be safely used for more years of row crops and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IIs-1

This unit consists of nearly level, moderately deep, well-drained, dark-colored soils that have a surface layer of loam or silt loam and a moderately fine textured and medium-textured subsoil. These soils are underlain by loose outwash sand or sand and gravel. They are on benches on outwash plains. The plow layer of these soils is slightly eroded or is not eroded at all.

The fertility of these soils is medium. The available water capacity is medium, and permeability is moderate in the subsoil and rapid in the substratum. The organic-matter content is medium. All the soils in this unit are moderately droughty. These soils are easy to cultivate. The major management concerns are the maintenance of organic-matter content and tilth, conservation of moisture, and improvement of fertility.

These soils are well suited to all crops commonly grown in the county. The major crops are corn, soybeans, small grain, and alfalfa. These soils are also suited to use as pasture, woodland, and wildlife habitat.

Minimum tillage, barnyard manure, crop residue, and green-manure crops help to maintain the organic-matter content and to conserve moisture. If these soils are intensively managed, they can be safely used for more years of row crops and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IIw-1

This unit consists of nearly level, moderately deep and deep, poorly drained, very dark colored soils that have a surface layer of silt loam or silty clay loam and a medium-textured, moderately fine textured, and fine textured subsoil. These soils are on low benches or stream bottoms.

The fertility of these soils is medium to high. The available water capacity is medium, high, and very high, and permeability is moderate, moderately slow, or slow. Generally, the tilth is poor because the soils are wet. Undrained areas of these soils are frequently flooded, and small ponds remain for a long period after the floodwaters have receded. The water table is at or near the surface most of the year. These soils are slow to warm in spring and quick to cool in fall, because they are wet. The major management concerns are the lowering of the water table, provision of surface drainage, control of flooding, improvement of tilth, and raising of the soil temperature.

Areas of these soils that are adequately drained are well suited to most crops commonly grown in the county. The main crops are corn, soybeans, and clover. Undrained areas of these soils are suited to limited pasture. They provide excellent wildlife habitat.

Where these soils are cultivated, a good system of tile and open-ditch drainage is needed. Some areas of these soils are underlain by very unstable silt and very fine sand. If tiles are to be placed in this material, consideration should be given to blinding the joint in the tile to prevent clogging. Some soils in this unit have moderately slow permeability in the subsoil; therefore, closer spacing of tile lines is required if adequate drainage is to be achieved. Surface drains remove water that has ponded in low spots, and open ditches help to control flooding. If tile drains are installed, good structure in the surface layer is desirable. The timeliness of tillage is extremely important, because these soils puddle if they are worked when they are too wet. These practices, as well as minimum tillage and the return of crop residue to the soil, help to keep good tilth. Row crops can be grown if the organic-matter content, tilth, and fertility are maintained at a high level and minimum tillage is practiced. Undrained areas of soils that are used for pasture can be planted to reed canarygrass. The soils in areas used for wildlife habitat can be planted to specialty plants such as smartweed or wild rice.

CAPABILITY UNIT IIw-2

This unit consists of nearly level or gently sloping, deep or moderately deep, somewhat poorly drained, dark-colored to light-colored soils that have a surface layer of silt loam or sandy loam and a moderately fine textured or fine textured subsoil. These soils are underlain by sand, glacial till, lake-laid silt and clay, or sand and gravel outwash. They are on benches in stream valleys or on uplands that receive seepage or runoff from higher lying soils.

The fertility of these soils is medium or high. The available water capacity is medium to high, and permeability is moderate to slow. The organic-matter content is moderately high or high. These soils have a fluctuating water table that is at a depth of 1 to 3 feet for a considerable period during the year. Because of the depth to the water table, tillage operations are delayed during the spring. These soils warm slowly in spring and cool quickly in fall. They are subject to infrequent flooding of short duration. The gently sloping soils are subject to moderate erosion. These soils are easy to cultivate in areas where they are adequately drained. The major concerns of management are reducing the wetness of the soils and the hazard of flooding, controlling erosion, maintaining or improving tilth and fertility, and raising the temperature of the soil.

These soils are suited to corn, soybeans, small grain, and clover. Drained areas of these soils are also suited

to alfalfa. The major crops are corn, soybeans, oats, and clover. These soils are also suited to pasture and wildlife habitat. The light-colored soils in this unit are suited to stands of fast-growing timber.

A drainage system is needed for these soils if they are to be properly managed. Diversions that intercept runoff from higher lying soils and random tile lines that intercept seepage and drain extremely wet spots generally provide adequate drainage. The diversions also help to control erosion. In areas where the soils are nearly level, a complete system of tile and open-ditch drains that provides adequate drainage of the surface layer and the subsoil and that reduces flooding is needed. Minimum tillage, the return of crop residue to the soil, timely tillage, and other practices that maintain or improve tilth and fertility are important on these soils.

CAPABILITY UNIT IIw-5

This unit consists of nearly level and gently sloping, moderately deep, somewhat poorly drained and poorly drained soils that have a surface layer of silt loam and a subsoil of silty clay loam, silty loam, loam, sandy clay loam, and sandy loam. These soils are underlain by loose outwash sand or sand and gravel. They are on benches in stream valleys.

The fertility of these soils is medium. The available water capacity is medium, and permeability is moderate in the upper part of these soils and rapid in the lower part. Areas where the soils are nearly level are subject to infrequent flooding of short duration. The soils in these areas are subject to ponding, and the water remains for a period long enough to interfere with tillage. These nearly level soils also have a fluctuating water table that is at a depth of less than 3 feet for a considerable period. These soils warm slowly in spring and cool quickly in fall. The gently sloping soils of this unit are subject to moderate erosion. These soils are somewhat difficult to cultivate, because they are wet. The major management concerns of the soils in this unit are reducing the wetness of the soil and the hazard of flooding, controlling erosion, maintaining or improving tilth, raising the level of fertility, and raising the temperature of the soil.

These soils are suited to corn, soybeans, small grain, and clover. They are also suited to pasture and wildlife habitat. The somewhat poorly drained soils are suited to timber.

A drainage system is needed if these soils are to be properly managed. Diversions that intercept runoff or seepage from higher lying soils and open ditches that lower the water table are good management practices for these soils. In those areas where the soils are nearly level, open ditches must be placed close together to provide internal soil drainage and to reduce flooding. Surface drains can be used to drain areas that are ponded. Minimum tillage, return of crop residue to the surface, application of barnyard manure, and timely tillage help in the management of these soils.

CAPABILITY UNIT IIw-8

The only soil in this unit is Palms muck. This is a nearly level, deep, very poorly drained, mucky soil that is underlain by loam. This soil is on very low benches of bottom lands in stream valleys. Ground water is at or near the surface most of the year.

The fertility of this soil is medium. The available water capacity is very high, and permeability is moderately rapid. The organic-matter content is very high. This soil floods frequently. It warms slowly in spring and cools quickly in fall. Areas of this soil that are drained and cultivated are subject to moderate soil blowing. The major management concerns are lowering the water table, controlling flooding, improving fertility, protecting from soil blowing, and raising of the temperature of the soil.

Adequately drained areas of this soil are suited to all major crops in the county. Areas where this soil is undrained provide excellent wildlife habitat or are suited to limited pasture.

If these soils are planted to crops, a good system of tile or open-ditch drainage, or both, is needed. Tiles should be placed as shallow as is permitted by their design, because the loamy material is slowly permeable. Backfilling with topsoil is also desirable. A tile system provides internal drainage, and ditches help to control flooding. Surface drains can be used to remove water that is ponded. Timeliness of tillage is important for the maintenance of tilth. Minimum tillage, the return of crop residue to the soil, and other practices help to maintain permeability and tilth. Row crops may be grown continuously in areas that are drained if the soils are intensively managed. In undrained areas the soils can be planted to reed canarygrass and used for limited pasture. A high quality of wildlife habitat can be obtained by planting specialty crops and by using practices such as level ditching.

CAPABILITY UNIT IIw-11

The only soil in this unit is Huntsville silt loam, 0 to 2 percent slopes. This is a deep, well drained to moderately well drained, dark-colored soil that formed in alluvium on stream flood plains. This soil continuously receives fresh sediment through flooding.

The fertility of this soil is high. The available water capacity is very high, and permeability is moderate. The organic-matter content is high. This soil is subject to occasional flooding of short duration and to streambank cutting. This soil is easy to cultivate. The major management concerns are the control of streambank erosion, control of flooding, and the maintenance of tilth and fertility.

Areas of this soil that are unprotected are suited to limited row crops and to production of forage. They provide excellent wildlife habitat. Corn, soybeans, oats, alfalfa, or clover may be grown in areas where this soil is intensively managed.

The straightening and deepening of the stream channel help to reduce flooding. Plantings and structures help to prevent or reduce streambank cutting. Diversions and grassed waterways can be used to intercept and channel runoff from higher lying areas. These practices and practices such as minimum tillage and heavy fertilization permit the safe use of this soil for more years of corn and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IIw-13

This unit consists of nearly level, moderately deep

and deep, somewhat poorly drained and poorly drained, light colored soils that have a surface layer of silt loam and underlying material dominantly of silt loam. These soils formed in alluvium. They are on stream flood plains.

The fertility of these soils is medium and high. The available water capacity is high or very high, and permeability is moderate or moderately slow. These soils are subject to frequent flooding and to streambank cutting. They have a high water table. They are difficult to drain and to protect from flooding. These soils are difficult to cultivate. The major concerns of management are the reduction of flooding, lowering of the water table, and stabilization of the streambanks.

Drained areas of these soils are suited to corn, small grain, and clover. The main crops in the drained areas are corn and clover. Undrained areas of these soils are better suited to pasture and wildlife habitat than to most other uses.

The straightening and deepening of the stream channel help to reduce flooding. Open ditches and surface drains help to lower the water table. Plantings and structures are needed to reduce or prevent erosion of the streambank. Diversions and grassed waterways may be used to intercept and channel runoff from slopes above. These practices and practices such as minimum tillage, return of crop residue to the soil, and proper fertilization permit the safe use of these soils for more years of corn and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IIIe-1

This unit consists of sloping, deep, well drained to moderately well drained, dark-colored to light-colored soils that have a surface layer of loam or silt loam and a thick, moderately fine textured subsoil. These soils are underlain by loam, loose outwash sand and gravel, or clay residuum derived from limestone bedrock. They are on uplands, on colluvial side slopes, and on benches in stream valleys. In areas where these soils are slightly eroded they have a surface layer that is slightly thicker and are easier to cultivate than in other areas.

The fertility of these soils is medium or high. The available water capacity is medium to very high, and permeability is moderate. These soils respond to applications of fertilizer and manure. They are relatively easy to keep in good tilth. The dark-colored soils in this unit are the easiest to keep in good tilth. All of these soils are subject to severe erosion. The major concerns of management are the control of erosion and the maintenance of organic-matter content and fertility.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also well suited to pasture, woodland, and wildlife habitat.

If these soils are cultivated, they are subject to water erosion. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Runoff from higher lying soils can be intercepted by diversions, and grassed waterways remove the excess water without gullying. Erosion control and practices such as minimum tillage, the return of crop residue to the soil, and application of barnyard manure and fertilizer permit the safe use of these soils for more years of corn and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IIIe-2

This unit consists of sloping, moderately deep, well-drained, dark-colored and light-colored soils that have a surface layer of silt loam and loam and a medium-textured to moderately fine textured subsoil. These soils are underlain at a depth of less than 40 inches by sand over sandstone bedrock, clay over dolomite, loose sand, or sand and gravel. They are on uplands and on benches in stream valleys.

The fertility of these soils is medium. The available water capacity is low or medium, and permeability is moderate. These soils generally have better tilth in areas where they are slightly eroded than in areas where they are moderately eroded. These soils are subject to a moderate hazard of drought and a severe hazard of erosion. The major management concerns are the control of erosion, conservation of moisture, and the maintenance or improvement of tilth, organic-matter content, and fertility.

These soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are also suited to pasture and wildlife habitat. The light-colored soils are suited to timber.

If these soils are used for crops, conservation practices are needed to control erosion and conserve moisture. Contour stripcropping, diversions, terraces, and grassed waterways help to control erosion. Minimum tillage, the return of crop residue to the soil, application of fertilizer according to soil tests, application of barnyard manure, and other practices are also helpful. If many or all of these practices are applied, these soils can be used safely for more years of row crops and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IIIe-3

This unit consists of gently sloping, shallow, well-drained, dark-colored and light-colored soils that have a surface layer of silt loam and a thin, fine-textured subsoil. These soils are underlain by dolomite at a depth of 10 to 20 inches. They are on the tops of ridges.

The fertility of these soils is low. The available water capacity is low, and permeability is moderately slow. The organic-matter content is moderate or moderately low. The hazard of drought is severe. The hazard of erosion is severe because of soil depth and slope. These soils are difficult to cultivate. In areas where material from the clayey subsoil has been plowed into the surface layer, the tilth is poor. The major management concerns are the control of erosion, conservation of moisture, and improvement or maintenance of tilth and fertility.

If conservation practices are used, these soils are suited to all crops commonly grown in the county. The main crops are alfalfa, oats, and corn. These soils are better suited to alfalfa than to most other crops. These soils are also suited to pasture and wildlife habitat. The light-colored soils are also suited to woodland.

If conservation practices are used, row crops can be grown successfully. Contour stripcropping and grassed waterways are helpful. Such practices as minimum till-

age, return of crop residue to the soil, and the application of barnyard manure are also helpful.

CAPABILITY UNIT IIIe-6

This unit consists of sloping, moderately deep, well drained to moderately well drained soils that have a surface layer of silt loam and a fine-textured subsoil and substratum. These soils are on ridges on unglaciated uplands.

The fertility of these soils is medium. The available water capacity is medium or low, and permeability is moderate in the surface layer and slow in the subsoil. The organic-matter content is medium to moderately low. The tilth is poor in eroded areas. Runoff is high during periods of heavy rainfall. The hazard of erosion is severe. These soils are difficult to cultivate. The major concerns of management are control of erosion and improvement or maintenance of permeability.

Where these soils are properly managed, they are suited to all the crops commonly grown in the county. The main crops are corn, oats, alfalfa, and clover. These soils are also suited to pasture, woodland, or wildlife habitat.

Minimum tillage, heavy applications of manure, return of crop residue, and plowing under of green-manure crops help to maintain or improve soil tilth and organic-matter content. These practices, along with terraces, grassed waterways, diversions, and contour stripcropping help to control runoff and reduce erosion. Intensive management practices permit the safe use of these soils for more years of row crops and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IIIe-7

This unit consists of sloping, moderately deep, well drained and moderately well drained, light-colored soils that have a surface layer of sandy loam and a moderately coarse textured subsoil. These soils are on benches in stream valleys, where they are underlain by silt or sand and gravel, and on uplands, where they are underlain by sandstone bedrock.

The fertility of these soils is medium to low. The available water capacity is medium to low, and permeability is moderately rapid in the subsoil. These soils are subject to moderate hazard of drought and to severe hazards of erosion and soil blowing. These soils are easy to cultivate. The major concerns of management are the improvement of organic-matter content and fertility, conservation of moisture, and control of erosion.

Where these soils are managed properly, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are better suited to meadow, pasture, woodland, and wildlife habitat than to most other uses.

Management practices such as contour farming and stripcropping, minimum tillage, return of crop residue, and application of barnyard manure help to conserve moisture, control water erosion, reduce soil blowing, and increase the organic-matter content.

CAPABILITY UNIT IIIs-4

This unit consists of nearly level and gently sloping, moderately deep, somewhat excessively drained to moderately well drained soils that have a surface layer of sandy loam and a moderately coarse textured subsoil. These soils are underlain at a depth of 20 to 40 inches by silt, sand, or gravel. They are on benches in stream valleys.

The fertility of these soils is medium to low. The available water capacity is medium to low, and permeability is moderately rapid in the subsoil. The hazard of drought is severe and the hazard of soil blowing is moderate. These soils are easy to cultivate. The major concerns of management are improvement of organic-matter content and fertility, conservation of moisture, and control of erosion.

Where properly managed, these soils are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are well suited to pasture, woodland, and wildlife habitat.

Management practices such as contour farming, wind stripcropping, minimum tillage, return of crop residue, and application of barnyard manure help to control soil blowing, conserve moisture, increase the organic-matter content, and slow erosion.

CAPABILITY UNIT IIIw-3

This unit consists of nearly level, shallow to deep, poorly drained, very dark colored soils that have a surface layer of silt loam and silty clay loam and a medium-textured subsoil. These soils are underlain by stratified silt and fine sand. They are on benches or flood plains in old lake basins.

The fertility of these soils is low or high. The available water capacity is high to very high, and permeability is moderate or moderately slow. These soils are subject to frequent flooding of medium duration. Low areas pond and seriously delay tillage. The water table is within 1 foot of the surface for a part of the year. These soils are difficult to cultivate because they are wet. The major concerns of management are reduction of wetness and the hazard of flooding, drainage of ponded areas, improvement and maintenance of soil tilth, and improvement of the level of fertility.

Where these soils are adequately drained and properly cultivated, they are suited to corn, oats, and clover. Areas that are not drained are in meadows of bluegrass or sedge. These soils are also suited to limited pasture or well suited to wildlife habitat.

An artificial drainage system is needed to grow cultivated crops. Diversions, open ditches, and surface drains help to remove surface water and reduce flooding. The deep soils lack a structural subsoil and do not respond well to tile drainage. The shallow soils can be drained adequately by tiles placed 40 to 60 feet apart and at a depth of 2 to 3 feet. Timely tillage is extremely important to prevent puddling. Many areas of the shallow soils do not have sufficient phosphorus available, because the pH level is high.

CAPABILITY UNIT IIIw-9

The only soil in this unit is Houghton muck. It is a nearly level, deep, very poorly drained, very dark colored muck soil. This soil is on very low benches in stream valleys and old lake basins.

This soil has a medium level of fertility. The available water capacity is very high, and permeability is moderately rapid. The organic-matter content is very

high. In areas that are not drained, the water table is at a depth of less than 1 foot most of the year. This soil is subject to frequent flooding of long duration. Areas of this soil that are drained and cultivated are subject to moderate soil blowing. Some areas of this soil have minor problems of nutrient fertility. The major concerns of management are the lowering of the water table, control of flooding, minimization of subsidence, improvement of fertility, and protection from soil blowing.

Where this soil is adequately drained, it is well suited to most crops commonly grown in the county. The main crops are corn, soybeans, oats, and clover. Specialty crops such as mint and sod are also grown. Areas of this soil that are undrained are very well suited to use as wildlife habitat or limited pasture.

A good system of tile and open-ditch drainage is needed if cultivated crops are to be grown. These systems provide internal drainage and help to control flooding. Surface drains can be used to remove ponded water. Minimum tillage and the return of crop residue, as well as other practices, help to maintain permeability and tilth. The application of lime and fertilizer according to soil tests is very important if protection against a nutrient shortage is to be provided. If this soil is properly managed, continuous row crops can be safely grown in drained areas. Areas of this soil that are undrained can be planted to reed canarygrass and used as limited pasture. High-quality wildlife habitat can be developed by introducing specialty plants, such as wild rice or smartweed, and by using practices such as level ditching.

CAPABILITY UNIT IIIw–12

The only soil in this unit is Kickapoo fine sandy loam, 2 to 6 percent slopes. This is a gently sloping, deep, well drained to moderately well drained soil that has a surface layer of sandy loam. This soil formed in alluvium and fresh sediment is continually added to this soil by flooding. It is in drainageways.

The fertility of this soil is medium. The available water capacity is medium, and permeability is moderately rapid. The organic-matter content differs greatly from layer to layer. This soil is subject to frequent flooding of short duration, and many areas of this soil gully readily. The major concerns of managament are the control of flooding and gullying and the improvement of fertility.

Where this soil is intensively managed, corn, oats, and hay may be safely grown. Areas of this soil that are unprotected are better suited to use as pasture, woodland, or wildlife habitat than to most other uses.

Straightening and shaping of stream channels help to control flooding. Plantings and structures help to reduce or eliminate gullying. Diversions and grassed waterways can be used to intercept runoff from higher lying soils. Minimum tillage and proper fertilization help to keep tilth and improve the level of fertility.

CAPABILITY UNIT IVe–1

This unit consists of sloping and moderately steep, deep, well drained to moderately well drained, dark-colored to light-colored soils that have a surface layer of loam, silt loam, or fine sandy loam and a thick, moderately fine textured subsoil. These soils are underlain by loamy glacial till or silt. Most areas of these soils are moderately eroded. Soils in the slightly eroded areas have a slightly thicker surface layer and are easier to cultivate.

The fertility of these soils is medium or high. The available water capacity is medium to very high. Permeability is moderate in the upper part of these soils and moderately rapid to moderately slow in the underlying material. These soils respond well to application of fertilizer and manure. Where these soils are protected, good tilth can be maintained. They are subject to very severe erosion. The major concerns of management are control of erosion and maintenance of organic-matter content and fertility.

These soils are better suited to small grain and to meadow, pasture, woodland, or wildlife habitat than to most other uses. Where these soils are adequately protected from erosion, some row crops can be safely grown.

Contour stripcropping in conjunction with diversions and grassed waterways help to control erosion in areas of these soils that are cultivated. Runoff from higher lying soils can be intercepted by diversions, and grassed waterways remove the excess water without gullying. These practices, along with practices such as minimum tillage, the return of crop residue, and the application of barnyard manure and fertilizer permit the safe use of these soils for more years of row crops and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IVe–2

This unit consists of moderately steep and steep, moderately deep, well-drained, dark-colored and light-colored soils that have a surface layer of silt loam and loam and a medium-textured or moderately fine textured subsoil. These soils are underlain at a depth of less than 40 inches by sand over sandstone bedrock, clay over dolomite, loam over dolomite, or sand and gravel.

Fertility of these soils is medium. The available water capacity is low or medium, and permeability is moderate in the subsoil. Areas of these soils that are slightly eroded and moderately eroded have fair to good tilth, and areas that are severely eroded have poor tilth. The soils in the severely eroded areas are difficult to cultivate, because cultivation results in poor tilth, low fertility, and low organic-matter content. All of these soils are subject to a moderate hazard of drought and to a very severe hazard of erosion. The major concern of management is control of erosion. Other concerns of management are conservation of moisture and the maintenance or improvement of tilth, organic-matter content, and fertility.

Where these soils are properly managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and alfalfa. These soils are better suited to small grain and hay and to pasture and wildlife habitat than to most other uses. The light-colored soils are also suited to woodland.

Where these soils are cultivated, conservation practices are needed to control erosion and to conserve moisture. Contour stripcropping, in conjunction with diversions and grassed waterways, helps to control erosion. Minimum tillage, return of crop residue, the ap-

plication of fertilizer according to soil tests, application of barnyard manure, and other practices are also helpful. Where many or all of these practices are applied, these soils may be safely used for more years of row crops and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IVe-3

This unit consists of sloping, shallow, somewhat excessively drained to well-drained, dark-colored and light-colored soils that have a surface layer of silt loam and sandy loam and a moderately coarse textured or fine-textured subsoil. These soils are underlain at a depth of less than 20 inches by sand over sandstone bedrock or clay over dolomite. They are on uplands.

The fertility of these soils is low. The available water capacity is low or very low, and permeability is moderately rapid or moderately slow. Generally, the soils in the slightly eroded areas have better tilth than the same soils in the more eroded areas. The soils in this unit are subject to a severe hazard of drought and to a very severe hazard of erosion. The major concerns of management are control of erosion, conservation of moisture, and maintenance or improvement of tilth, organic-matter content, and fertility.

Where these soils are properly managed, some row crops can be included in the rotation; however, these soils are not well suited to row crops. The main crops are oats and alfalfa. These soils are better suited to meadow, pasture, woodland, and wildlife habitat than to most other uses. The soils in some of the slightly eroded areas are in timber or permanent pasture.

Conservation practices are needed to control erosion and conserve moisture if these soils are cultivated. Contour stripcropping, in conjunction with diversions and grassed waterways, helps to control erosion. Minimum tillage, return of crop residue, application of fertilizer according to soil tests, application of barnyard manure, and other practices are also helpful. Where many or all of these practices are applied, some row crops may be safely grown.

CAPABILITY UNIT IVe-6

The only soil in this unit is Basco silt loam, 12 to 20 percent slopes, eroded. It is a moderately deep, well drained to moderately well drained, light-colored soil that has a surface layer of silt loam and a moderately fine textured and fine textured subsoil. This soil is underlain by sandstone and shale and is on side slopes.

The fertility of this soil is medium. The available water capacity is low, and permeability is slow. The organic-matter content is medium. This soil has very poor tilth in eroded areas. The rate of runoff is high during periods of heavy rainfall. The hazard of erosion is very severe. This soil is difficult to cultivate. The major concerns of management are control of erosion and runoff.

Where properly managed this soil is suited to most crops commonly grown in the county. The main crops are corn, oats, alfalfa, and clover. This soil is better suited to meadow, pasture, woodland, or wildlife habitat than to most other uses.

Minimum tillage, heavy applications of manure, return of crop residue, and plowing under of greenmanure crops help to maintain or improve tilth and organic-matter content. These practices, along with use of grassed waterways, diversions, and contour stripcropping, help to control runoff and reduce erosion. Where these soils are intensively managed, they can be safely used for more years of row crops and fewer years of meadow than would be possible without this form of management.

CAPABILITY UNIT IVe-7

This unit consists of sloping, moderately deep, somewhat excessively drained and well drained, light-colored soils that have a surface layer of sandy loam and a medium-textured or moderately fine textured subsoil. These soils are underlain at a depth of 20 to 40 inches by loose sand, sand and gravel, or sandstone bedrock. They are on sandstone uplands and on outwash benches in stream valleys.

The fertility of these soils is low. The available water capacity is low, and permeability is moderately rapid in the subsoil. These soils are subject to a severe hazard of drought and to very severe hazards of water erosion and soil blowing. These soils are easy to cultivate. The major concern of management is control of erosion. Less important concerns of management are improvement of organic-matter content and fertility and conservation of moisture.

Where these soils are properly managed, they are suited to all crops commonly grown in the county. The main crops are corn, oats, and afalfa. These soils are better suited to meadow, pasture, woodland, and wildlife habitat than to most other uses.

Management practices such as contour farming and stripcropping, minimum tillage, return of crop residue, and the application of barnyard manure help to control water erosion and soil blowing, to conserve moisture, and to increase organic-matter content. Where many or all of these practices are applied, some row crops can be safely grown.

CAPABILITY UNIT IVs-3

This unit consists of nearly level to gently sloping, moderately deep to deep, excessively drained, somewhat excessively drained, and moderately well drained, dark-colored to light-colored soils that have a surface layer of loamy sand. Some of these soils have a slightly coherent subsoil. All these soils are underlain at a depth of 20 to 40 inches by loose outwash sand. They are on benches in stream valleys.

The fertility of these soils is low. The available water capacity is low and very low, and permeability is rapid. The organic-matter content ranges from low to moderately high. The hazard of drought is severe, and the hazard of soil blowing is severe or very severe. These soils are easy to cultivate. The major concerns of management are conservation of moisture, control of soil blowing, and improvement of the level of fertility.

Where these soils are properly managed, they are suited to all crops commonly grown in the county except row crops. The main crops are corn for silage, pine trees, oats, alfalfa, and clover. These soils are well suited to meadow, pasture, woodland, and wildlife habitat. Because of their gentle slope and sand texture, these soils are well suited to irrigation.

Planting windbreaks, wind stripcropping, mulching crop residue, and planting cover crops help to control

soil blowing and maintain the organic-matter content. Other management practices, such as minimum tillage and the application of barnyard manure, lime, and fertilizer, are also helpful. Where many or all these practices are applied in conjunction with supplemental irrigation, continuous row crops can be safely grown.

CAPABILITY UNIT IVw-5

This unit consists of nearly level, deep, somewhat poorly drained and poorly drained, dark-colored soils that have a surface layer of loamy sand and a coarse-textured subsoil. These soils are underlain by sand. They are on low benches in old lake basins.

Their fertility is low. The available water capacity is low and very low, and permeability is rapid. These soils are subject to frequent flooding of moderate duration. Low areas pond and seriously delay tillage. The water table is within 3 feet of the surface part of the year. These soils are difficult to cultivate because they are wet. The major concerns of management are the reduction of wetness, control of the hazard of flooding, drainage of ponded areas, and improvement and maintenance of tilth and fertility.

Where these soils are adequately drained and cultivated, they are suited to limited use for row crops, oats, and clover. Most areas of these soils that are not drained are in meadow of bluegrass or of sedge. These areas are suited to meadow, pasture, or wildlife habitat.

A drainage system is needed if efficient production of crops is to be achieved. Generally, use of diversions that intercept runoff or seepage from higher lying soils coupled with closely spaced open ditches is a helpful drainage practice. They intercept runoff, control flooding, and lower the water table. Areas that are cultivated need protection from soil blowing. Minimum tillage, return of crop residue, application of barnyard manure, and timely tillage help to maintain or improve the tilth, fertility, and organic-matter content.

CAPABILITY UNIT IVw-7

The only soil in this unit is Adrian muck. It is a nearly level, deep, very poorly drained, very dark colored muck soil. This soil is underlain at a depth of 20 to 40 inches by sand. It is on very low benches in stream valleys and old lake basins.

This soil has low fertility. The available water capacity is high, and permeability is moderately rapid. The organic-matter content is very high. Where this soil is not drained, the water table is at a depth of less than 1 foot most of the year. This soil is subject to frequent flooding of long duration. Areas of this soil that are drained and cultivated are subject to moderate soil blowing. Some areas of this soil have a minor nutrient deficiency. The major concerns of management are the lowering of the water table, control of flooding, minimization of subsidence, improvement of fertility, and protection of the soil from blowing.

Where this soil is adequately drained, it is suited to most crops commonly grown in the country. The main crops are corn, soybeans, oats, and clover. Where this soil is not drained, it is better suited to wildlife habitat or limited pasture.

A good system of open-ditch drainage is needed if cultivated crops are grown. Ditches provide internal drainage and help to control flooding. Surface drains can be used to remove water that is ponded. Tile drains can be installed where organic material is thick enough to meet the minimum criteria for the designed system. Minimum tillage and the return of crop residue, in conjunction with other practices, help to maintain permeability and tilth and to control soil blowing. The application of lime and fertilizer according to soil tests is very important for protection against nutrient shortage. If this soil is properly managed, continuous row crops can be grown safely in drained areas. Areas of this soil that are not drained can be planted to reed canarygrass and used as limited pasture. High-quality wildlife habitat can be developed by planting wild rice or other specialty plants and by use of level ditching or other management practices.

CAPABILITY UNIT Vw-14

The only soil in this unit is Alluvial land, wet. This is a nearly level, deep, poorly drained, dark-colored and light-colored, silty miscellaneous land type that has a surface layer and subsurface layer of mixed sandy and silty alluvium. It is on stream bottoms.

This land type has a moderately high level of fertility. The available water capacity is very high, and permeability is moderate. The water table is at a depth of less than 1 foot for a large part of the year. This soil is subject to frequent flooding of long duration. Drainage generally is not feasible because suitable outlets are lacking. The major concerns of management are reduction of flooding and maintenance of good plant cover.

This soil is better suited to pasture or wildlife habitat than to most other uses. The main plants are clover, bluegrass, and various kinds of water-tolerant trees. Where it is feasible, areas of this land type that are used for pasture should be renovated. Wooded areas commonly need improvement. These soils provide excellent wildlife habitat. Special plantings and level ditching provide cover and winter food for wildlife.

CAPABILITY UNIT VIe-1

This unit consists of steep, deep, well drained and moderately well drained, light-colored soils that have a surface layer of silt loam and sandy loam and a moderately fine textured subsoil. These soils are underlain by silt. They are on colluvial side slopes.

Their level of fertility is medium to high. The available water capacity is high, and permeability is moderate in the subsoil. These soils respond to application of fertilizer. If these soils are cultivated, their steepness makes them susceptible to very severe erosion. The major concern of management is control of erosion. Other concerns are improvement of fertility, organic-matter content, and tilth.

These soils are suited only to some of the crops commonly grown in the county. The main crops are oats, alfalfa, bluegrass, and timber. These soils are well suited to use as pasture, woodland, and wildlife habitat.

CAPABILITY UNIT VIe-2

This unit consists of steep, moderately deep, well-drained, light-colored soils that have a surface layer of loam and silt loam and a moderately thick, moderately fine textured subsoil. These soils are underlain by sand residuum derived from sandstone, clay

residuum derived from limestone bedrock, and outwash sand and gravel. They are mainly on uplands and benches.

The fertility of the slightly eroded or moderately eroded soils in this unit is medium, and the fertility of the severely eroded soils is moderately low. The available water capacity is low or medium. Permeability is moderate in the slightly eroded and moderately eroded soils and moderately slow in the severely eroded soils. If these soils are cultivated, their steepness makes them susceptible to very severe erosion. Also, the operation of farm equipment on these soils is hazardous because of their steepness. The major concern of management is control of erosion. Other concerns are conservation of moisture and improvement of fertility, organic-matter content, and tilth.

These soils are suited only to some of the crops commonly grown in the county. The main crops are oats, alfalfa, timber, and bluegrass. These soils are well suited to pasture, woodland, and wildlife habitat.

The application of barnyard manure, lime, and fertilizer helps to reduce runoff and improve tilth. These soils support stands of fast-growing hardwood trees. Special plantings help to develop excellent wildlife habitat.

CAPABILITY UNIT VIe–3

This unit consists of moderately steep, shallow, well-drained and somewhat excessively drained, dark-colored to light-colored soils that have a surface layer of sandy loam and silt loam and a thin, fine-textured or moderately coarse textured subsoil. These soils are underlain by sandstone or dolomite bedrock. They are on uplands.

The fertility of the slightly eroded and moderately eroded soils in this unit is moderately low, and the fertility of the severely eroded soils is low. The available water capacity is low or very low. Permeability is moderately slow or moderately rapid in the slightly eroded and moderately eroded soils and slow in the severely eroded soils. If these soils are cultivated, their steepness and shallowness make them susceptible to severe erosion. These soils are subject to a severe hazard of drought. The major concern of management is control of erosion. Other concerns are conservation of moisture and improvement of fertility, organic-matter content, and tilth.

These soils are suited only to some of the crops commonly grown in the county. The main crops are oats, alfalfa, and bluegrass. These soils are better suited to pasture, woodland, and wildlife habitat than to most other uses. The selection of tree species for planting should be correlated with the kind of soil to achieve the best results.

CAPABILITY UNIT VIe–4

This unit consists only of Kidder soils, 10 to 20 percent slopes, eroded. These are deep, well-drained, light-colored soils that have a loamy surface layer and a moderately thick, moderately fine textured and medium-textured subsoil. These soils are underlain at a depth of 20 to 40 inches by sandy loam glacial till. They are on glaciated uplands.

The fertility of these soils is medium. The available water capacity is medium, and permeability is moderate. These soils are slightly droughty. They respond to application of fertilizer. If they are cultivated, steepness makes them susceptible to very severe erosion. The major concern of management is control of erosion. Other concerns are conservation of moisture and improvement of fertility, organic-matter content, and tilth.

These soils are not suited to all crops commonly grown in the county. The main crops are oats, alfalfa, timber, and bluegrass. The soils are better suited to meadow, pasture, woodland, and wildlife habitat than to most other uses.

The application of barnyard manure, lime, and fertilizer helps to increase fertility and to improve tilth. Special plantings help to develop excellent wildlife habitat.

CAPABILITY UNIT VIe–6

The only soil in this unit is Basco silt loam, 20 to 30 percent slopes, eroded. This is a moderately deep, well-drained, light-colored soil that has a surface layer of silt loam and a moderately thick, fine-textured subsoil. This soil is underlain by sandstone and shale bedrock. It is on uplands.

The fertility of this soil where it is slightly eroded or moderately eroded is medium. The available water capacity is low, and permeability is slow. The operation of farm equipment on this steep soil is hazardous. If this soil is cultivated, its slow permeability and steepness make it susceptible to very severe erosion. The major concern of management is control of erosion. Other concerns are conservation of moisture, maintenance of permeability, and improvement of fertility, organic-matter content, and tilth.

This soil is suited only to some crops commonly grown in the county. The main crops are oats, alfalfa, timber, and bluegrass. This soil is better suited to pasture, woodland, and wildlife habitat than to most other uses.

The application of barnyard manure, lime, and fertilizer helps to reduce runoff and improves tilth. Special plantings help to develop excellent wildlife habitat.

CAPABILITY UNIT VIe–7

The only soil in this unit is Eleva sandy loam, 20 to 30 percent slopes, eroded. This is a moderately deep, somewhat excessively drained, light-colored soil that has a surface layer of sandy loam and a moderately coarse textured subsoil. This soil is underlain at a depth of 20 to 40 inches by sandstone bedrock. It is on uplands.

The fertility of this soil is low. The available water capacity is low, and permeability is moderately rapid. The chief concern of management is control of erosion. If this soil is cultivated, its steepness makes it susceptible to very severe erosion. Other concerns are conservation of moisture and improvement of fertility, organic-matter content, and tilth.

This soil is suited only to a few of the crops commonly grown in the county. The main crop is bluegrass, but many areas are idle. This soil is better suited to limited pasture, woodland, or wildlife habitat than to most other uses. Pasture renovation, tree planting, and plantings for the improvement of wildlife habitat are management practices that help to control

erosion and also lead to the production of some income from woodland and pasture.

CAPABILITY UNIT VIs–5

The only soil in this unit is Sogn silt loam, 2 to 20 percent slopes. This is a very shallow, excessively drained, dark-colored soil that has a surface layer of silt loam. The surface layer is immediately underlain by dolomite bedrock. This soil is on uplands.

The fertility of this soil is very low. The available water capacity is very low, and permeability is moderate. If this soil is cultivated, it is susceptible to very severe erosion. The major concern of management is control of erosion. Other concerns are conservation of moisture and improvement of fertility, organic-matter content, and tilth.

This soil is suited only to a few of the crops commonly grown in the county. The main crop is bluegrass. This soil is better suited to limited pasture and wildlife habitat than to most other uses. The renovation of pasture is a useful management practice.

CAPABILITY UNIT VIs–9

The only soil in this unit is Plainfield sand, 1 to 6 percent slopes. This is a deep, excessively drained, light-colored soil that has a sand surface layer and a thin, coarse-textured subsoil. This soil is underlain by loose sand. It is on outwash plains.

The fertility of this soil is very low. The available water capacity is very low, and permeability is rapid. Where this soil is cultivated, the hazards of drought and water erosion are very severe. The major concerns of management are conservation of moisture, control of erosion, and maintenance of organic-matter content. Soil blowing also is a concern.

This soil is not suited to crops unless the rainfall that it normally receives is supplemented by irrigation. The main crops are bluegrass and small grain. Many areas of this soil are idle or are in black oak timber. Unless this soil is subjected to a high level of management, it is better suited to trees or wildlife habitat than to most other uses.

CAPABILITY UNIT VIIe–3

This unit consists of steep and very steep, shallow, well-drained and somewhat excessively drained, light-colored soils that have a surface layer of sandy loam and silt loam and a thin, medium-textured or fine-textured subsoil. These soils are underlain by bedrock. They are on uplands.

The fertility of these soils is low. The available water capacity is low and very low, and permeability is moderately rapid or moderately slow. The hazard of erosion is very severe. Where these soils are severely eroded, they have poor tilth and a low organic-matter content. These soils are difficult to cultivate because of their clayey subsoil, shallowness, and relief. The major concerns of management are control of erosion and conservation of moisture. Another concern is the improvement of tilth, organic-matter content, and fertility.

These soils are not well suited to crops. The main crops are alfalfa and bluegrass. Many areas of these soils are idle and in weeds. These soils are better suited to woodland or wildlife habitat than to most other uses.

CAPABILITY UNIT VIIe–4

This unit consists only of Kidder soils, 20 to 35 percent slopes, eroded. These are deep, well-drained, light-colored soils that have a loamy surface layer and a thin, moderately fine textured subsoil. They are underlain at a depth of 10 to 40 inches by glacial till. They are on glaciated uplands.

The fertility of these soils is medium. The available water capacity is moderate, and permeability is moderate. If these soils are cultivated, steepness makes them susceptible to erosion. The major concern of management is control of erosion. Other concerns are conservation of moisture and improvement of fertility, organic-matter content, and tilth.

These soils are not suited to most of the crops commonly grown in the county. The main crop is bluegrass. Many areas are idle. These soils are better suited to limited pasture, woodland, or wildlife habitat than to most other uses.

The major management practices needed are renovation of pasture where feasible, tree planting, or plantings for improvement of wildlife habitat. Tree planting and planting for improvement of wildlife habitat help to control erosion and also permit a sufficiently high level of crop production to return some income.

CAPABILITY UNIT VIIs–3

This unit consists of gently sloping to steep, deep soils that have a sandy surface layer and a coarse-textured subsoil. They are underlain at a depth of 20 to 40 inches by sand. They are on foot slopes in valleys.

The fertility is very low. The available water capacity is low and very low, and permeability is rapid. If these soils are cultivated, their steepness makes them susceptible to very severe erosion. The major concern of management is control of erosion. Other concerns are conservation of moisture and improvement of fertility, organic-matter content, and tilth.

These soils are not suited to most of the crops commonly grown in the county. The main vegetation is black oak trees. Some areas of these soils are idle. These soils are better suited to very limited pasture, woodland, or wildlife habitat than to most other uses.

CAPABILITY UNIT VIIs–5

This unit consists of steep to very steep and very shallow soils that have a surface layer of sandy loam and silt loam. These soils do not have a subsoil. The surface layer is immediately underlain by gravelly outwash or dolomite.

The fertility of these soils is very low. The available water capacity is low, and permeability is moderate and rapid. If these soils are cultivated, they are susceptible to very severe erosion. The major concern of management is control of erosion. Other concerns are conservation of moisture and improvement of fertility, organic-matter content, and tilth. It is very difficult to maintain a plant cover on these soils.

These soils are not suited to most of the crops commonly grown in the county. The main crop is bluegrass. These soils are better suited to very limited pasture or wildlife habitat than to most other uses. The soils that are underlain by gravelly outwash commonly are a good source of construction aggregate.

CAPABILITY UNIT VIIs–6

This unit consists of gently sloping to very steep, shallow, excessively drained and somewhat excessively drained, light-colored soils that have a loamy surface layer and a thin, moderately coarse textured or medium-textured subsoil. These soils are underlain by dolomite or sandstone bedrock.

The fertility of these soils is low. The available water capacity is very low, and permeability is moderately rapid. The hazards of drought and erosion are very severe. These soils are difficult to cultivate because of their stoniness and relief. The major concerns of management are maintenance of a sod cover, conservation of moisture, and control of erosion.

Most of these soils are not suited to most crops. The main crops are timber, in scattered areas, and bluegrass. Many areas of these soils are idle. These soils are better suited to limited pasture, woodland, and wildlife habitat than to most other uses. It is difficult to establish plant cover in areas where the soil material has been disturbed.

The production of grass for pasture is very low on these soils. Some areas are limited to tree planting or plantings for improvement of wildlife habitat. The renovation of pasture, tree planting, and planting for improvement of wildlife habitat help to control erosion and at the same time, permit a sufficiently high level of crop production to return some income.

CAPABILITY UNIT VIIIs–10

This unit consists only of Made land. This miscellaneous land type is made up of bricks, rubble, garbage, and other materials that have been used as fill. The only soil material is that used to cover the nonsoil material.

This land type is not suited to crops. Most areas are idle. No vegetation that is harvestable is produced. Plantings of grasses, trees, and shrubs help to control erosion, provide wildlife habitat, and aid in establishing areas for recreational use.

CAPABILITY UNIT VIIIw–15

This unit consists only of Marsh. This land type is flooded most of the year and is very poorly drained. It is generally adjacent to streams and in drained, wet areas. The vegetation consists mainly of cattails, bulrushes, and other water-tolerant plants.

This land type is not suitable for pasture or trees, but it can be used as wildlife habitat or for recreation. In most places level ditches can be used to improve the areas for waterfowl, muskrat, and other kinds of wildlife. Protection from fire is needed in winter and during extremely dry periods, because the vegetation burns readily when dry.

Predicted Yields

In table 2 the predicted average yields per acre of the principal crops in Dane County are listed. Native bluegrass pasture is common on many of the soils that are too steep for renovation or too droughty for the production of other crops. The predictions in the table are based on results obtained by the Wisconsin Agricultural Experiment Station from experimental test plots, and from observations made by soil scientists and others who are familiar with the soils. The average yields in table 2 were determined from data compiled over a long period of time.

If the soils are managed at a level higher than the one proposed in table 2, and if improved varieties of crops are planted, then a higher level of production than that shown in the table can be expected.

The relative capacity of the soils to produce can be determined by examining table 2, and even if the general level of production increases, information about the relative capacity of the soils to produce remains useful. It must be remembered, however, that future improvements in technology may affect some soils more than they affect others. Also, some soils that have low to medium levels of production because of droughtiness may be well suited to intensive use for the production of specialty crops if they are irrigated.

The predicted yields of crops given in table 2 are estimated for a fully developed program of soil management. A high level of soil and crop management requires some essential practices such as insect and weed control, timeliness of tillage, and a complete program of fertilization. Each year management practices must be planned that effectively use the maximum potential of land, labor, and capital.

The following practices are applied on a well-managed field regardless of the crop that is grown.

1. Lime is added until the pH value is 6.5 or 7.0.
2. Fertilizer is applied according to soil test recommendations based on the expected production of crops.
3. Adequate surface and internal drainage is provided as needed.
4. Timely and adequate seedbed preparation and proper and effective planting methods are used.
5. Timely and careful harvesting methods are used.
6. Practices that control erosion are initiated and maintained as needed.
7. Cropping systems that are adapted to the condition of the soil and the soil slope are used.
8. Weeds are controlled.
9. Insects that damage crops are controlled.

Cut and fill land, Made land, and Marsh are not included in table 2, because they are not suitable for the production of crops.

Woodland [2]

Oak forest of the open or grove type covered much of the area of Dane County before it was settled. The rest of the county, which includes a relatively large area in the north-central part and a smaller area in the west-central part, was tall grass prairie. Big bluestem, little bluestem, switchgrass, indiangrass, and other prairie plants covered these areas and filled the openings between the oak groves.

The oak forest consisted of white and bur oak, red oak, black oak, northern pin oak, and other oak trees, and scattered through the stand were hickory, black cherry, aspen, and other hardwoods (*3*).

[2] By GEORGE W. ALLEY, woodland conservationist, Soil Conservation Service.

TABLE 2.—*Predicted average yields per acre of principal crops under improved management*

[Absence of a yield figure indicates that the soil is not suited to the crop or that the crop is not ordinarily grown on the soil]

Soil	Corn		Oats	Alfalfa-brome hay	Bluegrass pasture
	Grain	Silage			
	Bu	*Tons*	*Bu*	*Tons*	*Animal-unit-days* [1]
Adrian muck	90	17	50		130
Alluvial land, wet					105
Ashdale silt loam, 2 to 6 percent slopes	120	17	80	5.5	135
Ashdale silt loam, 6 to 12 percent slopes, eroded	110	15	75	4.5	125
Basco silt loam, 2 to 6 percent slopes, eroded	100	16	65	4.0	110
Basco silt loam, 6 to 12 percent slopes, eroded	90	13	60	3.5	100
Basco silt loam, 12 to 20 percent slopes, eroded	80	11	50	3.0	95
Basco silt loam, 20 to 30 percent slopes, eroded			40	2.0	95
Batavia silt loam, gravelly substratum, 0 to 2 percent slopes	140	18	85	6.5	160
Batavia silt loam, gravelly substratum, 2 to 6 percent slopes	130	16	80	5.5	140
Batavia silt loam, gravelly substratum, 6 to 12 percent slopes, eroded	120	14	70	5.0	120
Boyer sandy loam, 2 to 6 percent slopes	70	12	55	2.5	110
Boyer sandy loam, 6 to 12 percent slopes, eroded	60	10	50	2.2	100
Boyer sandy loam, 12 to 20 percent slopes, eroded			45	2.0	90
Brems loamy sand	50	9	40	2.5	80
Chaseburg silt loam, 2 to 6 percent slopes	100	18	70	4.0	160
Colwood silt loam	110	9	50		130
Dells silt loam, 0 to 3 percent slopes	100	14	80	4.5	130
Del Rey silt loam, 0 to 3 percent slopes	95	15	75	4.5	125
Derinda silt loam, 2 to 6 percent slopes, eroded	105	16	75	4.5	125
Derinda silt loam, 6 to 12 percent slopes, eroded	85	14	70	4.0	115
Dickinson sandy loam, 0 to 2 percent slopes	75	11	60	3.0	100
Dickinson sandy loam, 2 to 6 percent slopes	70	9	55	2.5	90
Dickinson sandy loam, 6 to 12 percent slopes	65	8	50	2.0	85
Dickinson loamy fine sand, sandy variant, 1 to 4 percent slopes	55	10	45	2.5	85
Dodge silt loam, 2 to 6 percent slopes	115	17	80	4.5	130
Dodge silt loam, 6 to 12 percent slopes, eroded	100	15	75	4.0	120
Dodge and Kidder soils, 6 to 20 percent slopes, eroded	85	11	65	3.2	110
Dodgeville silt loam, 2 to 6 percent slopes	80	15	80	5.0	130
Dodgeville silt loam, 6 to 12 percent slopes	90	13	75	4.5	120
Dodgeville silt loam, 12 to 20 percent slopes, eroded	75	11	65	4.0	110
Dresden loam, 12 to 20 percent slopes, eroded	70	9	60	2.5	95
Dresden loam, 20 to 30 percent slopes, eroded			45	2.0	80
Dresden silt loam, 2 to 6 percent slopes	85	13	70	3.2	115
Dresden silt loam, 6 to 12 percent slopes, eroded	80	11	65	3.0	105
Dunbarton silt loam, 2 to 6 percent slopes, eroded	70	13	60	3.5	85
Dunbarton silt loam, 6 to 12 percent slopes, eroded	60	11	55	3.0	75
Dunbarton silt loam, 12 to 20 percent slopes, eroded			45	2.2	65
Dunbarton silt loam, 20 to 30 percent slopes, eroded				2.0	60
Edmund silt loam, 2 to 6 percent slopes, eroded	80	11	70	4.7	
Edmund silt loam, 6 to 12 percent slopes, eroded	65	9	55	4.0	
Edmund silt loam, 12 to 20 percent slopes, eroded			45	3.8	
Elburn silt loam, 1 to 4 percent slopes	140	20	80	5.0	175
Elburn silt loam, gravelly substratum, 0 to 3 percent slopes	150	22	85	3.0	180
Eleva sandy loam, 6 to 12 percent slopes, eroded	70	11	50	2.5	85
Eleva sandy loam, 12 to 20 percent slopes, eroded	60	9	45	1.8	80
Eleva sandy loam, 20 to 30 percent slopes, eroded					65
Elkmound sandy loam, 6 to 12 percent slopes, eroded	55	9	45	2.0	75
Elkmound sandy loam, 12 to 20 percent slopes, eroded			40	1.8	65
Elkmound sandy loam, 20 to 30 percent slopes, eroded					60
Elkmound sandy loam, 30 to 60 percent slopes					40
Elvers silt loam	105	17	65		120
Gale silt loam, 2 to 6 percent slopes	95	16	65	4.0	115
Gale silt loam, 6 to 12 percent slopes, eroded	85	14	60	3.5	105
Gale silt loam, 12 to 20 percent slopes, eroded	75	12	50	3.0	100
Granby loamy sand	70	12	60	3.0	100
Grays silt loam, 0 to 2 percent slopes	115	18	80	5.5	135
Grays silt loam, 2 to 6 percent slopes	110	16	75	4.5	125
Grays silt loam, 6 to 12 percent slopes, eroded	95	14	70	4.0	115
Griswold loam, 2 to 6 percent slopes	110	14	75	5.5	130
Griswold loam, 6 to 12 percent slopes	95	11	70	4.8	120
Griswold loam, 12 to 20 percent slopes, eroded	80	9	65	3.0	110
Hayfield silt loam, 0 to 3 percent slopes	100	14	70	3.5	135
Hixton loam, 2 to 6 percent slopes	90	13	65	3.5	110
Hixton loam, 6 to 12 percent slopes, eroded	80	11	60	3.0	100
Hixton loam, 12 to 20 percent slopes, eroded	75	10	45	2.5	90

TABLE 2.—*Predicted average yields per acre of principal crops under improved management*—Continued

Soil	Corn		Oats	Alfalfa-brome hay	Bluegrass pasture
	Grain	Silage			
	Bu	*Tons*	*Bu*	*Tons*	*Animal-unit-days* [1]
Houghton muck	120	20	60		130
Huntsville silt loam, 0 to 2 percent slopes	120	20	80	4.5	150
Huntsville silt loam, 2 to 6 percent slopes	115	18	70	4.0	145
Kegonsa silt loam, 0 to 2 percent slopes	110	16	80	5.0	140
Kegonsa silt loam, 2 to 6 percent slopes	105	15	70	4.5	120
Kickapoo fine sandy loam, 2 to 6 percent slopes			60	2.5	90
Kidder loam, 2 to 6 percent slopes	100	13	70		
Kidder loam, 6 to 12 percent slopes, eroded	85	11	65		
Kidder loam, 12 to 20 percent slopes, eroded	75	9	60		
Kidder soils, 10 to 20 percent slopes, eroded				2.2	95
Kidder soils, 20 to 35 percent slopes, eroded				2.0	90
Marshan silt loam	90	16	50		130
McHenry silt loam, 2 to 6 percent slopes	105	15	75	4.5	125
McHenry silt loam, 6 to 12 percent slopes, eroded	90	13	70	4.0	115
McHenry silt loam, 12 to 20 percent slopes, eroded	80	11	65	3.0	105
Meridian loam, 0 to 2 percent slopes	95	15	80	4.0	125
Meridian loam, 2 to 6 percent slopes	80	13	70	3.0	115
Military loam, 6 to 12 percent slopes, eroded	85	12	60	3.0	110
Military loam, 12 to 20 percent slopes, eroded	75	9	50	2.8	105
Military loam, 20 to 30 percent slopes, eroded			45	2.0	100
Montgomery silty clay loam, 0 to 3 percent slopes	105	17	60		125
NewGlarus silt loam, 2 to 6 percent slopes, eroded	95	16	65	4.5	115
NewGlarus silt loam, 6 to 12 percent slopes, eroded	85	13	60	3.5	100
NewGlarus silt loam, 12 to 20 percent slopes, eroded	75	11	55	2.5	90
NewGlarus silt loam, 20 to 30 percent slopes, eroded			50	2.0	85
Orion silt loam	105	17	65	4.0	145
Orion silt loam, wet	105	17	65		145
Otter silt loam	105	15	65		130
Palms muck	115	20	50		130
Pecatonica silt loam, 2 to 6 percent slopes	120	18	80	5.0	145
Pecatonica silt loam, 6 to 12 percent slopes, eroded	110	15	70	4.5	135
Plainfield sand, 1 to 6 percent slopes					60
Plano silt loam, 0 to 2 percent slopes	150	20	85	6.0	175
Plano silt loam, 2 to 6 percent slopes	130	18	80	5.5	165
Plano silt loam, 6 to 12 percent slopes, eroded	110	16	75	5.2	160
Plano silt loam, gravelly substratum, 0 to 2 percent slopes	150	20	85	6.5	175
Plano silt loam, gravelly substratum, 2 to 6 percent slopes	140	18	80	5.5	165
Plano silt loam, gravelly substratum, 6 to 12 percent slopes, eroded	125	16	75	5.2	160
Port Byron silt loam, 2 to 6 percent slopes	120	18	85	5.8	220
Port Byron silt loam, 6 to 12 percent slopes	105	14	60	4.0	200
Radford silt loam, 0 to 3 percent slopes	110	16	75	4.0	130
Ringwood silt loam, 2 to 6 percent slopes	120	16	80	5.5	155
Ringwood silt loam, 6 to 12 percent slopes, eroded	105	14	75	5.0	150
Rockton silt loam, 2 to 6 percent slopes	90	14	65	4.0	125
Rockton silt loam, 6 to 12 percent slopes, eroded	85	12	60	3.5	115
Rockton silt loam, 12 to 30 percent slopes, eroded	85	10	55	3.0	110
Rodman sandy loam, 12 to 35 percent slopes					50
Sable silty clay loam, 0 to 3 percent slopes	130	19	70		145
St. Charles silt loam, 0 to 2 percent slopes	135	21	90	5.5	160
St. Charles silt loam, 2 to 6 percent slopes	125	19	80	5.0	135
St. Charles silt loam, 6 to 12 percent slopes, eroded	110	17	75	4.0	125
St. Charles silt loam, 12 to 20 percent slopes, eroded	95	13	70	3.5	120
Salter sandy loam, 2 to 6 percent slopes	95	15	70	3.0	110
Salter sandy loam, 6 to 12 percent slopes, eroded	85	13	60	2.5	100
Salter silt loam, 0 to 2 percent slopes	100	16	85	4.5	135
Salter silt loam, 2 to 6 percent slopes, eroded	95	14	80	4.0	120
Salter sandy loam, wet variant, 0 to 3 percent slopes	110	15	75	4.0	135
Seaton silt loam, 2 to 6 percent slopes	120	19	80	5.0	135
Seaton silt loam, 6 to 12 percent slopes, eroded	105	17	75	4.0	125
Seaton silt loam, 12 to 20 percent slopes, eroded	90	13	70	3.5	120
Seaton silt loam, 20 to 30 percent slopes, eroded			60	3.0	100
Seaton fine sandy loam, loamy variant, 6 to 12 percent slopes, eroded	105	15	60	4.0	120
Seaton fine sandy loam, loamy variant, 12 to 20 percent slopes, eroded	95	13	55	3.5	110
Seaton fine sandy loam, loamy variant, 20 to 30 percent slopes					90
Sogn silt loam, 2 to 20 percent slopes				2.0	55
Sogn silt loam, 20 to 35 percent slopes					50
Spinks and Plainfield loamy sands, 2 to 6 percent slopes	55	9	40	2.5	80
Spinks and Plainfield loamy sands, 6 to 12 percent slopes			30	2.0	70

TABLE 2.—*Predicted average yields per acre of principal crops under improved management*—Continued

Soil	Corn		Oats	Alfalfa-brome hay	Bluegrass pasture
	Grain	Silage			
	Bu	*Tons*	*Bu*	*Tons*	*Animal-unit-days* [1]
Spinks and Plainfield loamy sands, 12 to 25 percent slopes					60
Stony and rocky land					65
Troxel silt loam, 1 to 4 percent slopes	115	19	75	4.5	145
Virgil silt loam, 1 to 4 percent slopes	125	20	90	5.0	165
Virgil silt loam, gravelly substratum, 0 to 3 percent slopes	130	21	90	4.2	170
Wacousta silty clay loam	105	13	60		135
Warsaw silt loam, 2 to 6 percent slopes	90	15	65	3.5	120
Warsaw silt loam, 6 to 12 percent slopes, eroded	80	11	60	3.4	110
Watseka loamy sand	70	9	45	3.0	120
Westville silt loam, 2 to 6 percent slopes	115	15	75	4.5	140
Westville silt loam, 6 to 12 percent slopes, eroded	105	13	65	4.0	130
Westville silt loam, 12 to 20 percent slopes, eroded	95	10	60	3.5	120
Whalan loam, 20 to 30 percent slopes, eroded					105
Whalan silt loam, 2 to 6 percent slopes	105	17	65	4.0	145
Whalan silt loam, 6 to 12 percent slopes, eroded	95	12	60	3.5	115
Whalan silt loam, 12 to 20 percent slopes, eroded	80	10	55	3.0	110

[1] Animal-unit-days is a term used to express the carrying capacity of pasture. This value is obtained by multiplying the number of animal units carried per acre by the number of days the pasture can be grazed during a single season without injury to the sod.

The number of acres in commercial timber in Dane County according to a 1958 forest inventory was 67,800 acres, or about 8.9 percent of the land area (*17*). Of this area, 49,300 acres was oak, 6,500 acres was upland brush or grass, 3,400 acres was lowland brush, 4,100 acres was aspen, and 2,100 acres was northern hardwoods. The rest of the area was 1,400 acres of lowland hardwoods and 1,000 acres of conifers, mostly planted pine.

Woodland suitability groups

The soils of Dane County have been placed in woodland suitability groups to assist landowners in planning the use of their soils for wood crops. Each suitability group is made up of soils that are suited to the same kinds of trees; soils that need approximately the same kind of management if the vegetation on them is similar; and soils that have about the same potential productivity. The woodland suitability group for each soil can be found by referring to the "Guide to Mapping Units" at the back of this survey.

Each woodland group in table 3 is identified by a three-part symbol, such as 2o1 or 3r2. The first part of the symbol represents the woodland suitability class and is always a number. It indicates the relative potential productivity of the soils in the group: 1 means high, 2 means moderately high, 3 means moderate, 4 means moderately low, 5 means low, and 6 means unproductive. These classes are based on growth potential expressed as site index. The site index is the average height of the dominant and codominant trees in a stand at 50 years of age. The site indexes for some of the more important species and soils have been measured, others are estimated from measurements made on similar soils and species.

Site indexes are based on recognized site index curves for silver and red maple (*5*); red oak, bur oak, northern pin oak, and upland oaks (*11*); sugar maple (*4*); and tamarack (*6*). Annual yields for tree species were estimated from yield tables based on site index for silver maple (*7*), upland oaks (*11*), northern hardwoods (*10*), and tamarack (*9*).

The second part of the woodland suitability group symbol is a small letter. This letter represents the subclass and indicates an important soil property that imposes a slight to severe limitation on the management of the soils of the group for wood crops. Definitions of the subclasses are given in the following paragraphs.

Subclass *w* indicates excessive wetness. The soils in this subclass are those in which excessive water, either seasonal or year long, significantly limits their use and management as woodland. These soils have restricted drainage or a high water table or are subject to flooding that adversely affects either the development of the stand or its management.

Subclass *d* indicates restricted rooting depth. The soils in this subclass are restricted or limited for woodland use or management because of a restricted rooting depth. Soils that are shallow to bedrock, to a hardpan, or to another layer in the soil that restricts roots are examples.

Subclass *c* indicates clayey soils. The soils in this subclass are restricted or limited for use or management as woodland because of the kind or amount of clay in the upper part of the soil.

Subclass *s* indicates sandy soils. In this subclass are dry sandy soils that have little or no textural B horizon and that are moderately to severely restricted or limited for use and management as woodland. These soils have equipment limitations, have low available water capacity, and normally are low in available plant nutrients.

Subclass *f* indicates fragmental or skeletal soils. The

TABLE 3.—*Potential productivity and limitations of the soils as woodland*

Woodland suitability groups, description of the soils, soil series, and map symbols	Potential productivity			Suitable species for reforestation	Management limitations or hazards		
	Tree species	Average site index	Annual growth		Equipment limitations	Erosion hazard	Seedling mortality
		Ft	*Bd ft*				
Group 1w5: Poorly drained, loamy soils. Colwood: Co; Otter: Ot.	Northern red oak.	79	310	Eastern white pine, white spruce, silver maple.	Slight	Slight	Slight.
Group 1o1: Moderately well drained and well drained, loamy soils that have slopes of less than 12 percent. St. Charles: ScA, ScB, ScC2; Salter, wet variant: ShA; Salter: SeB, SeC2, SfA, SfB2; Seaton: SmB, SmC2; Seaton, loamy variant: SnC2; Westville: WvB, WvC2.	Northern red oak. Sugar maple	71 67	260 110	Eastern white pine, red pine, white spruce.	Slight	Slight	Slight.
Group 1r2: Moderately well drained and well drained, loamy soils that have slopes of 12 to 30 percent. St. Charles: ScD2; Seaton: SmD2, SmE2; Seaton, loamy variant: SnD2, SnE; Westville: WvD2.	Northern red oak. Sugar maple	71 65	260 100	Eastern white pine, red pine.	Moderate	Moderate	Slight for north- and east-facing slopes. Moderate for south- and west-facing slopes.
Group 2o1: Moderately well drained and well drained, loamy soils that have slopes of less than 12 percent. Basco: BaB2, BaC2; Batavia: BbA, BbB, BbC2; Chaseburg: ChB; Derinda: DgB2, DgC2; Dodge: DnB, DnC2, DoC2; Dresden: DsB, DsC2; Gale: GaB, GaC2; Grays: GsA, GsB, GsC2; Hixton: HbB, HbC2; Huntsville: HuA, HuB; Kegonsa: KeA, KeB; Kidder: KdB, KdC2; McHenry: MdB, MdC2; Meridian: MeA, MeB; Military: MhC2; New-Glarus: NeB2, NeC2; Pecatonica: PeB, PeC2; Troxel: TrB; Whalan: WxB, WxC2.	Northern red oak. Sugar maple	67 62	230 95	Red pine, eastern white pine, white spruce.	Slight	Slight	Slight.

soils in this subclass are restricted or limited for use and management as woodland because large amounts of coarse fragments more than 2 millimeters and less than 10 inches in size are in the profile. Flaggy soils are included in this subclass.

Subclass *r* indicates relief or steepness of slope. The soils in this subclass are restricted or limited for use and management as woodland because of steepness of slope.

Subclass *o* indicates slight or no limitations. The soils in this subclass are not restricted or limited for use or management as woodland.

The third part of the symbol indicates the degree of hazard or limitation to be considered in management.

TABLE 3.—*Potential productivity and limitations of the soils as woodland*—Continued

Woodland suitability groups, description of the soils, soil series, and map symbols	Potential productivity			Suitable species for reforestation	Management limitations or hazards		
	Tree species	Average site index	Annual growth		Equipment limitations	Erosion hazard	Seedling mortality
		Ft	*Bd ft*				
Group 2r2: Moderately well drained and well drained, loamy soils that have slopes of 12 to 30 percent. Basco: BaD2, BaE2; Dresden: DrD2, DrE2; Gale: GaD2; Hixton: HbD2; Kidder: KdD2, KrD2, KrE2; McHenry: MdD2; Military: MhD2, MhE2; NewGlarus: NeD2, NeE2; Whalan: WwE2, WxD2.	Northern red oak.	64	220	Red pine, eastern white pine.	Moderate --	Moderate --	Slight for north- and east-facing slopes. Moderate for south- and west-facing slopes.
Group 3w4: Somewhat poorly drained and poorly drained, sandy and loamy soils that have a sandy subsoil or substratum. Granby: Gn; Watseka: Wt.	Silver maple	80	160	Silver maple, green ash.	Slight -----	Slight -----	Slight.
Group 3w5: Somewhat poorly drained to poorly drained soils that have a loamy or clayey subsoil. Montgomery: MoA; Wacousta: Wa.	Silver maple	80	160	Silver maple, green ash.	Slight -----	Slight -----	Slight.
Group 3d1: Well-drained to somewhat excessively drained soils that have a loamy subsoil, are shallow over sand, sand and gravel, or bedrock, and have slopes of less than 12 percent. Dunbarton: DuB2, DuC2; Elkmound: EmC2.	Northern red oak.	60	190	Red pine, white pine.	Slight -----	Slight -----	Slight.
Group 3d2: Well-drained to somewhat excessively drained soils that have a loamy subsoil, are shallow over sand, sand and gravel, or bedrock, and have slopes of 12 to 30 percent. Dunbarton: DuD2, DuE2; Elkmound: EmD2, EmE2.	Northern red oak.	55	160	Red pine, jack pine, eastern redcedar.	Moderate --	Moderate --	Slight for north- and east-facing slopes. Moderate for south- and west-facing slopes.
Group 3d3: Somewhat excessively drained soil that has a loamy subsoil, is shallow over bedrock, and has slopes of more than 30 percent. Elkmound: EmF.	Northern red oak.	43	95	Red pine, jack pine, eastern redcedar.	Severe-----	Severe-----	Slight for north- and east-facing slopes. Moderate for south- and west-facing slopes.

TABLE 3.—*Potential productivity and limitations of the soils as woodland*—Continued

Woodland suitability groups, description of the soils, soil series, and map symbols	Potential productivity			Suitable species for reforestation	Management limitations or hazards		
	Tree species	Average site index	Annual growth		Equipment limitations	Erosion hazard	Seedling mortality
		Ft	*Bd ft*				
Group 3s1: Moderately well drained to excessively drained loamy soils that have slopes of less than 12 percent. Brems: BrA; Spinks: SpB, SpC.	Northern pin oak.	48	120	Red pine, eastern white pine, jack pine.	Slight	Slight	Moderate.
Group 3s2: Excessively drained sandy soil that has slopes of 12 to 30 percent. Spinks: SpD.	Northern pin oak.	50	130	Red pine, eastern white pine, jack pine.	Moderate	Moderate	Moderate for north- and east-facing slopes. Severe for south- and west-facing slopes.
Group 3o1: Well-drained to somewhat excessively drained soils that have a loamy subsoil and slopes of less than 12 percent. Boyer: BoB, BoC2; Dells: DeA; Del Rey: DfA; Dickinson: DkA, DkB, DkC; Dickinson, sandy variant: DmA; Eleva: EhC2; Orion: Or, Os; Virgil: VrB, VwA.	Northern red oak and black oak.	52	140	Red pine, eastern white pine, jack pine.	Slight	Slight	Slight.
Group 3r2: Well-drained to somewhat excessively drained soils that have a loamy subsoil and slopes of 12 to 30 percent. Boyer: BoD2; Eleva: EhD2, EhE2; Hayfield: HaA; Kickapoo: KcB.	Northern red oak and black oak.	42	90	Red pine, eastern white pine, jack pine, eastern redcedar.	Moderate	Moderate	Slight for north- and east-facing slopes. Moderate for south- and west-facing slopes.
Group 4w5: Somewhat poorly drained to poorly drained loamy or clayey soils. Alluvial land, wet: Af; Elvers: Ev; Marshan: Mc; Radford: RaA; Sable: SaA.	Silver maple	70	135	Silver maple, green ash, poplar species.	Slight	Slight	Moderate.
Group 4d2: Excessively drained stony and rocky land that has slopes of 20 to 45 percent. Stony and rocky land: St.	Black oak, north slope. Bur oak, south slope.	54 32	150 50	Red pine, eastern white pine, eastern redcedar, jack pine.	Severe	Severe	Severe.
Group 4s1: Excessively drained, sandy soil that has slopes of less than 12 percent. Plainfield: PfB.	Northern pin oak.	45	100	White pine, red pine, jack pine.	Slight	Slight	Moderate.

TABLE 3.—*Potential productivity and limitations of the soils as woodland*—Continued

Woodland suitability groups, description of the soils, soil series, and map symbols	Potential productivity			Suitable species for reforestation	Management limitations or hazards		
	Tree species	Average site index	Annual growth		Equipment limitations	Erosion hazard	Seedling mortality
		Ft	*Bd ft*				
Group 4f2: Excessively drained soils and land types that have slopes of 12 to 30 percent and are underlain by sand, sand and gravel, or skeletal material. Cut and fill land: Cu; Made land: Ma; Rodman: RpE.	Black oak	43	95	Red pine, jack pine, eastern white pine.	Severe	Severe	Severe.
Group 4o1: Moderately well drained and well drained, loamy or clayey soils that have slopes of less than 20 percent. Elburn: EfB; Elburn, gravelly substratum: EgA.	Silver maple	70	135	Silver maple, white ash, green ash.	Slight	Slight	Slight.
Group 5d1: Well-drained, loamy soils that are shallow over bedrock and have slopes of less than 12 percent. Edmund: EdB2, EdC2.	Upland oak	35	60	Eastern redcedar, red pine, jack pine.	Slight	Slight	Moderate.
Group 5d2: Well-drained loamy soils that are shallow or very shallow over bedrock and have slopes of 12 to 30 percent. Edmund: EdD2; Sogn: SoD, SoE.	Upland oak	35	60	Eastern redcedar, red pine, jack pine.	Moderate	Moderate	Moderate for north- and east-facing slopes. Severe for south- and west-facing slopes.
Group 6w5: Unproductive marsh. Marsh: Mb.							

The numerals 1, 2, and 3 relate to factors of slope and apply to subclasses *o, c, s, d, f,* and *r;* and the numerals 4, 5, and 6 relate to factors of soil characteristics and apply only to subclass *w.*

The numeral 1 indicates that the slope is less than 12 percent and, therefore, the hazard of erosion and equipment limitations generally are slight.

The numeral 2 indicates that the slope is between 12 and 30 percent and, therefore, the hazard of erosion and equipment limitations are moderate to severe depending upon the subclass.

The numeral 3 indicates that the slope is more than 30 percent and, therefore, the hazard of erosion and equipment limitations are severe.

The numeral 4 indicates deep, sandy soils that are poorly drained to somewhat poorly drained.

The numeral 5 indicates soils that have a loamy or clayey subsoil and are poorly drained to somewhat poorly drained.

The numeral 6 indicates deep, organic soils.

The hazards or limitations that affect management of soils for woodland in Dane County are the hazard of erosion, limitation on the use of equipment, and hazard of seedling mortality. In table 3 a rating for these hazards or limitations for each woodland suitability group is given. These ratings are always slight, moderate, or severe.

The hazard of erosion refers to the potential hazard of soil loss in woodland. The hazard is *slight* if the expected soil loss is small; *moderate* if some soil loss is expected and care is needed during logging and construction to reduce soil loss; and *severe* if special methods of operation are necessary for preventing excessive soil loss.

Equipment limitations are rated on the basis of soil characteristics that restrict or prohibit the use of equipment commonly used in tending and harvesting trees. In Dane County, soil characteristics that have the

most limiting effect on equipment are excessive soil wetness, slope, and texture of the surface layer. *Slight* means there is no restriction in the kind of equipment that can be used or in the time of year it is used; *moderate* means that use of equipment is restricted for less than 3 months of the year; and *severe* means that special equipment is needed and its use is restricted for more than 3 months of the year.

Seedling mortality refers to the expected degree of mortality of planted seedlings. Considered in the ratings are plant competition and such soil characteristics as excessive wetness, hazard of flooding, slope and aspect, texture, and structure. Normal rainfall, good planting stock, and proper planting are assumed. A rating of *slight* indicates an expected loss of less than 25 percent of the planted seedlings; *moderate,* a loss of 25 to 50 percent of the seedlings; and *severe,* a loss of more than 50 percent of the seedlings.

The following organic soils—Adrian muck (Ad), Houghton muck (Ho), and Palms muck (Pa)—are so variable in their response to forest management that they are not included in the ordination system in table 3. Where tamarack grows on these soils, the site index is 50 and the annual growth rate is 100 board feet. In addition to tamarack, these soils may support forest growth of silver maple, American elm, or quaking aspen. The rate of growth of trees on these organic soils is frequently low and quite varied. Occasionally, silver maple, red maple, and white ash grow rapidly on these soils.

The listed mapping units in the following series had a native vegetation predominantly of prairie grasses, forbs, and a few scattered white oak and bur oak trees: Ashdale (AsB, AcC2), Dodgeville (DpB, DpC, DpD2), Griswold (GwB, GwC, GwD2), Plano (PnA, PnB, PnC2, PoA, PoB, PoC2), Port Byron (PrB, PrC), Ringwood (RnB, RnC2), Rockton (RoB, RoC2, RoD2), and Warsaw (WrB, WrC2). A few areas of these soils now have oak and hardwoods growing on them. Because most areas of these soils are farmed intensively, they are not likely to be used for trees and are not included in the ordination system in table 3.

Landscaping and windbreaks

In this subsection, information about some of the trees, shrubs, and vines used in landscaping home, school, industrial, and recreational sites is given. Information on species that are suitable for use in windbreaks around farmsteads or open fields is also given.

Organic soils of the Adrian, Houghton, and Palms series are subject to soil blowing in cultivated areas. If these soils are cropped, careful management and the use of windbreaks help to limit loss of soil by blowing. In Dane County various kinds of willows and poplars are better suited to windbreaks on muck than are most other trees.

The suitability of different soils, under different site conditions, for trees and shrubs varies greatly. The soils in the county have been placed in four tree and shrub groups. The placement is based mainly on the degree and length of time that the soils are saturated by water and on the available water capacity.

Group 1 consists of moderately deep to deep, well drained and moderately well drained, medium-textured soils that have moderate to high available water capacity.

Group 2 consists of somewhat excessively drained to excessively drained, coarse-textured or shallow soils that have low available water capacity.

Group 3 consists of somewhat poorly drained and poorly drained mineral soils.

Group 4 consists of poorly drained organic soils.

Table 4 lists the trees that are suitable for specified uses by the four tree and shrub groups. Table 5 gives the suitability, growth characteristics, and esthetic features of common shrubs and vines. Plants listed in the tables are only a partial list of the plants to which the soils in the county are suited. Many of the plants are not only used for landscaping but also provide food and cover for wildlife.

Wildlife

The soils of Dane County differ widely in the physical and chemical characteristics that affect the kind and amount of vegetation and wildlife they will support. Many research studies show a direct relationship between soil fertility and the number and vitality of wildlife. This correlation is high for both upland and wetland soils and applies to plants and to animals, both domesticated and wild.

Land management practices such as the planting of food and cover on lands intended primarily for wildlife production or where wildlife is a secondary crop are expected to encourage wildlife. Wildlife greatly benefits from many soil and water conservation practices such as stripcropping, fertilization, and the planting of trees on lands used for pasture and timber.

In Dane County about 200,000 acres is "wet" soils that have a permanent or seasonal high water table or are subject to flooding. The rest of the county is made up of well drained or moderately well drained soils that have ground water at a depth of 3 feet to more than 5 feet.

Most of the major soils in the county are suitable for fairly intensive farming and have a high potential for wildlife. However, the soils have been used for purposes not related to wildlife, and there is little wildlife habitat. The western part of the county, made up of high hills, many woodlands, and idle farmland, offers the greatest promise for the development of wildlife.

In table 6 the suitability of the soils for producing elements of wildlife habitat is rated. The size, shape, or location of areas of soils and the pattern they form with other soils on the landscape were not considered in table 6. These factors must be considered, however, when a particular site is evaluated for its potential for kinds of wildlife and wildlife habitat. Wildlife makes use of suitable habitat on different soils that are within the home range of the species. In table 7 the relative value of habit elements for important kinds of wildlife in the county is rated.

In table 6 the soils in the survey area are rated good, fair, poor, and unsuited. *Good* indicates that habitat generally is easily created, maintained, or improved, and that there are few, if any, limitations to habitat management. Satisfactory results can be expected. *Fair* indicates that habitat generally can be created, main-

TABLE 4.—*Tree*

[All tree species are suited to sunny sites; italicized species are also suited to

Tree and shrub planting group, soil series, and map symbols	Tree species suitable for—					
	Shade			Parkway		
	Species	Height	Shape	Species	Height	Shape
		Feet			*Feet*	
Group 1:						
Ashdale: AsB, AsC2.	*American beech*	>60	Oval.	*Norway maple*	30–60	Round.
Basco: BaB2, BaC2, BaD2, BaE2.	*Sugar maple*	>60	Oval.	Southern pin oak	30–60	Pyramidal.
Batavia: BbA, BbB, BbC2.	*Red maple*	30–60	Oval.	Thornless honey-locust.	30–60	Oval.
Boyer: BoB, BoC2, BoD2.	*Red oak*	>60	Round.		>60	Oval.
Chaseburg: ChB.	White oak	>60	Round.	*Basswood*	>60	Oval.
Derinda: DgB2, DgC2.	*Basswood*	>60	Oval.	*White ash*	>60	Oval.
Dickinson: DkA, DkB, DkC.	*Hackberry*	30–60	Round.	*Sugar maple*	30–60	Round.
Dodge: DnB, DnC2, DoC2.	*White ash*	>60	Oval.	Hackberry	30–60	Oval.
Dodgeville: DpB, DpC, DpD2.	Sycamore	>60	Oval.	Red maple		
Dresden: DrD2, DrE2, DsB, DsC2.	Bur oak	>60	Round.			
Eleva: EhC2, EhD2, EhE2.	Norway maple	30–60	Round.			
Gale: GaB, GaC2, GaD2.	Silver maple	>60	Oval.			
Grays: GsA, GsB, GsC2.	Thornless honey-locust.	30–60	Oval.			
Griswold: GwB, GwC, GwD2.						
Hixton: HbB, HbC2, HbD2.						
Huntsville: HuA, HuB.						
Kegonsa: KeA, KeB.						
Kickapoo: KcB.						
Kidder: KdB, KdC2, KdD2, KrD2, KrE2.						
McHenry: MdB, MdC2, MdD2.						
Meridian: MeA, MeB.						
Military: MhC2, MhD2, MhE2.						
NewGlarus: NeB2, NeC2, NeD2, NeE2.						
Pecatonica: PeB, PeC2.						
Plano: PnA, PnB, PnC2, PoA, PoB, PoC2.						
Port Byron: PrB, PrC.						
Ringwood: RnB, RnC2.						
Rockton: RoB, RoC2, RoD2.						
St. Charles: ScA, ScB, ScC2, ScD2.						
Salter: SeB, SeC2, SfA, SfB2.						
Seaton: SmB, SmC2, SmD2, SmE2, SnC2, SnD2, SnE.						
Troxel: TrB.						
Warsaw: WrB, WrC2.						
Westville: WvB, WvC2, WvD2.						
Whalan: WwE2, WxB, WxC2, WxD2.						
Group 2:						
Brems: BrA.	Bur oak	>60	Round.	Green ash	30–60	Oval.
Cut and fill land: Cu.	*Hackberry*	30–60	Round.	White ash	>60	Oval.
Dickinson, sandy variant: DmA.	Black oak	>60	Round.	*Hackberry*	30–60	Round.
Dunbarton: DuB2, DuC2, DuD2, DuE2.	Silver maple	>60	Oval.	Thornless honey-locust.	30–60	Oval.
Edmund: EdB2, EdC2, EdD2.	Green ash	30–60	Oval.			
Elkmound: EmC2, EmD2, EmE2, EmF.	Thornless honey-locust.	30–60	Oval.			
Made land: Ma.						
Plainfield: PfB.						
Rodman: RpE.						
Sogn: SoD, SoE.						
Spinks: SpB, SpC, SpD.						
Stony and rocky land: St.						

tained, or improved, but that there are moderate limitations to habitat management or development. A moderate intensity of management and fairly frequent attention may be required to assure satisfactory results. *Poor* indicates that habitat generally can be created, maintained, or improved, but that there are severe limitations. Habitat management may be difficult and expensive. Results are questionable. *Unsuited* indicates that it is impractical to attempt to create, maintain, or improve habitat under the prevailing conditions. Unsatisfactory results are probable.

In the paragraphs that follow, six elements of wildlife habitat are described and the basis for rating suitability of the soils for producing desirable habitat is explained.

Grain and seed crops are seed-producing annuals,

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partially shaded sites. The symbol > means more than; the symbol < means less than]

Tree species suitable for—Continued								
Lawn			Hedge and screen			Windbreak		
Species	Height	Shape	Species	Height	Shape	Species	Height	Shape
	Feet			*Feet*			*Feet*	
Flowering crab	<30	Round.	Redcedar	<30	Pyramidal.	*White spruce*	30–60	Pyramidal.
Mountain ash	<30	Oval.	*White-cedar*	30–60	Columnar,	*White-cedar*	30–60	Columnar,
Blue beech	<30	Round.	*White pine*	>60	pyramidal.	*White pine*	>60	pyramidal.
Paper birch	30–60	Oval.	White spruce	30–60	Pyramidal.	Red pine	>60	Pyramidal.
River birch	30–60	Oval.	Lombardy poplar	>60	Pyramidal.	Norway spruce	>60	Pyramidal.
Russian-olive	<30	Round.	Russian-olive	<30	Columnar.			Pyramidal.
Southern pin oak	30–60	Pyramidal.	*Upright yew*	<30	Round.			
Serviceberry	<30	Round.			Pyramidal.			
Horsechestnut	>60	Round.						
Norway spruce	>60	Pyramidal.						
Red pine	>60	Pyramidal.						
White pine	>60	Pyramidal.						
White spruce	30–60	Pyramidal.						
Black cherry	>60	Oval.						
Blue spruce	>60	Pyramidal.						
Norway spruce	>60	Pyramidal.						
Hawthorn	<30	Round.						
Flowering crab	<30	Round.	Redcedar	<30	Pyramidal.	Red pine	>60	Pyramidal.
Paper birch	30–60	Oval.	Russian-olive	<30	Round.	*White pine*	>60	Pyramidal.
Redcedar	<30	Pyramidal.	Red pine	>60	Pyramidal.	Redcedar	<30	Pyramidal.
White pine	>60	Pyramidal.	*White pine*	>60	Pyramidal.			
White spruce	30–60	Pyramidal.	*Upright yew*	<30	Pyramidal.			
Red pine	>60	Pyramidal.	*White spruce*	30–60	Pyramidal.			
Russian-olive	<30	Round.						

including farm grains, planted to produce food for wildlife. Examples are corn, oats, sorghum, barley, and rye. Criteria used as a basis for determining the suitability of soils for producing these plants in the kind and quantity needed by wildlife are susceptibility to flooding and erosion, slope, droughtiness, and fertility. Nearly level soils that have a high available water capacity and moderate to high fertility are considered well suited to grain and seed crops.

Grasses and legumes are domestic perennial grasses and herbaceous legumes that are established by planting and that furnish food and cover for wildlife. Examples are alfalfa, birdsfoot trefoil, red clover, sweet clover, and vetch. Criteria used as a basis for determining the suitability of soils for producing these plants in the kind and quantity needed by wildlife are degree of wetness or droughtiness, relief, and susceptibility to flooding.

TABLE 4.—*Tree planting*

Tree and shrub planting group, soil series, and map symbols	Tree species suitable for—					
	Shade			Parkway		
	Species	Height	Shape	Species	Height	Shape
		Feet			*Feet*	
Group 3:						
Alluvial land, wet: Af.	*Swamp white oak*	>60	Round.	*Green ash*	30–60	Oval.
Colwood: Co.	*Hackberry*	30–60	Round.	*Basswood*	>60	Oval.
Dells: DeA.	*Red maple*	30–60	Oval.	*Red maple*	30–60	Oval.
Del Rey: DfA.	*Basswood*	>60	Oval.			
Elburn: EfB, EgA.	*Green ash*	30–60	Oval.			
Elvers: Ev.	*White ash*	>60	Oval.			
Granby: Gn.	Silver maple	>60	Oval.			
Hayfield: HaA.	Cottonwood	>60	Oval.			
Marshan: Mc.						
Montgomery: MoA.						
Orion: Or, Os.						
Otter: Ot.						
Radford: RaA.						
Sable: SaA.						
Salter, wet variant: ShA.						
Virgil: VrB, VwA.						
Wacousta: Wa.						
Watseka: Wt.						
Group 4:						
Adrian: Ad.	Silver maple	>60	Oval.	Red maple	30–60	Oval.
Houghton: Ho.	*Red maple*	30–60	Oval.	Laurel willow	30–60	Oval.
Marsh: Mb.						
Palms: Pa.						

Wild herbaceous upland plants are native or introduced perennial grasses and forbs that provide food and cover mainly to upland forms of wildlife. They are established mainly through natural processes. Examples are prairie grasses, roundhead lespedeza, beggarstick, aster, and goldenrod. Criteria used as a basis for determining the suitability of soils for producing these plants in the kind and quantity needed by wildlife are droughtiness, natural drainage, relief, susceptibility to flooding, and fertility.

Hardwood woody plants are trees, shrubs, and woody vines that produce fruits, nuts, buds, catkins, twigs, or foliage used extensively by wildlife for food and cover. These plants are commonly established through natural processes, but they can be planted. Coniferous shrubs have about the same value for cover for wildlife as hardwood shrubs and are included in this category. Examples are viburnums, dogwood, hazelnut, oak, maple, and cherry. Criteria used as a basis for determining the suitability of soils for producing these plants in the kind and quantity needed by wildlife are degree of wetness, droughtiness, susceptibility to flooding, relief, and competition from grasses.

Coniferous trees are cone-bearing trees that are mainly important to wildlife as cover, but they can also furnish food in the form of browse, seeds, or fruitlike cones. These plants are commonly established through natural processes, but they can be planted. An open canopy is desirable. Examples are pines, firs, spruce, tamarack, and cedar. Criteria used as a basis for determining the suitability of soils for producing these plants in the kind and quantity needed by wildlife are degree of wetness, relief, susceptibility to flooding, droughtiness, and competition from grasses.

Wetland food and cover plants are annual and perennial, wild, herbaceous plants on moist and wet sites that produce food or cover for wetland forms of wildlife. Submerged and floating aquatic plants are not included in this group. Examples are smartweed, canarygrass, sedges, and sagittaria. Criteria used as a basis for determining the suitability of soils for producing these plants in the kind and quantity needed by wildlife are degree of wetness or droughtiness, reaction, and relief. These soils are types 1 and 2 wetlands, which are defined by the U.S. Department of the Interior as seasonally flooded or saturated areas. Type 1 areas are usually dry during the growing season. Type 2 areas are not covered, but they are saturated during the growing season.

Ponds and shallow water developments are impoundments or excavations for the control or maintenance of desired water levels for wildlife. The most suitable soils are nearly level and have a natural high water table or slow permeability. Many soils that have a high water table but are also moderately permeable to rapidly permeable are well suited to dugout ponds. On-site investigation is generally required for each development. The quality and quantity of water may vary considerably between sites, and these deviations may be of great importance to wildlife.

guide—Continued

Tree species suitable for—Continued								
Lawn			Hedge and screen			Windbreak		
Species	Height	Shape	Species	Height	Shape	Species	Height	Shape
	Feet			*Feet*			*Feet*	
White spruce	30–60	Pyramidal.	*White-cedar*	30–60	Columnar.	*White-cedar*	30–60	Columnar.
Paper birch	30–60	Oval.	*White spruce*	30–60	Pyramidal.	*White spruce*	30–60	Pyramidal.
Mountain ash	<30	Oval.	Lombardy poplar	>60	Columnar.	White pine	>60	Pyramidal.
Weeping willow	30–60	Pendulous.	Laurel willow	30–60	Oval.			
White-cedar	30–60	Pyramidal.						
River birch	30–60	Oval.						
White-cedar	30–60	Columnar.	*White-cedar*	30–60	Columnar.	Laurel willow	30–60	Oval.
White spruce	30–60	Pyramidal.	Laurel willow	30–60	Oval.	Poplar	>60	Pyramidal.
Weeping willow	30–60	Pendulous.				Tree lilac	<30	Oval.
						White-cedar	30–60	Columnar.

Shallow-water areas are types 3 and 4 wetlands, described by the U.S. Department of the Interior as shallow marshes in which the soil is saturated or covered with as much as 6 inches of water during the growing season and deep marshes that are covered by 6 inches to 3 feet of water during the growing season.

Deep-water areas are type 5 wetlands, described by the U.S. Department of the Interior as open freshwater areas that include shallow ponds and reservoirs or wet areas where water is less than 10 feet deep.

Engineering Uses of the Soils[3]

This section is useful to those who need information about soils used as structural material or as foundation upon which structures are built. Among those who can benefit from this section are planning commissions, town and city managers, land developers, engineers, contractors, and farmers.

Among properties of soils highly important in engineering are permeability, strength, compaction characteristics, soil drainage condition, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to the water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage refuse.

Information in this section of the soil survey can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, pipelines, and underground cables.
3. Seek sources of gravel, sand, or clay.
4. Plan farm drainage systems, irrigation systems, ponds, terraces, and other structures for controlling water and conserving soil.
5. Correlate performance of structures already built with properties of the kinds of soil on which they are built, for the purpose of predicting performance of structures on the same or similar kinds of soil in other locations.
6. Predict the trafficability of soils for cross-country movement of vehicles and construction equipment.
7. Develop preliminary estimates pertinent to construction in a particular area.

Most of the information in this section is presented in tables 8, 9, and 10, which show, respectively, several estimated soil properties significant to engineering; interpretations for various engineering uses; and results of engineering laboratory tests on soil samples.

This information, along with the soil map and other

[3] HARRY C. BROWN, engineer, Soil Conservation Service, assisted in preparing this section.

TABLE 5.— *Shrub and*

[The letter "x" means that the plant has the kind of suitability,

Common plant name and botanical name	Tree and shrub group	Suitability for—			
		Landscaping	Hedge, screen, windbreak	Roadside	Ground cover
Arborvitae (shrub types) (Thuja spp.)	1, 2, 3, 4	x	x		
Autumn-olive (Elaeagnus umbellata)	1, 2, 3	x	x		
Barberry, Japanese (Berberis thunbergi)	1, 2	x	x		
Bayberry or waxmyrtle (Myrica pensylvanica)	2, 3	x			x
Bittersweet (Celastrus scandens)	1, 2	x		x	x
Blackberry, dewberry, blackcap raspberry (Rubus spp.)	1, 2			x	x
Chokeberry, black (Aronia melanocarpa)	1, 3	x		x	x
Cotoneaster (Cotoneaster spp.)	1, 2	x	x		
Crabapple (Malus spp.)	1, 2	x	x	x	
Currant, alpine (Ribes alpinum)	1, 2	x	x		
Dogwood, gray (Cornus racemosa)	1, 2, 3			x	
Dogwood, pagoda (Cornus alternifolia)	1, 3			x	
Dogwood, redosier (Cornus stolonifera)	1, 3, 4	x			
Dogwood, roundleaf (Cornus rugosa)	1, 3, 4			x	x
Dogwood, silky (Cornus amomum)	1, 3, 4		x	x	
Elder, American (Sambucus canadensis)	1, 3, 4			x	
Filbert (hazelnut) (Corylus americana)	1, 2			x	
Forsythia (Forsythia spp.)	1, 2	x			
Grape, wild (Vitis spp:)	1, 2			x	x
Hawthorn or thornapple (Crataegus spp.)	1, 2, 3	x		x	
Honeysuckle (shrub types) (Lonicera spp.)	1, 2, 3, 4	x	x		
Juniper, creeping (Juniperus horizontalis)	1, 2	x		x	x
Juniper, Pfitzer (J. chinensis pfitzeriana)	1, 2	x			
Lilac (Syringa spp.)	1, 2	x	x	x	
Maple, Amur (Acer ginnala)	1, 2	x	x		
Mockorange (Philadelphus spp.)	1, 2	x	x		
Myrtle or periwinkle (Vinca minor)	1, 2	x		x	x
Ninebark, common (Physocarpus opulifolius)	1, 2, 3, 4	x	x	x	
Peashrub, Siberian (Caragana arborescens)	1, 2	x	x	x	
Pine, Mugho (Pinus mugo mughus)	1, 2	x			
Plum, American (Prunus americana)	1, 2, 3		x	x	
Russian-olive (Elaeagnus angustifolia)	1, 2, 3	x	x		
Spirea, narrow-leaf-meadowsweet (Spiraea alba)	3, 4			x	
Spirea, Vanhoutte (Spiraea vanhouttei)	1, 2, 3	x	x		

vine planting guide

characteristics, or esthetic feature indicated by the column heading]

Growth characteristics					Esthetic features		
Height	Type	Shade tolerant	Thorny	Thicket forming	Flower	Fruit or berry	Leaves color in fall
Feet							
3–7	Shrub	x					x
10–15	Shrub	x				x	x
6	Shrub	x	x			x	x
5–9	Shrub	x				x	x
Climbs	Vine	x				x	x
1–5	Bramble		x	x	x	x	x
1–3	Shrub	x		x		x	x
4–8	Shrub					x	x
Up to 25	Shrub				x	x	x
6–7	Foliage shrub	x			x		
6–10	Shrub	x			x	x	x
10–15	Shrub	x			x	x	x
3–9	Shrub	x		x	x	x	x
3–9	Shrub	x			x	x	x
6–10	Shrub	x			x	x	x
3–10	Shrub			x	x	x	
5–8	Shrub	x		x		x	x
4–8	Shrub	x			x		
Climbs	Vine	x				x	x
5–20	Shrub	x	x			x	x
6–12	Shrub	x			x	x	x
1–2	Shrub					x	x
8–10	Shrub		x				x
8–10	Shrub			x	x		
15+	Tall shrub						x
6–9	Shrub				x		
1	Short vine	x		Forms mat	x		
6–9	Shrub	x		x	x		x
10–15	Shrub					x	x
6–9	Shrub						x
10–15	Shrub	x	x	x	x	x	x
15+	Shrub		x			x	x
3–4	Shrub				x		x
5–6	Shrub	x			x		x

TABLE 5.—*Shrub and vine*

Common plant name and botanical name	Tree and shrub group	Suitability for—			
		Landscaping	Hedge, screen, windbreak	Road-side	Ground cover
Viburnum, American cranberrybush (Viburnum trilobum)	1, 3, 4	x	x	x	
Viburnum, mapleleaf (Viburnum acerifolium)	1, 3, 4			x	
Viburnum, nannyberry (Viburnum lentago)	1, 2, 3, 4		x	x	
Viburnum, wayfaringtree (Viburnum lantana)	1, 2, 3, 4		x	x	
Willows (shrubby types including pussywillows). (Salix spp.)	1, 2, 3, 4		x	x	
Winterberry, common (Ilex verticillata)	1, 3, 4			x	

parts of this publication, can be used to make interpretations in addition to those given in tables 8 and 9 and it also can be used to make other useful maps.

This information, however, does not eliminate need for further investigations at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths greater than 5 feet. Also, inspection of sites, especially the small ones, is needed because many delineated areas of a given soil mapping unit may contain small areas of other kinds of soil that have strongly contrasting properties and different suitabilities or limitations for soil engineering.

Some of the terms used in this soil survey have different meanings in soil science than in engineering. The Glossary defines many of these terms as they are commonly used in soil science.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system, used by the SCS engineers, Department of Defense, and others, and the AASHO system adopted by the American Association of State Highway Officials.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content (*16*). Soils are grouped in 15 classes. There are eight classes of coarse-grained soils, identified as GW, GP, GM, GC, SW, SP, SM, and SC; six classes of fine-grained soils, identified as ML, CL, OL, MH, CH, and OH; and one class of highly organic soils, identified as Pt. Soils on the borderline between two classes are designated by symbols for both classes; for example, ML–CL.

The AASHO system is used to classify soils according to those properties that affect use in highway construction and maintenance (*2*). In this system, a soil is placed in one of seven basic groups ranging from A–1 through A–7 on the basis of grain-size distribution, liquid limit, and plasticity index. In group A–1 are gravelly soils of high bearing strength, or the best soils for subgrade (foundation). At the other extreme, in group A–7, are clay soils that have low strength when wet and that are the poorest soils for subgrade. Where laboratory data are available to justify a further breakdown, the A–1, A–2, and A–7 groups are divided as follows: A–1–a, A–1–b, A–2–4, A–2–5, A–2–6, A–2–7, A–7–5, and A–7–6. As additional refinement, the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHO classification resulting from laboratory tests of some major soils is shown in table 10; the estimated classification for all the soils mapped in the survey area is given in table 8.

Engineering properties

Several estimates of soil properties significant in engineering are given in table 8. These estimates are made for representative soil profiles, by layers sufficiently different to have different significance for soil engineering. The estimates are based on field observations made in the course of mapping, on test data for these and similar soils, and on experience with the same kinds of soil in other counties. Following are explanations of some of the columns in table 8.

Depth to bedrock is distance from the surface of the soil to the upper surface of the rock layer.

Depth to seasonal high water table is distance from the surface of the soil to the highest level that ground water reaches in the soil in most years.

Texture is described in table 8 in the standard terms used by the United States Department of Agriculture (USDA). These terms take into account relative percentages of sand, silt, and clay in the part of the soil material that is less than 2 millimeters in diameter. "Loam," for example, is soil material that contains 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the soil contains gravel or other particles coarser than sand, an appropriate modifier is added, as for example, "gravelly loamy sand." "Sand,"

planting guide—Continued

Growth characteristics					Esthetic features		
Height	Type	Shade tolerant	Thorny	Thicket forming	Flower	Fruit or berry	Leaves color in fall
Feet							
7–9	Shrub	x			x	x	x
3–5	Shrub	x			x	x	x
9–12	Shrub	x			x	x	x
8–10	Shrub	x			x	x	x
2–8	Shrub						
6–9	Shrub	x				x	x

"silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this publication.

Liquid limit and plasticity index indicate the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from the semisolid to plastic state; and the liquid limit, from a plastic to a liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It indicates the range of moisture content within which a soil material is plastic. Liquid limit and plasticity index are estimated in table 8, but in table 10 the data on plasticity index are based on tests of soil samples.

Permeability is the quality of a soil that enables it to transmit water or air. It is estimated on basis of those soil characteristics observed in the field, particularly structure and texture. The estimates in table 8 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Percolation is the downward movement of water through the soil.

Available water capacity is the ability of soils to hold water for use by most plants. It commonly is defined as the difference between the amount of water in the soil at field capacity and the amount at the wilting point of most crop plants.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms used to describe soil reaction are explained in the Glossary.

Shrink-swell potential is the relative change in volume to be expected of soil material with changes in moisture content, that is, the extent to which the soil shrinks as it dries or swells when it gets wet. Extent of shrinking and swelling is influenced by the amount and kind of clay in the soil. Shrinking and swelling of soils causes much damage to building foundations, roads, and other structures. A *high* shrink-swell potential indicates a hazard to maintenance of structures built in, on, or with material having this rating.

Corrosivity, as used in table 8, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. Rate of corrosion of uncoated steel is related to such soil properties as drainage, texture, total acidity, and electrical conductivity of the soil material. Corrosivity for concrete is influenced mainly by the content of sodium or magnesium sulfate, but also by soil texture and acidity. Installations of uncoated steel that intersect soil boundaries or soil horizons are more susceptible to corrosion than installations entirely in one kind of soil or in one soil horizon. A corrosivity rating of *low* means that there is a low probability of soil-induced corrosion damage. A rating of *high* means that there is a high probability of damage, so that protective measures for steel and more resistant concrete should be used to avoid or minimize damage.

Engineering interpretations

The interpretations in table 9 are based on the estimated engineering properties of soils shown in table 8, on test data for soils in this survey area and others nearby or adjoining, and on the experience of engineers and soil scientists with the soils of Dane County. In table 9, ratings are used to summarize the suitability of the soils for all listed purposes other than for drainage of crops and pasture; irrigation, pond reservoir areas, embankments, dikes, and levees; terraces and diversions; and grassed waterways. For these particular uses, table 9 lists those soil features not to be overlooked in planning, installation, and maintenance.

Soil suitability is rated by the terms *good, fair, poor,* and *unsuitable. Good* means properties of the specific soil are generally favorable for the rated use. *Fair* means some properties limit the specified soil for the rated use. *Poor* means properties of the specified soil generally are unfavorable for the rated use. *Unsuitable*

TABLE 6.—*Suitability of the soils*

Soil series and map symbols	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants
Adrian: Ad	Fair where drained	Fair where drained; few species suited.	Unsuited: wetness; few species suited.
Alluvial land, wet: Af	Unsuited: wetness; subject to flooding.	Fair where drained. Severe where undrained: wetness; few species suited.	Poor: wetness; few species suited.
Ashdale:			
AsB	Good	Good	Good
AsC2	Fair: slope; subject to water erosion.	Good	Good
Basco:			
BaB2	Good	Good	Good
BaC2	Fair: slope; subject to water erosion; slightly droughty; subsoil is tight.	Good	Good
BaD2	Poor: slope; hazard of water erosion; slightly droughty; subsoil is tight.	Fair: slope	Fair: slope
BaE2	Poor: slope; hazard of water erosion; slightly droughty; subsoil is tight.	Poor: slope	Fair: slope
Batavia:			
BbA	Good	Good	Good
BbB	Good	Good	Good
BbC2	Fair: slope	Fair: slope	Good
Boyer:			
BoB	Fair: slightly droughty; hazard of water erosion.	Fair: slightly droughty; some species not suited.	Good
BoC2	Poor: slope	Fair: slightly droughty; some species not suited.	Good
BoD2	Poor: slope	Poor: slope	Good
Brems: BrA	Poor: droughty; subject to soil blowing; low fertility.	Fair: droughty; some species not suited.	Fair: droughty; some species not suited.
Chaseburg: ChB	Fair: hazard of water erosion; subject to flooding.	Fair: subject to flooding	Good
Colwood: Co	Good where drained. Unsuited where undrained: wetness.	Fair where drained. Poor where undrained: wetness; few species suited.	Poor: wetness; few species suited.
Cut and fill land: Cu. Too variable to be rated.			
Dells: DeA	Good where drained. Fair where undrained: seasonally wet.	Good where drained. Fair where undrained: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.
Del Rey: DfA	Good where drained. Fair where undrained: seasonally wet.	Good where drained. Fair where undrained: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.
Derinda:			
DgB2	Good	Good	Good
DgC2	Fair: slope	Good	Good

for elements of wildlife habitat

Woody plants		Wetland food and cover plants	Shallow and deep water developments
Hardwoods	Conifers		
Poor: wetness; few species suited.	Fair: wetness; some species not suited.	Good	Good.
Unsuited: wetness; subject to flooding; few species suited.	Poor: subject to flooding; wetness; few species suited.	Good	Good.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited	Poor: slow permeability in lower part of subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited	Poor: slow permeability in lower part of subsoil.
Good	Good	Unsuited: few species suited	Poor: slow permeability in subsoil.
Good	Good	Unsuited: few species suited	Poor: slow permeability in subsoil.
Fair: slope	Fair: slope	Unsuited: few species suited	Poor: slow permeability in subsoil.
Fair: slope	Fair: slope	Unsuited: few species suited	Poor: slow permeability in subsoil.
Good	Good	Poor: steeper areas are unsuitable; few species suited.	Poor: steeper areas are unsuitable; moderate permeability.
Good	Good	Unsuited: slope	Unsuited: slope.
Good	Good	Unsuited: slope	Unsuited: slope.
Fair: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: moderately rapid permeability.
Fair: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: moderately rapid permeability.
Fair: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: moderately rapid permeability.
Fair: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty; very acid.	Unsuited: rapid permeability.
Good	Fair: subject to flooding; some species not suited.	Poor: few species suited	Poor: moderate permeability.
Poor: wetness; few species suited.	Poor: wetness; few species suited; grass competition.	Good: wetness	Good: slope; wetness.
Fair: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.	Poor: some species not suited	Fair: seasonally wet; moderate permeability in subsoil.
Fair: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.	Fair: some species not suited	Good.
Good	Good	Unsuited: few species suited	Poor: moderately low permeability in subsoil.
Good	Good	Unsuited: few species suited	Poor: moderately low permeability in subsoil.

TABLE 6.—*Suitability of the soils for*

Soil series and map symbols	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants
Dickinson:			
DkA, DkB	Fair: slightly droughty; hazard of water erosion.	Fair: slightly droughty; some species not suited.	Good
DkC	Poor: slope	Fair: slightly droughty; some species not suited.	Good
Dickinson, sandy variant: DmA.	Poor: droughty; subject to soil blowing.	Fair: droughty; some species not suited.	Fair: droughty; some species not suited.
Dodge:			
DnB	Good	Good	Good
DnC2	Fair: slope	Good	Good
DoC2	Poor: slope	Fair: slope	Good
For Kidder part, see Kidder series, KdC2.			
Dodgeville:			
DpB	Good	Good	Good
DpC	Fair: slope	Good	Good
DpD2	Poor: slope	Fair: slope	Good
Dresden:			
DrD2	Poor: slope	Fair: slope	Good
DrE2	Poor: slope	Poor: slope	Fair: slope
DsB	Good	Good	Good
DsC2	Fair: slope	Good	Good
Dunbarton:			
DuB2	Fair: slope	Fair: slope	Fair: droughty; some species not suited.
DuC2	Poor: slope	Fair: slope	Fair: droughty; some species not suited.
DuD2	Poor: slope	Poor: slope	Fair: droughty; some species not suited.
DuE2	Poor: slope	Poor: slope	Poor: slope
Edmund:			
EdB2	Fair: slightly droughty; hazard of water erosion.	Fair: slightly droughty; some species not suited.	Fair: droughty; some species not suited.
EdC2	Poor: slope; slightly droughty; hazard of water erosion.	Fair: slightly droughty; some species not suited.	Fair: droughty; some species not suited.
EdD2	Poor: slope; slightly droughty; hazard of water erosion.	Poor: slope; slightly droughty; some species not suited.	Fair: droughty; some species not suited.

elements of wildlife habitat—Continued

Woody plants		Wetland food and cover plants	Shallow and deep water developments
Hardwoods	Conifers		
Fair: droughty; some species not suited; grass competition.	Fair: droughty; some species not suited; grass competition.	Unsuited: droughty	Unsuited: moderately rapid to rapid permeability.
Fair: droughty; some species not suited; grass competition.	Fair: droughty; some species not suited; grass competition.	Unsuited: droughty	Unsuited: moderately rapid to rapid permeability.
Fair: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: moderately rapid to rapid permeability.
Good	Good	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Good	Good	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Good	Good	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Good	Good	Unsuited: few species suited	Unsuited: moderate permeability in subsoil and rapid permeability in substratum.
Fair: slope	Fair: slope	Unsuited: few species suited	Unsuited: moderate permeability in subsoil and rapid permeability in substratum.
Good	Good	Unsuited: few species suited	Unsuited: moderate permeability in subsoil and rapid permeability in substratum.
Good	Good	Unsuited: few species suited	Unsuited: moderate permeability in subsoil and rapid permeability in substratum.
Fair: droughty; some species not suited.	Good	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to fissured dolomite.
Fair: droughty; some species not suited.	Good	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to fissured dolomite.
Fair: droughty; some species not suited.	Good	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to fissured dolomite.
Fair: droughty; some species not suited.	Fair: slope	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to fissured dolomite.
Fair: droughty; some species not suited; grass competition.	Poor: droughty; grass competition; few species suited.	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to fissured dolomite.
Fair: droughty; some species not suited; grass competition.	Poor: droughty; grass competition; few species suited.	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to fissured dolomite.
Fair: droughty; some species not suited; grass competition.	Poor: droughty; grass competition; few species suited.	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to fissured dolomite.

TABLE 6.—*Suitability of the soils for*

Soil series and map symbols	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants
Elburn:			
EfB	Good where drained. Fair where undrained: seasonally wet.	Good where drained. Fair where undrained: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.
EgA	Good where drained. Fair where undrained: seasonally wet.	Good where drained. Fair where undrained: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.
Eleva:			
EhC2	Poor: slightly droughty; hazard of water erosion.	Fair: slightly droughty; some species not suited.	Good
EhD2	Poor: slightly droughty; hazard of water erosion.	Poor: slope; slightly droughty; some species not suited.	Good
EhE2	Poor: slightly droughty; hazard of water erosion.	Poor: slope; slightly droughty; some species not suited.	Fair: slope
Elkmound:			
EmC2	Poor: slightly droughty; hazard of water erosion.	Fair: slightly droughty; some species not suited.	Fair: droughty; some species not suited.
EmD2	Poor: slightly droughty; hazard of water erosion.	Poor: slope; droughty; some species not suited.	Fair: droughty; some species not suited.
EmE2, EmF	Poor: slightly droughty; hazard of water erosion.	Poor: slope; droughty; some species not suited.	Poor: slope; some species not suited.
Elvers: Ev	Good where drained. Unsuited where undrained; wet soil; subject to flooding.	Fair where drained. Poor where undrained: wet soil; few species suited.	Poor: wet soil; few species suited.
Gale:			
GaB	Good	Good	Good
GaC2	Fair: slope; hazard of water erosion.	Good	Good
GaD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
Granby: Gn	Fair where drained. Unsuited where undrained: wet soil; subject to soil blowing.	Fair where drained. Poor where undrained: wet soil; few species suited.	Poor: wet soil; few species suited.
Grays:			
GsA	Good	Good	Good
GsB	Good	Good	Good
GsC2	Fair: slope; hazard of water erosion.	Good	Good
Griswold:			
GwB	Good	Good	Good
GwC	Fair: slope; hazard of water erosion.	Good	Good
GwD2	Poor: slope; hazard of water erosion.	Fair: slope	Good

elements of wildlife habitat—Continued

Woody plants		Wetland food and cover plants	Shallow and deep water developments
Hardwoods	Conifers		
Fair: seasonally wet; some species not suited.	Poor: seasonally wet; some species not suited; grass competition.	Poor: some species not suited.	Poor: seasonally wet; moderately slow permeability.
Fair: seasonally wet; some species not suited.	Poor: seasonally wet; some species not suited; grass competition.	Fair: some species not suited.	Fair: seasonally wet; moderately slow permeability.
Fair: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: moderately rapid to rapid permeability.
Fair: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: moderately rapid to rapid permeability.
Poor: slope; droughty; some species not suited.	Poor: slope; some species not suited.	Unsuited: droughty	Unsuited: moderately rapid to rapid permeability.
Fair: droughty; some species not suited.	Fair: droughty	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to rapid permeable sandstone.
Fair: droughty; some species not suited.	Fair: droughty	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to rapid permeable sandstone.
Poor: droughty; some species not suited.	Poor: droughty	Unsuited: droughty	Unsuited: moderately slow permeability in subsoil; shallow to rapid permeable sandstone.
Unsuited: wet soil; subject to flooding; few species suited.	Poor: subject to flooding; few species suited; wet soil.	Good	Good.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil.
Poor: wet soil; few species suited.	Fair: wet soil; some species not suited.	Good	Good.
Good	Good	Poor: few species suited	Poor: moderate permeability.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil; moderately rapid permeability in the substratum.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil; moderately rapid permeability in the substratum.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil; moderately rapid permeability in the substratum.

TABLE 6.—*Suitability of the soils for*

Soil series and map symbols	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants
Hayfield: HaA	Good where drained. Fair where undrained: seasonally wet.	Good where drained. Fair where undrained: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.
Hixton:			
HbB	Good	Good	Good
HbC2	Fair: slope; hazard of water erosion.	Good	Good
HbD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
Houghton: Ho	Fair where drained. Unsuited where undrained: wet soil; subject to soil blowing.	Fair where drained. Unsuited where undrained: wet soil; few species suited.	Unsuited: wet soil; few species suited.
Huntsville: HuA, HuB	Fair: subject to flooding	Fair: subject to flooding	Fair: subject to flooding
Kegonsa:			
KeA	Good	Good	Good
KeB	Good	Good	Good
Kickapoo: KcB	Poor: droughty; hazard of erosion.	Fair: droughty; some species not suited.	Fair: droughty; some species not suited.
Kidder:			
KdB	Good	Good	Fair: slope
KdC2	Fair: slope; slightly droughty; hazard of water erosion.	Good	Fair: slope
KdD2	Poor: slope; slightly droughty; hazard of water erosion.	Fair: slope; slightly droughty.	Fair: slope
KrD2, KrE2	Poor: slope; slightly droughty; hazard of water erosion.	Fair: slope; slightly droughty.	Fair: slope
Made land: Ma. Too variable to be rated.			
Marsh: Mb	Unsuited: flooded most of the year.	Unsuited: flooded most of the year.	Unsuited: flooded most of the year.
Marshan: Mc	Good where drained. Unsuited where undrained: wetness.	Fair where drained. Poor where undrained: wetness; few species suited.	Unsuited: wetness; few species suited.
McHenry:			
MdB	Good	Good	Good
MdC2	Fair: slope; hazard of water erosion.	Good	Good
MdD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
Meridian:			
MeA	Good	Good	Good
MeB	Good	Good	Good

elements of wildlife habitat—Continued

Woody plants		Wetland food and cover plants	Shallow and deep water developments
Hardwoods	Conifers		
Fair: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.	Fair: some species not suited.	Fair: seasonally wet; moderate permeability in subsoil.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil.
Poor: wet soil; few species suited.	Fair: wet soil; some species not suited.	Good	Good.
Poor: subject to flooding; grass competition.	Poor: subject to flooding; grass competition; few species suited.	Poor: subject to flooding; few species suited.	Poor: subject to flooding; moderate permeability.
Good	Good	Poor: few species suited	Poor: moderate permeability in subsoil and rapid permeability in substratum.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil and rapid permeability in substratum.
Fair: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty; upland drainageways.	Unsuited: moderately rapid permeability; upland drainageways.
Good	Good	Unsuited: few species suited.	Unsuited: moderately rapid permeability in substratum.
Good	Good	Unsuited: few species suited.	Unsuited: moderately rapid permeability in substratum.
Good	Good	Unsuited: few species suited.	Unsuited: moderately rapid permeability in substratum.
Fair: slope	Fair: slope	Unsuited: few species suited.	Unsuited: moderately rapid permeability in substratum.
Unsuited: flooded most of the year.	Unsuited: flooded most of the year.	Good	Good.
Poor: wet soil; few species suited; grass competition.	Poor: wet soil; few species suited; grass competition.	Good	Good.
Good	Good	Unsuited: few species suited.	Unsuited: moderately rapid permeability in substratum.
Good	Good	Unsuited: few species suited.	Unsuited: moderately rapid permeability in substratum.
Good	Good	Unsuited: few species suited.	Unsuited: moderately rapid permeability in substratum.
Good	Good	Poor: few species suited	Poor: moderate permeability in subsoil.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.

TABLE 6.—*Suitability of the soils for*

Soil series and map symbols	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants
Military:			
MhC2	Fair: slope; hazard of water erosion.	Good	Good
MhD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
MhE2	Poor: slope; hazard of water erosion.	Fair: slope	Fair: slope
Montgomery: MoA	Good where drained. Unsuited where undrained: wetness; tight subsoil.	Fair where drained. Poor where undrained: wetness; few species suited.	Poor: wet soil; few species suited.
NewGlarus:			
NeB2	Good	Good	Good
NeC2	Fair: slope; hazard of water erosion.	Good	Good
NeD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
NeE2	Poor: slope; hazard of water erosion.	Poor: slope	Fair: slope
Orion:			
Or	Good where drained. Fair where undrained: seasonally wet; subject to flooding.	Fair: seasonally wet; subject to flooding; some species not suited.	Fair: seasonally wet; subject to flooding; few species suited.
Os	Good where drained. Unsuited where undrained: wetness; subject to flooding.	Fair where drained. Poor where undrained: wetness; few species suited.	Poor: wetness; few species suited.
Otter: Ot	Good where drained. Unsuited where undrained: wet soil.	Fair where drained. Poor where undrained: wetness; few species suited.	Unsuited: wetness; few species suited.
Palms: Pa	Fair where drained. Unsuited where undrained: subject to soil blowing.	Fair where drained. Unsuited where undrained: wetness; few species suited.	Unsuited: wetness; few species suited.
Pecatonica:			
PeB	Good	Good	Good
PeC2	Fair: slope; hazard of water erosion.	Good	Good
Plainfield: PfB	Poor: droughty; subject to soil blowing; low fertility.	Fair: droughty; some species not suited.	Fair: droughty; some species not suited.
Plano:			
PnA	Good	Good	Good
PnB	Good	Good	Good
PnC2	Fair: slope; hazard of water erosion.	Good	Good
PoA	Good	Good	Good
PoB	Good	Good	Good
PoC2	Fair: hazard of water erosion	Good	Good
Port Byron:			
PrB	Good	Good	Good
PrC	Fair: slope	Good	Good
Radford: RaA	Good where drained. Fair where undrained: seasonally wet; subject to flooding.	Good where drained. Fair where undrained: seasonally wet; subject to flooding.	Fair: seasonally wet; subject to flooding; some species not suited.

elements of wildlife habitat—Continued

Woody plants		Wetland food and cover plants	Shallow and deep water developments
Hardwoods	Conifers		
Good	Good	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Good	Good	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Fair: slope	Fair: slope	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Poor: wet soil; few species suited.	Poor: wet soil; few species suited.	Good	Good.
Good	Good	Unsuited: few species suited	Unsuited: steepness.
Good	Good	Unsuited: few species suited	Unsuited: steepness.
Good	Good	Unsuited: few species suited	Unsuited: steepness.
Fair: slope	Fair: slope	Unsuited: few species suited	Unsuited: steepness.
Fair: seasonally wet; subject to flooding; some species not suited.	Poor: subject to flooding; few species suited; seasonally wet.	Fair: subject to flooding; some species not suited.	Fair: subject to flooding; seasonally wet; moderate permeability.
Unsuited: wetness; subject to flooding; few species suited.	Poor: subject to flooding; wetness; few species suited.	Good	Good.
Poor: wetness; few species suited; grass competition.	Poor: wetness; few species suited; grass competition.	Good	Good.
Poor: wetness; few species suited.	Fair: wetness; some species not suited.	Good	Good.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability.
Fair: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: rapid permeability.
Fair: grass competition	Fair: grass competition	Poor: few species suited	Poor: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Poor: few species suited	Poor: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Fair: grass competition	Fair: some species not suited; grass competition.	Unsuited: slope; few species suited.	Unsuited: slope; moderately slow permeability.
Fair: grass competition	Fair: some species not suited; grass competition.	Unsuited: slope; few species suited.	Unsuited: slope; moderately slow permeability.
Poor: seasonally wet; subject to flooding; grass competition.	Poor: subject to flooding; few species suited; grass competition.	Fair: subject to flooding; species not suited.	Fair: subject to flooding; seasonally wet; moderate permeability.

TABLE 6.—*Suitability of the soils for*

Soil series and map symbols	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants
Ringwood:			
RnB	Good	Good	Good
RnC2	Fair: slope; hazard of water erosion.	Good	Good
Rockton:			
RoB	Good	Good	Good
RoC2	Fair: slope; hazard of water erosion.	Good	Good
RoD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
Rodman: RpE	Unsuited: droughty; hazard of water erosion.	Poor: droughty; some species not suited.	Fair where slope is 12 to 20 percent. Poor where slope is steeper: droughty; some species not suited.
Sable: SaA	Good where drained. Unsuited where undrained: wetness.	Fair where drained. Poor where undrained: wetness; few species suited.	Unsuited: wetness; few species suited.
St. Charles:			
ScA	Good	Good	Good
ScB	Good	Good	Good
ScC2	Fair: slope; hazard of water erosion.	Good	Good
ScD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
Salter:			
SeB	Good	Good	Good
SeC2	Fair: slope; hazard of water erosion; slightly droughty.	Good	Good
SfA	Good	Good	Good
SfB2	Good	Good	Good
Salter, wet variant: ShA	Good where drained. Fair where undrained: seasonally wet.	Good where drained. Fair where undrained: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.
Seaton:			
SmB	Good	Good	Good
SmC2	Fair: slope; hazard of water erosion.	Good	Good
SmD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
SmE2	Poor: slope; hazard of water erosion.	Poor: slope	Fair: slope
Seaton, loamy variant:			
SnC2	Fair: hazard of water erosion.	Good	Good
SnD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
SnE	Poor: slope; hazard of water erosion.	Poor: slope	Fair: slope

elements of wildlife habitat—Continued

Woody plants		Wetland food and cover plants	Shallow and deep water developments
Hardwoods	Conifers		
Fair: grass competition	Fair: grass competition	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited.	Unsuited: moderate permeability in subsoil.
Poor: droughty; few species suited.	Poor: droughty; few species suited.	Unsuited: droughty	Unsuited: rapid permeability.
Poor: wet soil; few species suited; grass competition.	Poor: wetness; few species suited; grass competition.	Good	Good.
Good	Good	Poor: few species suited	Poor: moderate permeability in subsoil.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Good	Good	Unsuited: droughty	Unsuited: moderately rapid permeability above the silty substratum.
Good	Good	Unsuited: droughty	Unsuited: moderately rapid permeability above the silty substratum.
Good	Good	Poor: few species suited	Poor: moderate permeability.
Good	Good	Unsuited: slope; few species suited.	Unsuited: moderate permeability.
Fair: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.	Fair: some species not suited.	Fair: seasonally wet; moderate permeability.
Good	Good	Poor: few species suited	Poor: moderate permeability.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability.
Fair: slope	Fair: slope	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability.
Good	Good	Unsuited: few species suited.	Unsuited: moderate permeability.
Fair: slope	Fair: slope	Unsuited: few species suited.	Unsuited: moderate permeability.

TABLE 6.—*Suitability of the soils for*

Soil series and map symbols	Grain and seed crops	Grasses and legumes	Wild herbaceous upland plants
Sogn:			
SoD	Poor: droughty; hazard of water erosion; shallow to rock.	Fair: some species not suited; droughty.	Fair: droughty; some species not suited.
SoE	Poor: droughty; hazard of water erosion; shallow to rock.	Poor: slope; droughty; some species not suited.	Poor: slope; droughty; some species not suited.
Spinks and Plainfield:			
SpB	Poor: droughty; subject to soil blowing; low fertility.	Fair: droughty; some species not suited.	Fair: droughty; some species not suited.
SpC	Unsuited: slope; droughty; subject to soil blowing; low fertility.	Fair: droughty; some species not suited.	Fair: droughty; some species not suited.
SpD	Unsuited: slope; droughty; subject to soil blowing; low fertility.	Poor: slope; droughty; some species not suited.	Fair: droughty; some species not suited.
Stony and rocky land: St	Unsuited: thin soil; hazard of erosion.	Poor: thin soil; steepness	Fair: steepness; droughty
Troxel: TrB	Good	Good	Good
Virgil:			
VrB	Good where drained. Fair where undrained: seasonally wet.	Good where drained. Fair where undrained: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.
VwA	Good where drained. Fair where undrained: seasonally wet.	Good where drained. Fair where undrained: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.
Wacousta: Wa	Good where drained. Unsuited where undrained: wet soil; subject to flooding.	Fair where drained. Poor where undrained: wet soil; few species suited.	Unsuited: wet soil; subject to flooding; few species suited.
Warsaw:			
WrB	Good	Good	Good
WrC2	Fair: slope; hazard of water erosion.	Good	Good
Watseka: Wt	Poor: seasonally wet; subject to soil blowing; low fertility.	Fair: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.
Westville:			
WvB	Good	Good	Good
WvC2	Fair: slope; hazard of water erosion.	Good	Good
WvD2	Poor: slope; hazard of water erosion.	Fair: slope	Good
Whalan:			
WwE2	Poor: slope; hazard of water erosion.	Poor: slope	Fair: slope
WxB	Good	Good	Good
WxC2	Fair: slope; hazard of water erosion.	Good	Good
WxD2	Poor: slope; hazard of water erosion.	Fair: slope	Good

elements of wildlife habitat—Continued

Woody plants		Wetland food and cover plants	Shallow and deep water developments
Hardwoods	Conifers		
Poor: droughty; few species suited; grass competition.	Poor: droughty; grass competition; few species suited.	Unsuited: droughty	Unsuited: shallow to fissured dolomite.
Poor: droughty; few species suited; grass competition.	Poor: droughty; grass competition; few species suited.	Unsuited: droughty	Unsuited: shallow to fissured dolomite.
Poor: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: rapid permeability.
Poor: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: rapid permeability.
Poor: droughty; some species not suited.	Fair: droughty; some species not suited.	Unsuited: droughty	Unsuited: rapid permeability.
Fair: steepness; thin soil; hand planting needed.	Fair: steepness; thin soil; hand planting needed.	Unsuited: steepness; droughty.	Unsuited: steepness; droughty; rapid permeability in the sandstone bedrock.
Poor: subject to flooding; grass competition.	Poor: subject to flooding; few species suited; grass competition.	Poor: subject to flooding; few species suited.	Poor: subject to flooding; moderate permeability.
Fair: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.	Poor: slope; some species not suited.	Poor: slope; seasonally wet; moderate permeability in subsoil.
Fair: seasonally wet; some species not suited.	Fair: seasonally wet; some species not suited.	Fair: some species not suited	Fair: seasonally wet; moderate permeability.
Poor: wet soil; subject to flooding; few species suited.	Poor: subject to flooding; few species suited; grass competition.	Good: wet soil	Good: flooding hazard; wet soil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Fair: grass competition	Fair: grass competition	Unsuited: few species suited	Unsuited: moderate permeability in subsoil.
Fair: seasonally wet and droughty; some species not suited.	Fair: seasonally wet; some species not suited.	Fair: very acid	Fair: seasonally wet; rapid permeability.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Fair: slope	Fair: slope	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.
Good	Good	Unsuited: slope; few species suited.	Unsuited: slope; moderate permeability in subsoil.

TABLE 7.—*Relative importance of elements of wildlife habitat for selected species of wildlife*

[A rating of 1 means little or no value to the species; 2 means some value to the species; 3 means important to the species; and 4 means very important to the species. Absence of a figure means that the element is not applicable to the particular species]

Selected wildlife species	Grain and seed crops		Grasses and legumes		Wild herbaceous upland plants	Woody plants			Wetland food and cover plants [1]	Water developments	
						Hardwoods		Conifers			
	Harvested	Unharvested	Harvested	Unharvested		Shrubs	Trees			Shallow [2]	Deep [3]
Migratory waterfowl:											
Ducks	3	3	1	3	3		1		*4	*4	4
Geese	4	4	4	1					2	3	4
Upland game birds:											
Hungarian partridge	4	4	3	4	4	1			1		
Pheasants	4	4		*4	*4	4		1	*4	3	
Quail	4	4	2	4	4	*4	2	1	4	3	
Ruffed grouse	1	1	1	2	2	*4	4	3			
Sharp-tailed grouse	3	4	3	4	4	4	3	1	4	1	
Woodcock			1	3	3	4	4	2	3		
Small game:											
Cottontail rabbits	3	4	3	*4	*4	*4	3	1	2	3	
Snowshoe rabbits				1	1	*4	3	*4	1		
Raccoon	3	4		1	1	2	4		1	*4	4
Squirrels	3	4		1	1	2	*4	1			
Large game:											
Deer	3	4	3	3	4	4	4	4	3	3	2
Furbearers:											
Beaver						4	*4		4	4	*4
Red fox [4]	2	3	2	3	3	3	2	1	3	3	1
Mink [4]						2	1	1	3	*4	*4
Muskrat	1	1				1			4	*4	*4

[1] Type 1 and 2 wetlands as defined by United States Department of the Interior.

[2] Type 3 and 4 wetlands as defined by the United States Department of the Interior.

[3] Type 5 wetlands as defined by the United States Department of the Interior.

[4] Carnivorous species not strictly dependent on elements listed.

[*] Critical element for the species.

means that soil properties are so unfavorable that overcoming the limitations for the rated use is not practical or that the rated use is not practical.

Engineers and others who use bearing capacity as a soil factor affecting a specific engineering use should not apply specific values to the estimates of bearing capacity given in table 9.

Following are explanations of some of the columns in table 9.

Road fill is soil material used in embankments for roads. The suitability ratings reflect (1) the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided with adequate drainage and (2) the relative ease of excavating the material at borrow areas.

Sand and gravel are used in great quantities in many kinds of construction. The ratings in table 9 provide guidance about where to look for probable sources. A soil rated *good* or *fair* generally has a layer of sand or gravel at least 3 feet thick, the top of which is within a depth of 6 feet. The ratings do not take into account thickness of overburden, location of the water table, or other factors that affect mining of materials, and neither do they indicate quality of the deposit.

Topsoil is used for topdressing an area where vegetation is to be established and maintained. Suitability is affected mainly by ease of working and spreading the soil material, as for preparing a seedbed; natural fertility of the material, or the response of plants when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments are characteristics that affect suitability, but also considered in the ratings is damage that will result at the area from which topsoil is taken.

Pond reservoir areas hold water behind a dam or embankment. Soils suitable for pond reservoir areas have low seepage, which is related to their permeability and depth to fractured or permeable bedrock or other permeable material.

Embankments, dikes, and levees require soil material resistant to seepage and piping and of favorable stability, shrink-well potential, shear strength, and compactibility. Presence of stones or organic material in a soil are among factors that are unfavorable.

Drainage of crops and pasture is affected by such soil properties as permeability, texture, and structure; depth to claypan, rock, or other layers that influence rate of water movement; depth to the water table; slope; stability in ditchbanks; susceptibility to stream overflow; and availability of outlets for drainage.

Irrigation of a soil is affected by such features as slope; susceptibility to stream overflow, water erosion or slow blowing; soil texture; content of stones; depth of root zone; rate of water intake at the surface; permeability of soil layers below the surface layer and in fragipans or other layers that restrict movement of water; amount of water held available to plants; and need for drainage, or depth to water table or bedrock.

Terraces and diversions are embankments, or ridges, constructed across the slope to intercept runoff so that it soaks into the soil or flows slowly to a prepared outlet. Features that affect suitability of a soil for terraces are uniformity and steepness of slope; depth to bedrock or other unfavorable material; presence of stones; permeability; and resistance to water erosion, soil slipping, and soil blowing. A soil suitable for these structures provides outlets for runoff and is not difficult to vegetate.

Engineering test data

Table 10 contains engineering test data for some of the major soil series in Dane County. These tests were made to help evaluate the soils for engineering purposes. The engineering classifications given are based on data obtained by mechanical analyses and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods.

Compaction (or moisture-density) data are important in earthwork. If a soil material is compacted at successively higher moisture content, assuming that the compactive effort remains constant, the density of the compacted material increases until the *optimum moisture content* is reached. After that, density decreases with increase in moisture content. The highest dry density obtained in the compactive test is termed *maximum dry density*. As a rule, maximum strength of earthwork is obtained if the soil is compacted to the maximum dry density.

Tests to determine plasticity index measure the effect of water on the consistence of soil material, as has been explained for table 8.

Town and Country Planning

This section is of special interest to developers, planners, and others who are concerned with residential and industrial expansion in Dane County. In table 11 the soils of the county are listed and the degree and kinds of limitations of the soils for specified community development uses are given.

Soil limitations are indicated by the ratings slight, moderate, and severe. *Slight* means soil properties generally are favorable for the rated use, or in other words, limitations are minor and easily overcome. *Moderate* means that some soil properties are unfavorable but they can be overcome or modified by special planning and design. *Severe* means soil properties are so unfavorable and so difficult to correct or overcome as to require major soil reclamation, special designs, or intensive maintenance. For some uses, the rating of severe is divided to obtain ratings of severe and very severe. *Very severe* means one or more soil properties so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly not practical for the rated use.

Engineers and others should not assign specific values to the estimated bearing capacity given in table 11.

Following are explanations of some of the columns in table 11.

Septic tank absorption fields are subsurface systems of tile or perforated pipe that distribute effluent from a septic tank into natural soil. The soil material between depths of 18 inches and 5 feet is evaluated. The soil properties considered are those that affect both absorption of effluent and construction and operation of the system. Properties that affect absorption are permeability, depth to water table or rock, and susceptibility to flooding. Slope affects difficulty of layout and construction and also the risk of soil erosion, lateral seepage, and downslope flow of effluent. Large rocks or boulders increase construction costs.

Sewage lagoons are shallow ponds constructed to hold sewage within a depth of 2 to 5 feet long enough for bacteria to decompose the solids. A lagoon has a nearly level floor, and sides, or embankments, of compacted soil material. The assumption is made that the embankment is compacted to medium density and the pond is protected from flooding. Properties are considered that affect the pond floor and the embankment. Those that affect the pond floor are permeability, organic matter, and slope, and if the floor needs to be leveled, depth to bedrock becomes important. The soil properties that affect the embankment are the enginering properties of the embankment material as interpreted from the Unified soil classification and the amount of stones, if any, that influence the ease of excavation and compaction of the embankment material.

Shallow excavations require digging or trenching to a depth of less than 6 feet, for example, excavations for pipelines, sewerlines, telephone and power transmission lines, basements, open ditches, and cemeteries. Desirable soil properties are good workability, moderate resistance to sloughing, gentle slopes, absence of rock outcrops or big stones, and freedom from flooding or a high water table.

Dwellings, as rated in table 11, are not more than three stories high and are supported by foundation footings placed in undisturbed soil. The features that affect the rating of a soil for dwellings are those that relate to capacity to support load and resist settlement under load, and those that relate to ease of excavation. Soil properties that affect capacity to support load are wetness, susceptibility to flooding, density, plasticity, texture, and shrink-swell potential. Those that affect excavation are wetness, slope, depth to bedrock, and content of stones and rocks.

Sanitary landfill is a method of disposing of refuse in dug trenches. The waste is spread in thin layers, compacted, and covered with soil throughout the disposal period. Landfill areas are subject to heavy vehicu-

TABLE 8.—*Estimated soil properties*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The instructions for referring to other series that appear in the first column of this table. The symbol <

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHO
	Feet	*Feet*	*Inches*			
Adrian: Ad	>10	0–1	0–40	Muck	Pt	
			40–60	Sand	SP	A–3
Alluvial land, wet: Af. Too variable to be estimated.	>10	0–1				
Ashdale: AsB, AsC2	3–5	>5	0–18	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			18–42	Silty clay loam	CL	A–6 or A–7
			42–51	Clay	CH or MH	A–7
			51–60	Dolomite.		
Basco: BaB2, BaC2, BaD2, BaE2	2–4	>5	0–11	Silt loam	CL, ML, or ML–CL	A–4
			11–33	Clay and silty clay	CH or MH	A–7
			33–60	Sandstone.		
Batavia: BbA, BbB, BbC2	>10	3–5	0–10	Silt loam	ML or ML–CL	A–4
			10–44	Silty clay loam	CL	A–6
			44–50	Clay loam	CL or CH	A–6 or A–7
			50–60	Sand and gravel	GW	A–1
Boyer: BoB, BoC2, BoD2	>10	>5	0–7	Sandy loam	SM	A–2
			7–12	Sand and gravel	SC	A–4 or A–6
			12–30	Sandy loam	SM	A–2
			30–60	Sand and gravel	SP	A–3
Brems: BrA	>10	3–5	0–9	Loamy sand	SM	A–2
			9–60	Sand	SP	A–3
Chaseburg: ChB	5–10	3–5	0–60	Silt loam	ML	A–4
Colwood: Co	>10	0–1	0–10	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			10–24	Clay loam	CL	A–6
			24–35	Loamy very fine sand	SM	A–2
			35–60	Coarse silt and very fine sand.	ML	A–4
Cut and fill land: Cu. Too variable to be estimated.						
Dells: DeA	>10	1–3	0–7	Silt loam	ML or ML–CL	A–4
			7–29	Silty clay loam	CL	A–6
			29–60	Sand	SP	A–3
Del Rey: DfA	>10	1–3	0–9	Silt loam	CL or ML–CL	A–4 or A–7
			9–21	Clay	CH	A–7
			21–44	Silt loam	CL	A–6
			44–60	Silty clay loam	CL	A–6
Derinda: DgB2, DgC2	2–4	>5	0–13	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			13–21	Silty clay loam	CL	A–6 or A–7
			21–34	Clay	CH	A–7
			34–60	Shale bedrock.		
Dickinson: DkA, DkB, DkC	>10	>5	0–19	Fine sandy loam	SM	A–2
			19–31	Sandy loam	SM or SC–SM	A–2
			31–60	Sand	SP	A–3
Dickinson, sandy variant: DmA	>10	>5	0–14	Loamy fine sand	SM	A–2
			14–40	Loamy sand	SM	A–2
			40–60	Sand	SP	A–3

significant to engineering

soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the means less than; the symbol > means more than. Absence of data indicates that no estimate was made]

Percentage less than 3 inches passing sieve—			Liquid limit	Plasticity index	Permeability	Percolation	Available water capacity	Reaction	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
			Pct		*Inches per hour*	*Minutes per inch*	*Inches per inch of soil*	*pH*			
					2.0–6.3	0–45	0.25–0.35	6.1–8.4		High	Moderate.
100	75–100	1–5		[1] NP	6.3–20	0–45	0.02–0.04	6.6–8.4	Low	High	Moderate.
100	100	95–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	5.6–7.9	Low	Low	Low.
100	100	95–100	35–45	15–25	0.63–2.0	45–60	0.16–0.20	5.6–7.3	Moderate	Low	Low.
100	95–100	90–100	60–70	30–40	0.2–0.63	>60	0.12–0.16	5.6–7.8	High	Low	Low.
100	95–100	90–100	0–35	0–10	0.63–2.0	0–45	0.18–0.24	6.1–7.3	Low	Low	Low.
95–100	90–100	90–100	50–60	25–35	0.06–0.2	>60	0.12–0.16	5.5–6.0	High	Moderate	Low.
100	95–100	95–100	20–40	0–10	0.63–2.0	45–60	0.20–0.24	6.1–7.3	Low	Low	Low.
100	95–100	95–100	30–40	15–25	0.63–2.0	45–60	0.18–0.22	4.5–6.0	Moderate	Moderate	Moderate.
95–100	90–100	80–90	35–50	15–25	0.63–2.0	45–60	0.16–0.20	6.1–7.8	Moderate	Moderate	Low.
40–50	30–40	1–5		NP	>20	0–45	0.02–0.04	7.9–8.4	Very low	Moderate	Low.
90–100	80–90	25–35		NP	2.0–6.3	0–45	0.10–0.14	6.6–7.3	Low	Low	Low.
85–95	75–85	35–45	20–30	5–15	0.63–2.0	45–60	0.14–0.16	6.1–6.5	Moderate	Low	Low.
85–95	70–80	25–35		NP	2.0–6.3	0–45	0.06–0.10	5.6–6.5	Low	Low	Low.
90–100	70–80	1–5		NP	6.3–20	0–45	0.03–0.05	7.9–8.4	Low	Low	Low.
100	90–100	20–25		NP	6.3–20	0–45	0.06–0.10	5.1–5.5	Low	Low	Moderate.
95–100	90–100	1–5		NP	6.3–20	0–45	0.04–0.06	6.1–6.5	Low	Low	Moderate.
90–100	90–100	80–100	5–25	0–4	0.63–2.0	45–60	0.18–0.22	6.1–7.3	Low	Low	Low.
100	100	85–95	20–40	5–20	0.63–2.0	45–60	0.20–0.24	6.1–6.5	Low	Moderate	Low.
100	100	70–80	20–40	15–25	0.63–2.0	45–60	0.16–0.20	6.6–7.3	Moderate	Moderate	Low.
100	100	25–35		NP	2.0–6.3	0–45	0.05–0.09	7.4–8.4	Low	Moderate	Low.
100	100	85–95		NP	0.63–2.0	45–60	0.12–0.16	7.9–8.4	Low	High	Low.
100	100	90–100	10–30	0–5	0.63–2.0	45–60	0.18–0.22	6.1–6.5	Low	Moderate	Low.
100	100	90–100	20–35	10–20	0.63–2.0	45–60	0.16–0.20	4.5–5.5	Moderate	High	High.
100	85–90	1–5		NP	6.3–20	0–45	0.04–0.06	5.1–6.5	Low	Moderate	Moderate.
100	90–100	85–95	25–40	5–15	0.63–2.0	45–60	0.18–0.22	6.6–7.3	Low	Moderate	Low.
100	85–95	75–85	50–65	30–40	0.06–0.2	>60	0.12–0.16	6.1–7.3	High	Moderate	Low.
100	90–100	70–80	25–35	10–15	0.2–0.63	>60	0.16–0.20	6.6–8.4	Low	High	Low.
100	90–100	70–80	30–40	10–20	0.2–0.63	>60	0.10–0.14	7.9–8.4	Moderate	High	Low.
100	95–100	95–100	20–40	5–15	0.63–2.0	45–60	0.18–0.22	6.6–7.3	Low	Low	Low.
100	95–100	95–100	30–45	15–25	0.63–2.0	45–60	0.16–0.20	5.6–6.5	Moderate	Moderate	Low.
100	95–100	95–100	50–60	25–35	0.06–0.2	>60	0.14–0.18	6.6–8.4	High	Moderate	Low.
100	90–100	25–35		NP	2.0–6.3	0–45	0.12–0.16	5.6–6.5	Low	Low	Low.
100	90–100	20–25	10–20	0–10	2.0–6.3	0–45	0.08–0.12	5.6–6.5	Low	Low	Low.
90–100	85–95	1–5		NP	6.3–20	0–45	0.03–0.05	6.1–7.4	Low	Low	Low.
100	85–95	20–25		NP	2.0–6.3	0–45	0.08–0.12	7.4–7.8	Low	Low	Low.
100	85–95	20–25		NP	6.3–20	0–45	0.06–0.10	7.4–8.4	Low	Low	Low.
100	75–85	1–5		NP	6.3–20	0–45	0.04–0.06	7.9–8.4	Low	Low	Low.

TABLE 8.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHO
	Feet	*Feet*	*Inches*			
*Dodge: DnB, DnC2, DoC2 — For Kidder part of DoC2, see Kidder series.	5–10	>5	0–9	Silt loam	ML	A–4 or A–6
			9–29	Silty clay loam	CL	A–6 or A–7
			29–40	Sandy clay loam	SC	A–6
			40–60	Sandy loam	SM	A–2 or A–4
Dodgeville: DpB, DpC, DpD2	1–3	>5	0–12	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			12–21	Silty clay loam	CL	A–6 or A–7
			21–31	Clay	CH or MH	A–7
			31–60	Dolomite.		
Dresden: DrD2, DrE2, DsB, DsC2	>10	>5	0–14	Silt loam	ML	A–4
			14–31	Clay loam	CL	A–6
			31–60	Sand and gravel	GW–GM	A–1
Dunbarton: DuB2, DuC2, DuD2, DuE2.	1–2	>5	0–11	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			11–18	Clay	CH or MH	A–7
			18–60	Dolomite.		
Edmund: EdB2, EdC2, EdD2	1–2	>5	0–8	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			8–18	Clay	CH or MH	A–7
			18–60	Dolomite.		
Elburn:						
EfB	>10	1–3	0–16	Silt loam	CL, ML, or ML–CL	A–4
			16–45	Silty clay loam	CL	A–6 or A–7
			45–60	Sandy loam	SM	A–2
EgA	>10	1–3	0–15	Silt loam	CL, ML, or ML–CL	A–4
			15–44	Silty clay loam	CL	A–6
			44–60	Sand and gravel	SP or GP	A–1
Eleva: EhC2, EhD2, EhE2	2–4	>5	0–22	Sandy loam	SM	A–4
			22–38	Loamy sand	SM	A–2
			38–60	Sandstone.		
Elkmound: EmC2, EmD2, EmE2, EmF.	1–2	>5	0–17	Sandy loam	SM	A–2
			17–60	Sandstone.		
Elvers: Ev	>10	0–1	0–14	Silt loam	ML, CL, or ML–CL	A–4
			14–35	Silt loam	ML, CL, or ML–CL	A–4
			35–60	Muck	Pt	----------
Gale: GaB, GaC2, GaD2	2–4	>5	0–9	Silt loam	CL, ML, or ML–CL	A–4
			9–30	Silty clay loam	CL	A–6
			30–34	Loam	CL or CL–ML	A–4
			34–39	Sand	SP	A–3
			39–60	Sandstone.		
Granby: Gn	>10	0–1	0–10	Loamy sand	SM	A–2
			10–29	Fine sand	SP	A–3
			29–60	Medium sand	SP	A–3
Grays: GsA, GsB, GsC2	>10	>5	0–16	Silt loam	CL or ML–CL	A–4 or A–6
			16–33	Silty clay loam	CL	A–7 or A–6
			33–60	Silt and very fine sand	ML or CL–ML	A–4
Griswold: GwB, GwC, GwD2	5–10	>5	0–14	Loam	ML, CL, or ML–CL	A–4
			14–28	Clay loam	CL or CL–ML	A–6 or A–4
			28–60	Sandy loam	SM	A–2
Hayfield: HaA	>10	1–3	0–11	Silt loam	CL or ML–CL	A–4
			11–29	Sandy clay loam	SC	A–6
			29–60	Sand	SP	A–3
Hixton: HbB, HbC2, HbD2	2–4	>5	0–24	Loam	ML, CL, or CL–ML	A–4
			24–31	Sandy loam	SM, SC, or SM–SC	A–4 or A–2
			31–39	Sand	SP	A–3
			39–60	Sandstone.		

significant to engineering—Continued

Percentage less than 3 inches passing sieve—			Liquid limit	Plasticity index	Permeability	Percolation	Available water capacity	Reaction	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
			Pct		*Inches per hour*	*Minutes per inch*	*Inches per inch of soil*	*pH*			
100	100	90–100	30–40	5–15	0.63–2.0	45–60	0.18–0.22	6.1–7.3		Low	Low.
100	95–100	85–95	30–50	15–25	0.63–2.0	45–60	0.16–0.20	5.1–6.0	Moderate	Low	Low.
95–100	90–100	35–45	25–35	10–20	0.63–2.0	45–60	0.14–0.18	5.6–6.5	Moderate	Low	Low.
90–100	80–90	30–40		NP	2.0–6.3	0–45	0.08–0.12	7.9–8.4	Low	Low	Low.
100	95–100	90–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	6.6–7.3	Low	Low	Low.
100	95–100	95–100	25–45	10–20	0.63–2.0	45–60	0.18–0.22	6.1–6.5	Moderate	Low	Low.
95–100	90–100	85–95	55–65	25–35	0.63–2.0	>60	0.12–0.16	6.1–6.5	High	Low	Low.
100	85–95	55–65	10–30	0–4	0.63–2.0	0–45	0.16–0.20	5.6–7.3	Low	Low	Low.
100	90–100	60–75	30–40	15–20	0.63–2.0	0–45	0.16–0.20	5.6–6.0	Moderate	Low	Low.
40–50	30–40	5–10		NP	6.3–20	0–45	0.02–0.04	7.4–7.8	Low	Low	Low.
100	95–100	90–100	20–40	5–15	0.63–2.0	45–60	0.18–0.22	5.6–7.3	Low	Low	Low.
100	95–100	90–100	60–70	35–45	0.20–0.63	>60	0.12–0.16	5.6–6.5	High	Low	Low.
100	100	90–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	6.6–7.3	Low	Low	Low.
100	90–100	90–100	60–70	35–45	0.20–0.63	>60	0.12–0.16	6.6–7.3	High	Low	Low.
100	90–100	85–95	20–40	0–10	0.63–2.0	45–60	0.20–0.24	5.6–6.5	Low	Moderate	Low.
100	90–100	85–95	30–45	10–20	0.2–0.63	>60	0.18–0.22	5.6–7.8	Moderate	Moderate	Low.
90–100	80–90	25–35		NP	2.0–6.3	0–45	0.08–0.12	7.9–8.4	Low	High	Low.
100	100	85–95	20–40	0–10	0.63–2.0	45–60	0.20–0.24	5.6–6.5	Low	Moderate	Low.
100	100	85–95	30–40	10–20	0.2–0.63	>60	0.16–0.20	5.6–7.8	Moderate	Moderate	Low.
40–60	5–10	1–5		NP	6.3–20	0–45	0.02–0.04	7.9–8.4	Low	High	Low.
100	95–100	35–45	10–30	0–5	2.0–6.3	0–45	0.16–0.20	5.6–7.3	Low	Low	Low.
100	90–100	15–25		NP	6.3–20	0–45	0.06–0.08	5.1–6.0	Low	Low	Low.
100	100	15–25	10–20	0–4	2.0–6.3	0–45	0.11–0.15	5.1–6.5	Low	Low	Low.
100	100	90–100	25–35	5–10	0.63–2.0	>60	0.18–0.22	7.4–7.8	Low	Moderate	Low.
100	100	90–100	25–35	5–10	0.2–0.63	>60	0.18–0.22	6.1–7.3	Low	Moderate	Low.
					2.0–6.3	0–45	0.22–0.26	6.1–6.5		Moderate	Low.
100	100	95–100	25–35	5–10	0.63–2.0	45–60	0.18–0.25	6.6–7.3	Low	Low	Low.
100	95–100	85–95	30–40	10–20	0.63–2.0	45–60	0.16–0.20	4.6–5.5	Moderate	Moderate	Moderate.
100	90–100	55–65	15–25	5–10	0.63–2.0	45–60	0.16–0.20	4.6–5.0	Low	Moderate	Moderate.
100	90–100	1–5		NP	2.0–6.0	<45	0.05–0.10	4.6–5.0	Low	Moderate	Moderate.
100	95–100	15–25		NP	2.0–6.3	0–45	0.06–0.10	6.1–6.5	Low	Moderate	Low.
100	85–95	1–5		NP	6.3–20	0–45	0.03–0.05	6.1–6.5	Low	Moderate	Low.
100	85–95	1–5		NP	6.3–20	0–45	0.03–0.05	7.9–8.4	Low	Moderate	Low.
100	95–100	90–100	20–40	5–15	2.0–6.3	0–45	0.10–0.14	6.1–6.5	Low	Low	Low.
100	95–100	90–100	35–45	15–25	0.63–2.0	45–60	0.14–0.18	5.6–7.3	Moderate	Low	Low.
100		85–95	10–20	0–5	0.2–0.63	>60	0.12–0.16	7.9–8.4	Low	Low	Low.
100	70–80	55–65	15–30	0–10	0.63–2.0	45–60	0.18–0.22	6.6–7.3	Low	Low	Low.
85–95	70–80	60–70	20–35	5–15	0.63–2.0	45–60	0.14–0.18	5.6–6.5	Moderate	Low	Low.
80–90	70–80	25–35		NP	2.0–6.3	0–45	0.06–0.10	6.1–8.4	Low	Low	Low.
100	95–100	90–100	20–30	5–10	0.63–2.0	45–60	0.18–0.22	6.6–7.3	Low	Moderate	Low.
100	90–100	35–45	30–40	15–25	0.63–2.0	45–60	0.16–0.20	5.1–5.5	Moderate	Moderate	High.
100	90–100	1–5		NP	6.3–20	0–45	0.03–0.05	6.1–6.5	Low	Moderate	Low.
100	90–100	50–60	15–25	0–10	0.63–2.0	45–60	0.16–0.20	5.1–6.5	Low	Low	Moderate.
100	90–100	30–40	15–25	0–10	2.0–6.3	0–45	0.16–0.20	5.1–5.5	Low	Low	Moderate.
100	90–100	1–5		NP	6.3–20	0–45	0.03–0.05	5.1–5.5	Low	Low	Moderate.

TABLE 8.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHO
	Feet	*Feet*	*Inches*			
Houghton: Ho	>10	0–1	0–60	Muck	Pt	
Huntsville: HuA, HuB	>10	3–5	0–11	Silt loam	ML, CL, or CL–ML	A–4
			11–60	Silt loam	ML, CL, or CL–ML	A–4
Kegonsa: KeA, KeB	>10	>5	0–12	Silt loam	CL, ML, or ML–CL	A–4
			12–33	Silty clay loam	CL	A–6
			33–60	Sand and gravel	GW–GM	A–1
Kickapoo: KcB	5–10	3–5	0–45	Fine sandy loam	SM or SM–SC	A–2 or A–4
			45–60	Sandy loam	SM	A–2 or A–4
Kidder: KdB, KdC2, KdD2, KrD2, KrE2.	5–10	>5	0–9	Loam	ML, CL, or ML–CL	A–4
			9–38	Sandy clay loam	SC	A–6
			38–60	Sandy loam	SM	A–2 or A–4
Made land: Ma. Too variable to be rated.						
Marsh: Mb. Too variable to be rated.	>10	0–1				
Marshan: Mc	>10	0–1	0–13	Silt loam	ML, CL, or CL–ML	A–4
			13–24	Silty clay loam	CL	A–6
			24–33	Loamy sand	SM	A–2
			33–60	Sand	SP	A–3
McHenry: MdB, MdC2, MdD2	5–10	>5	0–7	Silt loam	ML or CL–ML	A–4
			7–18	Silty clay loam	CL	A–6
			18–33	Sandy clay loam	SC or SM–SC	A–2
			33–60	Sandy loam	SM	A–2
Meridian: MeA, MeB	>10	>5	0–8	Loam	CL, ML, or ML–CL	A–4
			8–24	Sandy clay loam	SC or SM–SC	A–2
			24–36	Sandy loam	SM	A–2
			36–60	Sand	SP	A–3
Military: MhC2, MhD2, MhE2	2–4	>5	0–9	Loam	ML, CL, or ML–CL	A–4
			9–28	Sandy clay loam	SC or SM–SC	A–6 or A–4
			28–33	Sandy loam	SM, SC, or SC–SM	A–2
			33–60	Sandstone.		
Montgomery: MoA	>10	0–1	0–17	Silty clay loam	CL	A–6 or A–7
			17–45	Clay	CH	A–7
			45–60	Silty clay loam	CL	A–6 or A–7
NewGlarus: NeB2, NeC2, NeD2, NeE2.	2–4	>5	0–8	Silt loam	CL, ML, or ML–CL	A–4
			8–35	Silty clay	CH	A–7
			35–60	Dolomite.		
Orion:						
Or	>10	1–3	0–60	Silt loam	ML, CL, or CL–ML	A–4
Os	>10	0–1	0–60	Silt loam	ML, CL, or ML–CL	A–4
Otter: Ot	>10	0–1	0–60	Silt loam	ML, CL, or ML–CL	A–4 or A–6
Palms: Pa	>10	0–1	0–31	Muck	Pt	
			31–48	Silt loam	ML or ML–CL	A–4
			48–60	Fine sand	SP	A–3
Pecatonica: PeB, PeC2	>10	>5	0–10	Silt loam	CL, ML, or ML–CL	A–4
			10–21	Silty clay loam	CL	A–6 or A–7
			21–37	Sandy clay loam	SC or SC–SM	A–4 or A–6
			37–60	Sandy loam	SM or SC–SM	A–2
Plainfield: PfB	>10	>5	0–60	Sand	SP	A–3

significant to engineering—Continued

Percentage less than 3 inches passing sieve—			Liquid limit	Plasticity index	Permeability	Percolation	Available water capacity	Reaction	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
			Pct		*Inches per hour*	*Minutes per inch*	*Inches per inch of soil*	*pH*			
					2.0–6.3	0–45	0.25–0.35	5.6–6.5		High	Moderate.
100	90–100	85–95	10–30	0–10	0.63–2.0	45–60	0.20–0.24	6.6–7.3	Low	Low	Low.
100	90–100	85–95	10–30	0–10	0.63–2.0	45–60	0.20–0.24	5.6–7.3	Low	Moderate	Moderate.
100	95–100	95–100	10–30	0–10	0.63–2.0	45–60	0.20–0.24	6.1–7.3	Low	Low	Low.
100	95–100	90–100	25–40	15–25	0.63–2.0	45–60	0.18–0.22	5.1–5.5	Moderate	Moderate	Moderate.
40–50	30–40	5–10		NP	>20	0–45	0.02–0.04	7.9–8.4	Low	Low	Low.
100	100	30–40	10–20	0–5	2.0–6.3	0–45	0.11–0.15	6.1–6.5	Low	Low	Low.
100	100	30–40		NP	2.0–6.3	0–45	0.10–0.14	6.1–7.3	Low	Low	Low.
100	85–95	55–65	15–30	0–10	0.63–2.0	45–60	0.16–0.20	6.1–6.5	Low	Low	Low.
95–100	90–100	35–45	25–35	10–15	0.63–2.0	45–60	0.14–0.18	5.1–6.5	Moderate	Low	Low.
85–95	80–90	30–40		NP	2.0–6.3	30–40	0.08–0.12	7.9–8.4	Low	Low	Low.
100	100	85–95	10–30	0–10	0.63–2.0	45–60	0.18–0.22	6.1–6.5	Low	Moderate	Low.
100	95–100	85–95	30–40	15–20	0.63–2.0	45–60	0.16–0.20	6.6–8.4	Moderate	Moderate	Low.
85–95	75–85	15–25		NP	2.0–6.3	0–45	0.10–0.14	7.9–8.4	Low	Moderate	Low.
95–100	85–95	1–5		NP	6.3–20	0–45	0.03–0.05	7.9–8.4	Low	Moderate	Low.
100	100	90–100	10–30	0–5	0.63–2.0	45–60	0.18–0.22	6.6–7.3	Low	Low	Low.
100	95–100	85–95	30–40	15–20	0.63–2.0	45–60	0.16–0.20	5.1–6.5	Moderate	Low	Low.
95–100	90–100	25–35	20–30	5–10	0.63–2.0	45–60	0.14–0.18	5.5–6.0	Low	Low	Low.
90–100	80–90	20–30		NP	2.0–6.3	0–45	0.08–0.12	7.9–8.4	Low	Low	Low.
100	90–100	50–60	15–30	0–10	0.63–2.0	45–60	0.16–0.20	6.6–7.3	Low	Low	Low.
100	100	25–35	20–30	5–10	0.63–2.0	45–60	0.16–0.20	6.1–6.5	Moderate	Low	Low.
100	100	15–25		NP	2.0–6.3	0–45	0.08–0.12	5.6–6.5	Low	Low	Low.
100	90–100	1–5		NP	6.3–20	0–45	0.03–0.05	5.6–6.0	Low	Low	Low.
100	90–100	65–75	15–30	0–10	0.63–2.0	45–60	0.14–0.18	6.6–7.3	Low	Low	Low.
90–100	90–100	35–45	20–35	5–15	0.63–2.0	45–60	0.12–0.16	5.1–6.0	Moderate	Moderate	Low.
90–100	90–100	15–25	15–25	0–10	2.0–6.3	0–45	0.10–0.14	5.1–5.5	Low	Moderate	Low.
100	100	85–95	30–45	15–25	0.63–2.0	45–60	0.20–0.24	7.3–8.4	Moderate	Moderate	Low.
100	100	85–95	50–60	28–33	0.2–0.63	>60	0.10–0.14	7.9–8.4	High	High	Low.
100	90–100	85–95	35–45	15–25	0.06–0.2	>60	0.10–0.14	7.9–8.4	Moderate	High	Low.
100	95–100	85–95	10–35	0–10	0.63–2.0	45–60	0.18–0.22	6.6–7.3	Low	Low	Low.
100	95–100	85–95	50–60	25–35	0.2–0.63	>60	0.14–0.18	5.6–6.5	High	Moderate	Low.
100	100	85–95	10–30	0–10	0.63–2.0	45–60	0.18–0.22	7.4–7.8	Low	Moderate	Low.
100	95–100	85–95	10–30	0–10	0.6–2.0	>60	0.20–0.22	6.6–7.8	Low	Moderate	Low.
100	100	85–95	20–40	5–15	0.63–2.0	45–60	0.20–0.24	6.6–8.4	Low	Moderate	Low.
					2.0–6.3	0–45	0.25–0.35	6.1–7.8		Moderate	Low.
100	95–100	90–100	10–20	0–5	0.2–0.63	>60	0.18–0.22	7.4–8.4	Low	Moderate	Low.
95–100	85–95	1–5		NP	6.3–20	0–45	0.03–0.05	7.9–8.4	Low	High	Low.
100	95–100	85–95	10–30	0–10	0.63–2.0	45–60	0.18–0.22	6.6–7.3	Low	Low	Low.
100	95–100	85–95	30–45	10–20	0.63–2.0	45–60	0.16–0.20	6.1–6.5	Moderate	Low	Low.
90–100	80–90	50–60	20–35	5–15	0.63–2.0	45–60	0.14–0.18	5.1–5.5	Low	Low	Moderate.
80–90	70–80	25–35	10–20	0–5	2.0–6.3	0–45	0.08–0.12	6.1–7.8	Low	Low	Low.
95–100	90–100	1–5		NP	6.3–20	0–45	0.03–0.05	5.6–7.3	Low	Low	Low.

TABLE 8.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHO
	Feet	*Feet*	*Inches*			
Plano:						
PnA, PnB, PnC2	>10	3–5	0–16	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			16–41	Silty clay loam	CL	A–6 or A–7
			41–60	Sandy loam	SM	A–2
PoA, PoB, PoC2	>10	>5	0–14	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			14–44	Silty clay loam	CL	A–6 or A–7
			44–50	Loamy sand	SM	A–2
			50–60	Sand and gravel	GP	A–1
Port Byron: PrB, PrC	4–10	3–5	0–15	Silt loam	CL, ML, or ML–CL	A–4
			15–40	Silt loam	CL or CL–ML	A–6 or A–4
			40–60	Silt loam	CL or ML–CL	A–4
Radford: RaA	>10	1–3	0–29	Silt loam	CL, ML, or ML–CL	A–6 or A–4
			29–60	Silty clay loam	CL	A–6 or A–7
Ringwood: RnB, RnC2	5–10	>5	0–17	Silt loam	CL, ML, or ML–CL	A–4
			17–26	Silty clay loam	CL	A–6 or A–7
			26–36	Sandy clay loam	SC or SC–SM	A–4
			36–60	Sandy loam	SM	A–2
Rockton: RoB, RoC2, RoD2	2–4	>5	0–23	Silt loam	CL, ML, or ML–CL	A–4
			23–32	Sandy clay loam	SC, SM, or SC–SM	A–4
			32–60	Dolomite.		
Rodman: RpE	>10	>5	0–13	Sandy loam	SM	A–2
			13–60	Sand and gravel	GP	A–1
Sable: SaA	>10	0–1	0–19	Silty clay loam	CL	A–6 or A–7
			19–42	Silty clay loam	CL	A–6
			42–60	Silt loam	CL or CL–ML	A–4
St. Charles: ScA, ScB, ScC2, ScD2	>10	3–5	0–15	Silt loam	CL, ML, or ML–CL	A–4
			15–41	Silty clay loam	CL	A–6
			41–50	Loam	CL or ML–CL	A–4
			50–60	Sandy loam	SM	A–2
Salter: SeB, SeC2, SfA, SfB2	>10	3–5	0–27	Sandy loam	SM	A–2 or A–4
			27–38	Loamy sand	SM	A–2
			38–60	Silt loam	ML, CL, or CL–ML	A–4
Salter, wet variant: ShA	>10	1–3	0–10	Sandy loam	SM	A–2 or A–4
			10–26	Loam	CL or ML–CL	A–4
			26–39	Loamy sand	SM	A–2
			39–60	Stratified loamy sand to silt loam.	ML or CL–ML	A–4
Seaton: SmB, SmC2, SmD2, SmE2	5–10	3–5	0–11	Silt loam	ML, CL, or ML–CL	A–4 or A–6
			11–60	Silt loam	CL or ML–CL	A–6 or A–4
Seaton, loamy variant: SnC2, SnD2, SnE.	5–10	>5	0–12	Fine sandy loam	SM or SC–SM	A–2 or A–4
			12–19	Loam	ML, CL, or CL–ML	A–4
			19–60	Silt loam	CL or CL–ML	A–4
Sogn: SoD, SoE	0–2	>5	0–7	Silt loam	ML, CL, or ML–CL	A–4 or A–6
			7–60	Dolomite.		
*Spinks: SpB, SpC, SpD	5–10	>5	0–6	Loamy sand	SM	A–2
			6–31	Sand	SP	A–3
			31–60	Sand and thin bands of loamy sand.	SM, SP–SM, or SP	A–2 or A–3
For Plainfield part, see Plainfield series.						
Stony and rocky land: St. Too variable to be estimated.						

significant to engineering—Continued

Percentage less than 3 inches passing sieve—			Liquid limit	Plasticity index	Permeability	Percolation	Available water capacity	Reaction	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
			Pct		*Inches per hour*	*Minutes per inch*	*Inches per inch of soil*	*pH*			
100	95–100	90–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	6.1–7.3	Low	Low	Low.
100	95–100	90–100	35–45	15–25	0.63–2.0	45–60	0.18–0.22	5.1–6.0	Moderate	Moderate	Moderate.
80–100	70–80	25–35		NP	2.0–6.3	0–45	0.08–0.12	6.6–8.4	Low	Moderate	Low.
100	95–100	95–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	5.6–7.3	Low	Low	Low.
100	95–100	90–100	30–45	10–20	0.63–2.0	45–60	0.18–0.22	5.1–6.0	Moderate	Moderate	Moderate.
90–100	85–95	15–25		NP	2.0–6.3	0–45	0.06–0.10	6.1–7.8	Low	Low	Low.
40–50	30–40	1–5		NP	6.3–20	0–45	0.02–0.04	7.9–8.4	Low	Low	Low.
100	95–100	95–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	5.6–6.5	Low	Low	Low.
100	95–100	95–100	20–35	5–15	0.63–2.0	45–60	0.18–0.22	5.1–6.5	Moderate	Low	Low.
100	95–100	95–100	20–30	5–10	0.63–2.0	45–60	0.16–0.20	5.6–6.0	Low	Low	Low.
100	100	90–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	6.1–7.3	Low	Low	Low.
95–100	95–100	90–100	25–45	10–20	0.63–2.0	45–60	0.20–0.24	6.1–7.8	Moderate	Moderate	Low.
100	100	85–95	15–30	0–10	0.63–2.0	45–60	0.20–0.24	6.1–7.3	Low	Low	Low.
100	100	85–95	30–45	10–20	0.63–2.0	45–60	0.16–0.20	5.1–6.0	Moderate	Low	Low.
90–100	80–90	40–50	20–30	5–10	0.63–2.0	45–60	0.14–0.18	5.6–6.0	Low	Low	Low.
80–90	75–85	25–35		NP	2.0–6.3	0–45	0.06–0.10	7.9–8.4	Low	Low	Low.
100	85–95	80–90	10–30	0–10	0.63–2.0	45–60	0.20–0.24	6.1–7.3	Low	Low	Low.
90–100	80–90	30–40	20–30	5–10	0.63–2.0	45–60	0.12–0.18	6.1–6.5	Low	Moderate	Low.
90–100	80–90	25–35		NP	2.0–6.3	0–45	0.10–0.14	6.6–7.3	Low	Low	Low.
40–50	30–40	1–5		NP	>20	0–45	0.02–0.04	7.4–7.8	Low	Low	Low.
100	100	90–100	35–50	15–25	0.63–2.0	45–60	0.20–0.24	5.6–6.6	Moderate	Moderate	Moderate.
100	100	90–100	25–40	10–20	0.63–2.0	45–60	0.18–0.22	6.1–7.8	Moderate	Moderate	Low.
100	100	90–100	20–30	5–10	0.2–0.63	>60	0.16–0.20	7.4–7.8	Low	Moderate	Low.
100	95–100	90–100	10–30	0–10	0.63–2.0	45–60	0.18–0.22	6.1–7.3	Low	Low	Low.
100	95–100	85–95	25–40	10–20	0.63–2.0	45–60	0.16–0.20	5.1–6.0	Moderate	Moderate	Moderate.
90–100	85–95	55–65	10–30	5–10	0.63–2.0	45–60	0.16–0.20	6.1–6.5	Low	Low	Low.
90–100	80–90	25–35		NP	2.0–6.3	0–45	0.08–0.12	7.9–8.4	Low	Moderate	Low.
100	90–100	30–40	0–20	0–4	2.0–6.3	0–45	0.14–0.18	7.4–7.8	Low	Low	Low.
100	90–100	20–25		NP	2.0–6.3	0–45	0.06–0.08	7.4–7.8	Low	Low	Low.
100	100		10–25	0–10	0.2–0.63	>60	0.14–0.18	6.1–6.5	Low	Low	Low.
100	95–100	30–40	0–20	0–4	2.0–6.3	0–45	0.10–0.14	5.6–6.5	Low	Low	Low.
90–100	80–90	50–60	10–30	5–10	0.63–2.0	45–60	0.14–0.18	5.1–5.5	Low	Moderate	Moderate.
	100	15–25	5–25	0–5	0.2–0.63	>60	0.12–0.16	5.1–5.5	Low	Moderate	High.
95–100	95–100	50–60		NP	2.0–6.3	0–45	0.08–0.12	5.1–5.5	Low	Moderate	Moderate.
100	100	95–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	5.6–7.3	Low	Low	Low.
100	95–100	95–100	20–35	5–15	0.63–2.0	45–60	0.18–0.22	5.1–7.3	Low	Low	Moderate.
100	100	30–40	10–30	0–5	2.0–6.3	0–45	0.14–0.16	6.1–6.5	Low	Low	Low.
100	90–100	55–65	10–20	0–10	0.63–2.0	45–60	0.16–0.20	5.1–5.5	Low	Low	Moderate.
100	100	90–100	20–30	5–10	0.63–2.0	45–60	0.18–0.22	4.6–5.0	Low	Moderate	Moderate.
100	100	85–95	20–40	5–15	0.63–2.0	45–60	0.20–0.24	7.4–7.8	Low	Low	Low.
100	90–100	20–25		NP	2.0–6.0	0–45	0.08–0.12	6.1–6.5	Low	Low	Low.
100	90–100	1–5		NP	6.3–20	0–45	0.04–0.06	5.6–6.0	Low	Low	Low.
100	90–100	1–30		NP	2.0–6.3	0–45	0.04–0.10	5.6–6.0	Low	Low	Low.

TABLE 8.—*Estimated soil properties*

Soil series and map symbols	Depth to—		Depth from surface	USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHO
	Feet	*Feet*	*Inches*			
Troxel: TrB	>10	3–5	0–28	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			28–43	Silty clay loam	CL or ML–CL	A–4 or A–6
			43–60	Silt loam	CL–ML or CL	A–4
Virgil:						
VrB	>10	1–3	0–15	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			15–51	Silty clay loam	CL	A–6
			51–60	Sandy loam	SM	A–2
VwA	>10	1–3	0–13	Silt loam	CL, ML, or ML–CL	A–4 or A–6
			13–49	Silty clay loam	CL	A–6
			49–60	Sand	SP	A–3
Wacousta: Wa	>10	0–1	0–12	Silty clay loam	CL	A–6 or A–7
			12–60	Silt loam	CL, ML, or CL–ML	A–4
Warsaw: WrB, WrC2	>10	>5	0–10	Silt loam	CL, ML, or ML–CL	A–4
			10–30	Sandy clay loam	SC or SM–SC	A–6 or A–4
			30–60	Sand and gravel	SP or GP	A–1
Watseka: Wt	>10	1–3	0–16	Loamy sand	SM	A–2
			16–60	Sand	SP	A–3
Westville: WvB, WvC2, WvD2	>10	>5	0–16	Silt loam	CL, ML, or ML–CL	A–6 or A–4
			16–62	Sandy clay loam	SC, SM–SC, CL, or CL–ML	A–4
			62–80	Sandy loam	SM	A–2 or A–4
Whalan: WwE2, WxB, WxC2, WxD2	2–4	>5	0–10	Silt loam	ML, CL, or ML–CL	A–4
			10–27	Sandy clay loam	SC, SM–SC	A–6 or A–4
			27–60	Dolomite.		

[1] NP = Nonplastic.

lar traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have slow permeability, withstand heavy traffic, and are friable and easy to excavate. Unless otherwise stated the ratings in table 10 apply only to a depth of about 5 feet, and therefore limitation ratings of *slight* or *moderate* may not be valid if trenches are to be much deeper than that. For some soils, reliable predictions can be made to a depth of 10 to 15 feet, but regardless of that, every site should be investigated before it is selected.

Local streets and roads, as rated in table 11, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base consisting of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly asphalt or concrete. These roads are graded to shed water and have ordinary provisions for drainage. They are built mainly from soil at hand, and most cuts and fills are less than 6 feet deep.

Soil properties that most affect design and construction of roads and streets are load-supporting capacity and stability of the subgrade, and the workability and quantity of cut and fill material available. The AASHO and Unified classifications of the soil material, and also the shrink-swell potential, indicate traffic-supporting capacity. Wetness and flooding affect stability of the material. Slope, depth to hard rock, content of stones and rocks, and wetness affect ease of excavation and amount of cut and fill needed to reach an even grade.

Recreation

Knowledge of soils is necessary in planning, developing, and maintaining areas for recreation. In table 12 the soils of Dane County are rated according to limitations that affect their suitability for camp areas, picnic areas, playgrounds, paths and trails, and golf course fairways.

The soils are rated as having slight, moderate, or severe limitations for the specified uses. For all of these ratings, it is assumed that a good cover of vegetation can be established and maintained. A limitation of *slight* means that soil properties are generally favorable and limitations are so minor that they easily can be overcome. A *moderate* limitation can be overcome or modified by planning, by design, or by special maintenance. A *severe* limitation means that costly soil rec-

significant to engineering—Continued

Percentage less than 3 inches passing sieve—			Liquid limit	Plasticity index	Permeability	Percolation	Available water capacity	Reaction	Shrink-swell potential	Corrosivity	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
			Pct		*Inches per hour*	*Minutes per inch*	*Inches per inch of soil*	*pH*			
100	95–100	90–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	5.6–7.3	Low	Low	Low.
100	100	90–100	20–35	15–25	0.63–2.0	45–60	0.16–0.20	5.1–6.0	Moderate	Moderate	Moderate.
100	100	90–100	20–30	5–10	0.63–2.0	45–60	0.16–0.20	5.1–6.0	Low	Moderate	Moderate.
100	90–100	85–95	20–40	5–15	0.63–2.0	45–60	0.18–0.22	5.1–7.3	Low	Moderate	Moderate.
100	90–100	85–95	25–40	10–20	0.20–0.63	>60	0.16–0.20	5.1–5.5	Moderate	High	High.
90–100	80–90	25–35		NP	2.0–6.3	0–45	0.08–0.12	6.1–8.4	Low	High	Low.
100	90–100	90–100	20–40	5–15	0.63–2.0	45–60	0.18–0.22	6.6–7.3	Low	Moderate	Moderate.
100	90–100	85–95	25–40	10–20	0.2–0.63	>60	0.16–0.20	5.6–6.5	Moderate	High	High.
95–100	85–95	1–5			6.3–20	0–45	0.02–0.05	7.9–8.4	Low	High	Low.
100	100	90–100	35–50	15–25	0.63–2.0	45–60	0.20–0.24	7.4–7.8	Moderate	Low	Low.
100	100	85–95	15–30	0–10	0.2–0.63	>60	0.14–0.18	7.4–8.4	Low	High	Low.
100	85–95	60–70	10–30	0–10	0.63–2.0	45–60	0.20–0.24	6.6–7.3	Low	Low	Low.
100	90–100	35–45	20–35	5–15	0.63–2.0	45–60	0.13–0.17	5.6–6.5	Moderate	Low	Low.
40–60	5–10	1–5		NP	6.3–20	0–45	0.02–0.04	6.1–8.4	Very low	Low	Low.
100	95–100	20–25		NP	2.0–6.3	0–45	0.06–0.10	7.4–7.8	Low	Low	Low.
95–100	85–95	1–5		NP	6.3–20	0–45	0.03–0.05	7.4–7.8	Low	Low	Low.
100	100	90–100	20–40	5–15	0.63–2.0	45–60	0.20–0.24	6.6–7.8	Low	Low	Low.
95–100	85–95	45–55	20–30	5–10	0.63–2.0	45–60	0.16–0.20	5.1–6.5	Moderate	Low	Low.
95–100	85–95	30–40		NP	2.0–6.3	0–45	0.08–0.12	7.4–8.4	Low	Low	Low.
100	90–100	60–70	10–30	0–10	0.63–2.0	45–60	0.16–0.20	6.6–7.8	Low	Low	Low.
90–100	85–95	35–45	25–35	5–15	0.63–2.0	45–60	0.16–0.20	6.1–6.5	Moderate	Low	Low.

lamation, special design, intense maintenance, or a combination of these, is required.

Camp areas are areas used intensively for tents and small camp trailers and the accompanying activities of outdoor living. Little preparation of the site is required, other than shaping and leveling for tent and parking areas. Camp areas are subject to heavy foot traffic and limited vehicular traffic. The best soils have gentle slopes, good drainage, a surface free of rocks and coarse fragments, freedom from flooding during periods of heavy use, and a surface that is firm after rains but not dusty when dry.

Picnic areas are attractive natural or landscaped tracts used primarily for preparing meals and eating outdoors. These areas are subject to heavy foot traffic. Most of the vehicular traffic, however, is confined to access roads. The best soils are firm when wet but not dusty when dry; are free of flooding during the season of use; and do not have slopes or stoniness that greatly increases cost of leveling sites or of building access roads.

Playgrounds are areas used intensively for baseball, football, badminton, and similar organized games. Soils suitable for this use need to withstand intensive foot traffic. The best soils have a nearly level surface free of coarse fragments and rock outcrops, good drainage, freedom from flooding during periods of heavy use, and a surface that is firm after rains but not dusty when dry. If grading and leveling are required, depth to rock is important.

Paths and trails are used for local and cross-country travel by foot or on horseback. Design and layout should require little or no cutting and filling. The best soils are at least moderately well drained, are firm when wet but not dusty when dry, are flooded not more than once during the season of use, have slopes of less than 15 percent, and have few or no rocks or stones on the surface.

Golf fairways are areas that are landscaped for the construction of golf courses. The best soils are well drained, firm, and gently undulating. They should be free of flooding during the season of use, have good trafficability, and be relatively free of coarse fragments. They should also be capable of supporting a good turf and be well suited to many kinds of trees and shrubs.

TABLE 9.—*Interpretations of*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The instructions for referring to other series

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
Adrian: Ad	Surface layer and subsoil are unsuitable: unstable; high compressibility; very low bearing capacity.	Unsuitable: no gravel	Poor: substratum is poorly graded sand; seasonal high water table.	Poor: surface layer and subsoil are erodible and oxidize rapidly.
Alluvial land, wet: Af.	Poor: mixed material high in organic matter.	Unsuitable: loamy material; seasonal high water table.	Unsuitable: loamy material; seasonal high water table.	Fair in surface layer: dark, thick loamy material; seasonal high water table. Poor in subsoil.
Ashdale: AsB, AsC2	Poor in subsoil: low bearing capacity; unstable when wet; high compressibility and elasticity.	Poor: dolomite at depth of 3 to 5 feet; source of gravel when crushed.	Unsuitable: silty soil over dolomite.	Good in surface layer. Fair in subsoil: erodible; low fertility.
Basco: BaB2, BaC2, BaD2, BaE2.	Unsuitable in subsoil: high shrink-swell potential; very low bearing capacity; unstable. Substratum is sandstone bedrock and some shale layers.	Unsuitable: no gravel	Fair: sandstone is a source of sand; some shale.	Good in surface layer: moderately dark, thick, medium-textured material. Unsuitable in subsoil: clayey texture.
Batavia: BbA, BbB, BbC2.	Poor in subsoil: moderate shrink-swell potential; low bearing capacity; unstable when wet.	Fair: substratum is poorly graded gravel; thick overburden.	Fair: substratum is poorly graded sand; thick overburden.	Good in surface layer: dark, thick, medium-textured material. Fair in subsoil: moderately fine textured material.
Boyer: BoB, BoC2, BoD2.	Fair in subsoil and substratum: low stability unless confined; erodible; lacks stability under wheel loads when dry.	Good: poorly graded gravel in substratum.	Good: poorly graded sand in substratum.	Fair in surface layer: droughty. Poor in subsoil: sandy; droughty; erodible.
Brems: BrA	Fair in substratum: lacks stability under wheel loads when dry; low stability unless confined; erodible.	Unsuitable: little or no gravel.	Fair: substratum is poorly graded sand; seasonal water table at depth of 3 to 5 feet.	Poor in surface layer and subsoil: sandy; droughty; erodible.

engineering properties of the soils

soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the that appear in the first column of this table]

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderate to rapid permeability; seasonal high water table; dugout pond feasible.	Organic material; substratum poor in stability; very low compressibility; very pervious; piping hazard.	Rapid permeability; substratum generally unstable; subsurface drainage feasible.	High available water capacity; moderately deep soil; rapid intake rate; subject to soil blowing; poorly drained.	Unstable material; practices generally not applicable.	Highly erodible; wetness hinders construction; water-tolerant grasses suited; surface drainage desirable.
Suitable for dugout ponds; subject to severe flooding.	Poor stability and compaction characteristics.	Loamy material difficult to drain; lack of suitable outlets.	Subject to frequent, severe flooding.	Unstable soil material.	(1).
Moderate to slow permeability in subsoil; substratum is slowly permeable clay over fractured dolomite.	Fair to good stability and compaction characteristics in subsoil. Fair to poor stability and compaction characteristics in substratum; semipervious.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate; slope.	Few or no limitations.	(2).
Slow permeability in subsoil; substratum is pervious sandstone.	Subsoil has poor stability and compaction characteristics; impervious. Substratum is pervious sandstone bedrock.	Natural drainage adequate.	Medium or low available water capacity; moderately deep soil; slow intake rate; sloping.	Dense clayey subsoil makes terraces and diversions difficult to construct.	Difficult to establish vegetation in clayey subsoil.
Moderate permeability in subsoil; rapid permeability in sandy and gravelly substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and fair to good compaction characteristics; very pervious.	Natural drainage adequate.	High available water capacity; moderate intake rate; deep soil; nearly level to gently sloping.	(2) ----------	(2).
Moderately rapid permeability in subsoil; rapid permeability in sandy substratum.	Subsoil has fair stability and fair to good compaction characteristics; pervious; piping hazard. Substratum has poor stability and fair compaction characteristics; very pervious; piping hazard.	Natural drainage excessive.	Low available water capacity; deep soil; moderately rapid intake rate; sloping.	Sandy material; difficult to vegetate and stabilize.	Sandy material difficult to vegetate; erodible.
Rapid permeability_	Subsoil and substratum have poor stability and fair compaction characteristics; very pervious; erodible; piping hazard.	Rapid permeability; seasonal high water table; surface drainage feasible.	Low available water capacity; deep soil; rapid intake rate; subject to soil blowing; nearly level.	Sandy material; difficult to vegetate and stabilize.	Sandy material; highly erodible.

TABLE 9.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
Chaseburg: ChB	Poor in substratum: low stability; very low bearing capacity; highly susceptible to frost action.	Unsuitable: silty	Unsuitable: silty	Good in surface layer. Fair in subsoil: erodible.
Colwood: Co	Poor in subsoil: moderate bearing capacity; unstable when wet. Fair in substratum: seasonal high water table; moderate bearing capacity.	Unsuitable: little or no gravel.	Poor: layers of silt and poorly graded sand; water table at depth of 0 to 1 foot.	Good in surface layer: thin. Poor in subsoil: unstable; subject to ponding.
Cut and fill land: Cu.	Too variable to be rated.			
Dells: DeA	Poor in subsoil: low bearing capacity; unstable when wet. Fair in substratum unless dominated by sandy material.	Unsuitable: little or no gravel.	Good: substratum is poorly graded sand.	Good in surface layer: thin. Fair in subsoil: low in fertility; erodible.
Del Rey: DfA	Poor: high shrink-swell potential; low bearing capacity; unstable when wet.	Unsuitable: little or no gravel.	Unsuitable: little or no sand.	Fair in surface layer: dark, fine-textured material. Poor in subsoil: moderately fine textured material; seasonal high water table.
Derinda: DgB2, DgC2	Poor in subsoil: low bearing capacity; unstable when wet. Poor in substratum: shale residuum of bedrock.	Unsuitable: no gravel	Unsuitable: no sand	Good in surface layer: thin. Poor in subsoil: clayey.
Dickinson: DkA, DkB, DkC.	Good in subsoil and substratum: highly stable; erodible.	Fair: pockets of well-graded to poorly graded gravel.	Good: substratum is poorly graded sand and some gravel.	Good in surface layer: dark; moderately coarse textured; thick. Fair in subsoil: light, medium textured material.
Dickinson, sandy variant: DmA.	Good in subsoil: highly stable. Fair in substratum: low stability unless confined; erodible.	Unsuitable: little or no gravel.	Good: substratum is poorly graded sand.	Poor in surface layer and subsoil: droughty; erodible; sandy.

properties of the soils—Continued

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderate permeability; subject to flooding.	Subsoil and substratum have poor stability and compaction characteristics; pervious; piping hazard.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate; gently sloping.	Subject to flooding	(2).
Moderate permeability; seasonal high water table; dugout pond feasible; substratum unstable.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has poor stability and compaction characteristics; pervious; piping hazard.	Moderate permeability; seasonal high water table; substratum is generally unstable; subsurface or surface drainage feasible.	High available water capacity; deep soil; moderate intake rate; poorly drained.	Poor stability; highly erodible.	Highly erodible; wetness hinders construction in places; water-tolerant grasses suited; subject to flooding.
Pervious to semipervious subsoil; reservoir bottom requires thick, compacted seal blanket over sandy and gravelly substratum.	Subsoil has fair to good stability and compaction characteristics. Substratum has fair stability and compaction characteristics; very pervious.	Moderate permeability; seasonal high water table; surface and subsurface drainage feasible.	Moderate water intake rate; medium available water capacity; requires drainage before irrigating.	Wetness hinders construction in places.	Gravelly and sandy substratum should not be exposed; wetness hinders construction in places; water-tolerant grasses suited.
Moderately slow permeability in subsoil; slow permeability in substratum; seasonal high water table; dugout pond feasible in places.	Subsoil and substratum have fair to poor stability and compaction characteristics; semipervious; moderate compressibility; moderate shear strength.	Moderately slow permeability; seasonal high water table; subsurface or surface drainage feasible.	High available water capacity; deep soil; slow intake rate; somewhat poorly drained.	Dense clayey subsoil makes construction of terraces and diversions difficult.	Difficult to establish and maintain vegetation on wet, clayey subsoil.
Slow permeability in subsoil; impervious shale at depth of 2 to 4 feet.	Subsoil has fair to poor stability and compaction characteristics; semipervious. Substratum is impervious shale bedrock.	Natural drainage adequate.	Medium and low available water capacity; moderately deep soil; slow intake rate; sloping.	Shale bedrock at depth of 2 to 4 feet.	Difficult to establish vegetation on clayey subsoil; bedrock at depth of 2 to 4 feet.
Moderately rapid permeability; requires a thick seal blanket over sandy substratum.	Subsoil has fair stability and fair to good compaction characteristics; pervious. Substratum has poor stability and fair compaction characteristics; very pervious.	Natural drainage somewhat excessive.	Low available water capacity; rapid intake rate; nearly level.	Sandy material difficult to vegetate and stabilize.	Difficult to stabilize and vegetate.
Rapid permeability in subsoil; very rapid permeability in sandy substratum.	Subsoil has fair stability and fair to good compaction characteristics; pervious. Substratum has poor stability; very pervious; fair compaction characteristics; erodible; piping hazard.	Natural drainage adequate.	Low available water capacity; deep soil; rapid intake rate; subject to soil blowing; nearly level.	Difficult to vegetate and stabilize.	Difficult to stabilize and maintain vegetative cover.

TABLE 9.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
*Dodge: DnB, DnC2, DoC2. For Kidder part of DoC2, see Kidder series.	Fair in subsoil: moderate shrink-swell potential and stability. Good in substratum: moderately stable.	Poor: pockets of poorly graded gravel in substratum in places.	Poor: pockets of poorly graded sand in substratum in places.	Good in surface layer: thin. Fair in subsoil: erodible.
Dodgeville: DpB, DpC, DpD2.	Poor in subsoil: high shrink-swell potential; high compressibility and elasticity. Substratum is dolomite bedrock.	Poor: dolomite is a source of gravel if crushed.	Unsuitable: dolomite bedrock.	Good in surface layer. Fair in subsoil: clayey.
Dresden: DrD2, DrE2, DsB, DsC2.	Fair in subsoil: moderate shrink-swell potential; low bearing capacity when wet. Good in substratum: highly stable.	Fair: poorly graded to well-graded gravel at depth of 20 to 40 inches.	Fair: poorly graded to well-graded sand at depth of 20 to 40 inches.	Good in surface layer: thin. Fair in subsoil: light-colored, medium-textured, gravelly material.
Dunbarton: DuB2, DuC2, DuD2, DuE2.	Poor in subsoil: high shrink-swell potential; high compressibility and elasticity. Substratum is dolomite bedrock.	Poor: dolomite is a source of gravel if crushed.	Unsuitable: clayey soil over dolomite bedrock.	Good in surface layer: thin. Poor in subsoil: clayey.
Edmund: EdB2, EdC2, EdD2.	Poor in subsoil: high shrink-swell potential; high compressibility and elasticity. Substratum is dolomite bedrock.	Poor: dolomite is a source of gravel if crushed.	Unsuitable: dolomite bedrock.	Good in surface layer: thin. Poor in subsoil: clayey; shallow to bedrock.
Elburn:				
EfB	Poor in subsoil: low bearing capacity; unstable when wet. Good in substratum: high stability and bearing capacity.	Poor: pockets of poorly graded gravel in substratum in places.	Poor: pockets of poorly graded sand in substratum in places.	Good in surface layer: thick. Fair in subsoil: erodible.
EgA	Poor in subsoil: low bearing capacity; unstable when wet. Good in substratum: high stability and bearing capacity.	Fair: poorly graded to well-graded gravel in substratum; seasonal high water table; thick overburden.	Fair: poorly graded to well-graded sand in substratum; seasonal high water table; thick overburden.	Good in surface layer: dark, silty, thick. Poor in subsoil: silty; seasonal high water table.

properties of the soils—Continued

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderate stability in subsoil; moderately rapid permeability in substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and fair to good compaction characteristics; pervious; stony in places.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate; slopes.	Sandy loam substratum.	(2).
Moderate permeability in subsoil; substratum is slowly permeable clay over fractured dolomite.	Subsoil has fair to poor stability and compaction characteristics; semipervious; high shrink-swell potential. Substratum is fractured dolomite bedrock.	Natural drainage adequate.	Medium and low available water capacity; moderately deep soils; moderate intake rate; sloping.	Dolomite bedrock at depth of 1 to 3 feet.	Difficult to establish grass on clayey subsoil; erodible.
Moderate permeability in subsoil; rapid permeability in sand and gravel substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability; very pervious.	Natural drainage adequate.	Medium available water capacity; moderately deep soil; moderate intake rate; moderate on steeper slopes.	Sand and gravel at depth of 20 to 40 inches.	Vegetative cover can be established where sand and gravel are not exposed; erodible.
Moderate permeability in subsoil; less than 2 feet to fractured dolomite.	Subsoil has fair to poor stability and compaction characteristics; very thin. Substratum is fractured dolomite bedrock.	Natural drainage adequate.	Low available water capacity; shallow soil; moderate intake rate; slopes; clayey subsoil.	Shallow to dolomite bedrock.	Difficult to prepare an adequate seedbed on clayey subsoil.
Moderately slow permeability in subsoil; less than 2 feet to fractured dolomite.	Subsoil has fair to poor stability and compaction characteristics; very thin. Substratum is fractured dolomite bedrock.	Natural drainage adequate.	Low available water capacity; shallow soil; moderately slow intake rate; sloping.	Shallow to dolomite.	Difficult to shape waterway; shallow soil; difficult to establish grass on clayey subsoil.
Moderately slow permeability; seasonal high water table; dugout pond feasible in places.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and fair to good compaction; pervious; piping hazard.	Moderately slow permeability; seasonal high water table; subsurface and surface drainage feasible.	High available water capacity; deep soil; moderate intake rate; somewhat poorly drained.	Wetness hinders construction in places.	Wetness hinders construction in places; water-tolerant grasses suited.
Moderately slow permeability; seasonal high water table; dugout pond feasible; seal blanket needed if gravel substratum exposed.	Subsoil has fair stability and good compaction characteristics; semipervious. Substratum has good stability; very pervious.	Moderately slow permeability; seasonal high water table; subsurface and surface drainage feasible.	High available water capacity; deep soil; moderate intake rate; somewhat poorly drained.	Wetness hinders construction in places.	Wetness hinders construction in places; water-tolerant grasses suited.

TABLE 9.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
Eleva: EhC2, EhD2, EhE2.	Good in subsoil: highly stable. Substratum is sand on weakly cemented sandstone bedrock.	Unsuitable: little or no gravel.	Good: weakly cemented sandstone bedrock; poorly graded sand.	Fair in surface layer: moderately coarse. Fair in subsoil: light; medium texture.
Elkmound: EmC2, EmD2, EmE2, EmF.	Fair in subsoil: high bearing capacity; good stability where wet. Fair in substratum: cemented sandstone bedrock.	Unsuitable: little or no gravel.	Fair: sandstone bedrock is weakly cemented in some places.	Fair in surface layer: moderately dark; thick. Poor in subsoil: light; moderately coarse texture.
Elvers: Ev	Poor in subsoil: high compressibility and elasticity; seasonal high water table. Unsuitable in substratum: high compressibility; unstable.	Unsuitable: silty material over organic.	Unsuitable: silty soil over organic.	Good in surface layer: thick. Poor in subsoil: oxidizes rapidly; erodible.
Gale: GaB, GaC2, GaD2.	Poor in subsoil: low bearing capacity and unstable where wet. Substratum is sand or weakly cemented sandstone bedrock.	Unsuitable: no gravel	Good: sandstone bedrock is usually weakly cemented, poorly graded sand.	Good in surface layer: thin. Fair in subsoil: erodible; thin over sand.
Granby: Gn	Fair in substratum: lacks stability under wheel loads when dry; low stability unless confined; seasonal high water table; erodible.	Unsuitable: little or no gravel.	Fair: poorly graded sand substratum; seasonal high water table hinders excavation.	Poor in surface layer: dark, sandy; seasonal high water table. Unsuitable in subsoil: sandy.
Grays: GsA, GsB, GsC2.	Fair in subsoil and substratum: moderate bearing capacity; unstable where wet; erodible.	Unsuitable: no gravel	Poor: substratum is poorly graded sand interlayered with silt.	Good in surface layer: dark; thick; medium texture. Poor in subsoil: moderately fine texture.
Griswold: GwB, GwC, GwD2.	Fair in subsoil: moderate shrink-swell potential, stability, and bearing capacity. Good in substratum: stable.	Poor: pockets of poorly graded gravel in substratum in places.	Poor: pockets of poorly graded sand in substratum in places.	Good in surface layer: dark; medium texture; thick. Poor in subsoil: light; moderately fine texture.

properties of the soils—Continued

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderately rapid permeability; seal blanket needed over sandstone bedrock.	Subsoil and substratum have fair stability and compaction characteristics; semipervious; piping hazard.	Natural drainage somewhat excessive.	Sloping; low available water capacity; moderately rapid intake rate.	Sandy material, difficult to maintain.	Difficult to establish and maintain vegetative cover; highly erodible.
Moderately rapid permeability; seal blanket needed over sandstone.	Subsoil has poor stability and fair compaction characteristics; shallow; pervious. Substratum is sandstone bedrock.	Natural drainage adequate.	Very low available water capacity; moderately steep and steep.	Thin sandy material over sandstone bedrock.	Thin sandy material over sandstone bedrock.
Moderately slow permeability in mineral soil; moderately rapid permeability in organic material; seasonal high water table; subject to flooding; dugout pond feasible.	Subsoil has poor stability and compaction characteristics; semipervious; organic material in substratum is not suitable for embankments.	Moderately slow permeability; seasonal high water table; subject to flooding; dikes; subsurface or surface drainage feasible.	Very high available water capacity; deep soil; moderately slow intake rate; subject to flooding; poorly drained.	Moderate for diversions; unstable material in substratum; wetness hinders construction in places.	Wetness hinders construction in places; water-tolerant grasses suited.
Moderate permeability in subsoil; rapid permeability in sandstone substratum at depth of 2 to 4 feet.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum is pervious sandstone bedrock.	Natural drainage adequate.	Medium available water capacity; moderately deep; moderate intake rate; slope.	Sandstone bedrock at depth of 2 to 4 feet.	Sandy substratum should not be exposed.
Rapid permeability; seasonal high water table; dugout pond feasible.	Substratum and subsoil have poor stability and fair compaction characteristics; very pervious; erodible; piping hazard.	Rapid permeability; substratum unstable; subsurface and surface drainage feasible.	Low available water capacity; rapid intake rate; subject to soil blowing; poorly drained.	Sandy material; seasonal high water table; practice generally not applicable.	Highly erodible; water-tolerant grasses suited.
Moderate permeability.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has poor stability and compaction characteristics; pervious; piping hazard.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate; sloping.	Low stability; highly erodible.	Highly erodible; difficult to establish vegetation quickly enough to prevent gullying.
Moderate permeability in subsoil; moderately rapid permeability in substratum; seal blanket over substratum helpful.	Subsoil has fair stability and fair to good compaction characteristics; semipervious. Substratum has fair stability and fair to good compaction characteristics; pervious.	Natural drainage adequate.	Medium available water capacity; deep soil; moderate intake rate; sloping.	Sandy loam substratum; low stability; highly erodible.	Stones hinder construction in places.

TABLE 9.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
Hayfield: HaA	Fair in subsoil: moderate shrink-swell potential and bearing capacity. Good in substratum: highly stable.	Fair: poorly graded to well graded gravel in substratum; seasonal high water table at depth of 1 to 3 feet.	Fair: poorly graded to well graded sand in substratum; seasonal high water table at depth of 1 to 3 feet.	Good in surface layer: dark; thick; silty. Fair in subsoil: light; seasonal high water table.
Hixton: HbB, HbC2, HbD2.	Good in subsoil: highly stable. Substratum is sand on weakly cemented sandstone bedrock.	Unsuitable: very little gravel.	Good: sandstone bedrock is weakly cemented; poorly graded sand.	Good in surface layer: thin. Fair in subsoil: thin over sand; medium fertility.
Houghton: Ho	Unsuitable: organic soil; high compressibility; unstable.	Unsuitable: organic soil.	Unsuitable: organic soil.	Poor: erodible; oxidizes rapidly.
Huntsville: HuA, HuB.	Poor in substratum: low stability and very low bearing capacity where wet; subject to stream overflow.	Unsuitable: silty	Unsuitable: silty	Good in surface layer and subsoil.
Kegonsa: KeA, KeB	Poor in subsoil: low bearing capacity; unstable where wet. Good in substratum: highly stable.	Good: substratum is poorly graded gravel.	Good: substratum is poorly graded sand.	Good in surface layer: moderately dark; thick; medium texture. Fair in subsoil: moderately fine texture.
Kickapoo: KcB	Fair in substratum: high bearing capacity; very low shrink-swell potential; highly erodible.	Unsuitable: little or no gravel.	Poor: substratum consists of sandy material and high percentage of fines.	Fair in surface layer: loamy; thick; subject to seasonal overflow. Fair in subsoil: loamy; thick.
Kidder: KdB, KdC2, KdD2, KrD2, KrE2.	Fair in subsoil: moderate shrink-swell potential; moderate stability and bearing capacity. Good in substratum: moderately stable.	Poor: pockets of poorly graded gravel in substratum in some places.	Poor: pockets of poorly graded sand in substratum in some places.	Good in surface layer: thin. Fair in subsoil: sandy; stony in places.
Made land: Ma. Too variable to be rated.				
Marsh: Mb	Unsuitable: poorly drained; low stability and bearing capacity.	Unsuitable: no sand and gravel.	Unsuitable: no sand and gravel.	Unsuitable: ponded most of the year.

properties of the soils—Continued

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Pervious to semipervious subsoil; reservoir bottom requires thick, compacted seal blanket over sand and gravel substratum.	Subsoil has fair to good stability and compaction characteristics. Substratum has fair stability and compaction characteristics; very pervious.	Moderate permeability; seasonal high water table; subsurface or surface drainage feasible.	Moderate intake rate and medium available water capacity; requires drainage before irrigating.	Wetness hinders construction in places.	Gravelly and sandy substratum should not be exposed; wetness may hinder construction; water-tolerant grasses suited.
Moderate permeability through subsoil; rapid permeability in sandstone substratum at depth of 2 to 4 feet.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum is pervious sandstone bedrock.	Natural drainage adequate.	Medium available water capacity; moderately deep soil; moderate intake rate; sloping.	Sandstone bedrock at depth of 2 to 4 feet.	Suited where sandy substratum is not exposed; severe where slope is steeper.
Moderately rapid permeability; seasonal high water table; dugout pond feasible.	Organic soils not suitable for embankments.	Moderately rapid permeability; seasonal high water table; subsurface drainage feasible.	Very high available water capacity; deep soil; rapid intake rate; subject to soil blowing; poorly drained.	Unstable material; practices generally not applicable.	Highly erodible; wetness hinders construction; water-tolerant grasses suited.
Moderate permeability; subject to flooding; pervious to semipervious; bottom should be compacted.	Substratum has poor stability and compaction characteristics; pervious; moderate compressibility; piping hazard.	Moderate permeability; subject to stream overflow; dikes and surface drainage feasible.	Very high available water capacity; deep soil; moderate intake rate; subject to flooding.	For diversions: subject to frequent flooding. Terraces not needed.	(2).
Moderate permeability through subsoil; rapid permeability in sand and gravel substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and compaction characteristics; very pervious.	Natural drainage adequate.	Medium available water capacity; moderately deep soil; moderate intake rate; nearly level.	Sand and gravel at a depth of 20 to 40 inches.	Suited where gravelly substratum is not exposed.
Pervious to semipervious; bottom should be scarified and compacted.	Subsoil and subtratum have poor stability and compaction characteristics; pervious; piping hazard.	Natural drainage adequate.	Moderately rapid intake rate; medium available water capacity; gently sloping and sloping.	Subject to flooding	Difficult to vegetate; subject to gullying.
Moderate permeability through subsoil; moderately rapid permeability in substratum.	Subsoil has fair stability and fair to good compaction characteristics. Substratum has fair stability and fair to good compaction characteristics; pervious; piping hazard.	Natural drainage adequate.	Medium available water capacity; deep soil; moderate intake rate; sloping.	Sandy loam substratum.	(2).
Under water most of the year; suitable for dugout pond.	Pervious; fair to poor stability; susceptible to piping.	Seasonal high water table; generally lacks suitable outlets.	Drainage difficult	Drainage required before construction; practice generally not applicable.	Wetness hinders construction.

TABLE 9.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
Marshan: Mc	Poor in subsoil: unstable where wet. Fair in substratum: low stability unless confined; seasonal high water table.	Poor: low percentage of gravel; seasonal high water table.	Fair: poorly graded sand substratum; seasonal high water table hinders excavation.	Good in surface layer. Fair in subsoil: erodible; seasonal high water table.
McHenry: MdB, MdC2, MdD2.	Fair in subsoil: moderate shrink-swell potential and stability. Good in substratum: stable.	Poor: pockets of poorly graded gravel in substratum in some places.	Poor: pockets of poorly graded sand in substratum in some places.	Fair in surface layer: moderately dark; medium texture; thin. Poor in subsoil: light; moderately fine texture.
Meridian: MeA, MeB	Good in subsoil: moderately stable. Fair in substratum: low stability unless confined; erodible.	Unsuitable: substratum contains little or no gravel except for a few isolated pockets.	Good: substratum is poorly graded sand and contains fines in places.	Good in surface layer: thin. Fair in subsoil: thin over sand; erodible.
Military: MhC2, MhD2, MhE2.	Fair in subsoil: moderate stability and bearing capacity. Fair in substratum: weakly cemented bedrock.	Unsuitable	Fair: substratum is weakly cemented; sandstone bedrock; poorly graded sand.	Good in surface layer. Poor in subsoil: sandy; medium fertility.
Montgomery: MoA	Poor in subsoil and substratum: high shrink-swell potential; low bearing capacity; unstable where wet; seasonal high water table.	Unsuitable: no gravel	Unsuitable: no sand	Poor in surface layer: dark; moderately fine texture. Unsuitable in subsoil: clayey; very high seasonal water table.
NewGlarus: NeB2, NeC2, NeD2, NeE2.	Poor in subsoil: high shrink-swell potential; high compressibility and elasticity; substratum is dolomite bedrock.	Poor: dolomite is a source of gravel when crushed.	Unsuitable: clayey soil over dolomite bedrock.	Good in surface layer: thin. Fair in subsoil: shallow to clay; low fertility.
Orion: Or	Poor in substratum: very low bearing capacity; high frost heave potential; unstable where wet; subject to stream overflow.	Unsuitable: silty	Unsuitable: silty	Good in surface layer and subsoil: subject to flooding.

properties of the soils—Continued

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderate permeability through subsoil; sand and gravel substratum; seasonal high water table; dugout pond feasible.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has poor stability and fair compaction; very pervious; piping hazard.	Moderate permeability; seasonal high water table; substratum is generally unstable; subsurface or surface drainage feasible.	Medium available water capacity; moderately deep soil; moderate intake rate; poorly drained.	(1)	Sandy substratum should not be exposed; wetness hinders construction in places; water-tolerant grasses suited.
Moderate permeability through subsoil; moderately rapid permeability in substratum; seal blanket needed over substratum.	Subsoil has fair stability and fair to good compaction characteristics; semipervious. Substratum has fair stability and good compaction characteristics; pervious; piping hazard.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; slope.	Sandy loam substratum.	Sandy loam substratum should not be exposed.
Moderate permeability through subsoil; rapid permeability in sand substratum; thick seal blanket needed over sand.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has poor stability and fair compaction; very pervious; piping hazard.	Natural drainage adequate.	Medium available water capacity; moderately deep soil; moderate intake rate; nearly level.	Sand at depth of 20 to 40 inches.	Sandy substratum should not be exposed.
Moderate permeability through subsoil; rapid permeability in sandstone substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum is weakly cemented sandstone bedrock.	Natural drainage adequate.	Medium available water capacity; moderately deep soil; moderate intake rate; slope.	Sandstone bedrock at depth of 2 to 4 feet.	Difficult to vegetate sandstone substratum if exposed.
Moderately slow permeability in subsoil; slow permeability in substratum; high seasonal water table; dugout pond feasible.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair to poor stability and compaction characteristics; semipervious.	Moderately slow permeability; seasonal high water table; land smoothing and subsurface or surface drainage feasible.	High available water capacity; deep soil; moderately slow intake rate; poorly drained.	Dense clayey subsoil; seasonal high water table; construction difficult.	Difficult to establish and maintain vegetation in wet clayey subsoil.
Moderately slow permeability in clayey residuum over fractured dolomite.	Subsoil has fair to poor stability and compaction characteristics; semipervious; moderate shrink-swell potential. Substratum is fractured dolomite bedrock.	Natural drainage adequate.	Low available water capacity; moderately deep soil; moderate intake rate; slope.	Dolomite bedrock at depth of 2 to 4 feet.	Difficult to establish vegetation on clayey subsoil.
Moderate permeability; seasonal high water table; subject to flooding; dugout pond feasible in places.	Subsoil and substratum have poor stability and compaction characteristics; pervious; piping hazard.	Moderate permeability; seasonal high water table; subject to stream overflow; dikes and surface drainage feasible.	Very high available water capacity; deep soil; moderate intake rate; subject to flooding; somewhat poorly drained.	For diversions: subject to frequent flooding.	Wetness hinders construction in places; subject to flooding.

TABLE 9.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
Orion (*continued*) Os	Subsoil and substratum are poor; very low bearing capacity; unstable where wet; high compressibility and elasticity; seasonal high water table.	Unsuitable: silty	Unsuitable: silty	Good in surface layer. Fair in subsoil: erodible; seasonal high water table.
Otter: Ot	Substratum is poor; low bearing capacity; unstable where wet; highly susceptible to frost action.	Unsuitable: silty	Unsuitable: silty	Good in surface layer and subsoil: thick.
Palms: Pa	Surface layer and subsoil are unsuitable: unstable; high compressibility; very low bearing capacity.	Unsuitable: organic material over loam.	Unsuitable: organic material over loam.	Poor in surface layer and subsoil: erodible; oxidize rapidly.
Pecatonica: PeB, PeC2.	Fair in subsoil: moderate shrink-swell potential and low bearing capacity. Good in substratum.	Poor: pockets of poorly graded gravel in substratum in places.	Poor: pockets of poorly graded sand in substratum in places.	Good in surface layer: thin. Fair in subsoil: erodible.
Plainfield: PfB	Fair in substratum: lacks stability under wheel loads where dry; low stability unless confined; erodible.	Unsuitable: little or no gravel in substratum.	Good: poorly graded sand in substratum.	Poor in surface layer and subsoil: sandy; droughty; erodible.
Plano: PnA, PnB, PnC2	Poor in subsoil: moderate shrink-swell potential and low bearing capacity; unstable where wet. Good in substratum: moderately stable.	Poor: pockets of poorly graded gravel in places in substratum.	Poor: pockets of poorly graded sand in places in substratum.	Good in surface layer: thick. Fair in subsoil: fair; clayey; erodible.
PoA, PoB, PoC2	Poor in subsoil: moderate shrink-swell potential and low bearing capacity; unstable where wet. Good in substratum: highly stable.	Fair: poorly graded gravel in substratum; thick overburden.	Fair: poorly graded sand in substratum; thick overburden.	Good in surface layer: dark; medium texture; thick. Fair in subsoil; moderately fine texture.
Port Byron: PrB, PrC	Poor in subsoil and substratum: moderate compressibility and elasticity; unstable where wet; frost action.	Unsuitable: silty	Unsuitable: silty	Good in surface layer. Poor in subsoil: poor tilth.

properties of the soils—Continued

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderately slow permeability; seasonal high water table; dugout pond feasible.	Subsoil and substratum have fair stability and compaction characteristics; semipervious.	Moderately slow permeability; seasonal high water table; subject to slope wash; diversions and subsurface or surface drainage feasible.	Very high available water capacity; deep soil; moderately slow intake rate; poorly drained.	Poor stability; subject to flooding; seasonal high water table.	Highly erodible; wetness hinders construction in places; subject to flooding; water-tolerant grasses suited.
Moderately slow permeability; seasonal high water table; dugout pond feasible.	Subsoil and substratum have fair stability and compaction characteristics; semipervious.	Moderately slow permeability; seasonal high water table; diversions and subsurface or surface drainage feasible.	Very high available water capacity; deep soil; moderately slow intake rate; poorly drained.	For diversions: low stability; subject to flooding; seasonal high water table.	Wetness hinders construction in places; water-tolerant grasses suited.
Moderately rapid permeability in organic material; seasonal high water table; dugout pond feasible.	Organic material not suitable; substratum has poor to fair stability and compaction characteristics; pervious to semipervious.	Moderately rapidly permeable; seasonal high water table; surface or subsurface drainage feasible.	Very high available water capacity; deep soil; rapid intake rate; subject to soil blowing; poorly drained.	Unstable material; practices generally not applicable.	Highly erodible; wetness hinders construction; water-tolerant grasses suited.
Moderate permeability through subsoil; moderately rapid permeability in substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and fair to good compaction; pervious; piping hazard.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate; slopes.	Few or no limitations.	(2).
Rapid permeability	Subsoil and substratum have poor stability and fair compaction characteristics; very pervious; erodible; piping hazard.	Natural drainage adequate.	Very low available water capacity; deep soil; rapid intake rate; subject to soil blowing; nearly level.	Sandy material; difficult to vegetate and stabilize.	Difficult to establish and maintain vegetative cover; erodible.
Moderate permeability through subsoil; moderately rapid permeability in substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and fair to good compaction; pervious.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate; slope.	(2)	(2).
Moderate permeability through subsoil; rapid permeability in sand and gravel substratum; thick seal blanket needed over sand and gravel.	Subsoil is thick; fair to good stability and compaction characteristics; semipervious. Substratum has poor stability and fair compaction characteristics; very pervious.	Natural drainage adequate.	High available water capacity; moderate intake rate; deep soil; gently sloping.	(2)	(2).
Moderately slowly permeable; deep soil.	Subsoil and substratum have fair stability and compaction characteristics; semipervious to impervious.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate.	Low bearing capacity; fair stability; highly erodible.	(2).

TABLE 9.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
Radford: RaA	Poor in subsoil and substratum: very low bearing capacity; highly susceptible to frost action; unstable where wet; high elasticity.	Unsuitable: silty	Unsuitable: silty	Good in surface layer: dark; medium texture; thick. Fair in subsoil: dark; seasonal high water table and overflow.
Ringwood: RnB, RnC2	Fair in subsoil: moderate shrink-swell potential and stability. Good in substratum: moderately stable.	Poor: pockets of poorly graded gravel in substratum in some places.	Poor: pockets of poorly graded sand in substratum in some places.	Good in surface layer: thick. Fair in subsoil: erodible.
Rockton: RoB, RoC2, RoD2.	Fair in subsoil: moderate shrink-swell potential and bearing capacity. Substratum is dolomite bedrock.	Poor: dolomite can be a source of gravel when crushed.	Unsuitable: dolomite bedrock.	Good in surface layer: thin. Fair in subsoil: shallow over bedrock.
Rodman: RpE	Good in substratum: highly stable.	Good: poorly graded to well-graded gravel; large stones and boulders in places.	Fair: poorly graded to well-graded sand; large stones and boulders in places.	Unsuitable in surface layer: dark; thin; gravelly. Unsuitable in subsoil: gravelly.
Sable: SaA	Poor in substratum: moderate shrink-swell potential and low bearing capacity; unstable where wet; seasonal high water table.	Unsuitable: silty	Unsuitable: silty	Fair in surface layer: dark; silty; thick. Poor in subsoil: light; silty; very high seasonal water table.
St. Charles: ScA, ScB, ScC2, ScD2.	Poor in subsoil: moderate shrink-swell potential and low bearing capacity; unstable where wet. Fair in substratum: moderately stable.	Poor: pockets of poorly graded sand or gravel in places in substratum.	Poor: pockets of poorly graded sand or gravel in places in substratum.	Good in surface layer: moderately dark. Fair in subsoil: moderately fine texture.
Salter: SeB, SeC2	Good in subsoil: highly stable; erodible. Poor in upper part of substratum: low shrink-swell potential and bearing capacity; unstable where wet. Good in lower part of substratum: highly stable.	Poor: poorly graded gravel in lower part of substratum at a depth of 7 to 10 feet.	Poor: poorly graded sand in lower part of substratum at a depth of 7 to 10 feet.	Fair in surface layer: dark; moderately coarse texture; thick. Poor in subsoil: moderately coarse texture.

properties of the soils—Continued

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderate permeability; seasonal high water table; dugout pond feasible in places.	Subsoil and substratum have fair stability and poor compaction characteristics; pervious; erodible.	Moderate permeability; seasonal high water table; dikes and surface drains feasible.	Very high available water capacity; moderate intake rate; requires drainage before irrigating.	Subject to flooding; low stability.	Wetness hinders construction in places; water-tolerant grasses suited.
Moderate permeability through subsoil; moderately rapid permeability in substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and fair to good compaction characteristics; pervious.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate; sloping.	Sandy loam substratum at a depth of 20 to 40 inches.	(2).
Moderate permeability through subsoil; substratum is fractured dolomite at a depth of 2 to 4 feet.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum is fractured dolomite bedrock.	Natural drainage adequate.	Medium available water capacity; moderately deep soil; moderate intake rate; sloping.	Dolomite bedrock at a depth of 2 to 4 feet.	Care is needed to prevent exposure of bedrock; erodible.
Rapid permeability; thick seal blanket needed.	Subsoil is very thin; fair stability and compaction characteristics; very pervious. Substratum is loose sand and gravel.	Natural drainage excessive.	Very low available water capacity; thin soil; rapid intake rate; sloping.	Very shallow to sand and gravel.	Difficult to establish and maintain vegetative cover; highly erodible; droughty.
Moderate permeability; seasonal high water table; dugout pond feasible.	Subsoil and substratum have fair to good stability and compaction characteristics; semipervious; moderate shrink-swell potential.	Moderate permeability; seasonal high water table; surface and subsurface drainage feasible.	High available water capacity; moderate intake rate; requires drainage before irrigation.	Generally not needed; seasonal high water table can hinder construction.	Wetness hinders construction in places; water-tolerant grasses suited.
Moderate permeability through subsoil; moderately rapid permeability in substratum.	Subsoil has fair to good stability and compaction characteristics. Substratum has fair stability and good compaction characteristics; pervious.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate.	Few or no limitations.	(2).
Moderately rapid permeability in subsoil; moderately slow in substratum.	Subsoil has fair to poor stability and compaction characteristics; semipervious. Substratum has fair to good stability and compaction characteristics; semipervious.	Natural drainage adequate.	Medium available water capacity; deep soil; moderately rapid intake rate.	Low stability; difficult to maintain.	Highly erodible; difficult to maintain sod in sandy soil.

TABLE 9.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
Salter (*continued*) SfA, SfB2	Fair in subsoil and substratum: moderate bearing capacity; unstable where wet; highly susceptible to frost action; erodible.	Poor: poorly graded gravel at a depth of 7 to 10 feet.	Poor: poorly graded sand at depth of 7 to 10 feet.	Good in surface layer: thin. Fair in subsoil: unstable.
Salter, wet variant: ShA.	Fair: moderate bearing capacity; piping; frost heave; seepage; seasonal high water table.	Unsuitable: no gravel	Unsuitable: no sand	Fair in surface layer: dark; moderately coarse texture; thick. Fair in subsoil: medium texture; seasonal high water table.
Seaton: SmB, SmC2, SmD2, SmE2.	Poor in subsoil and upper part of substratum: low bearing capacity; highly susceptible frost action; low stability where wet.	Unsuitable: silty	Unsuitable: silty	Good in surface layer: moderately dark; thick; medium texture. Fair in subsoil: moderately fine texture.
Seaton, loamy variant: SnC2, SnD2, SnE.	Poor in subsoil and substratum: low bearing capacity and unstable where wet.	Unsuitable: silty	Unsuitable: silty	Fair in surface layer: moderately dark; coarse texture; thick. Fair in subsoil: medium texture.
Sogn: SoD, SoE	Substratum is dolomite bedrock.	Poor: dolomite bedrock can be source of gravel, if crushed.	Unsuitable: dolomite bedrock.	Good in surface layer: dark; medium texture; thin. Unsuitable in subsoil: dolomite bedrock.
*Spinks: SpB, SpC, SpD. For Plainfield part, see Plainfield series.	Fair in substratum: lacks stability under wheel loads when dry; low stability unless confined; erodible.	Unsuitable: little or no gravel.	Good: poorly graded sand and some fines.	Poor in surface layer: subsoil is unsuitable; sandy; droughty; erodible.
Stony and rocky land: St.	Fair in substratum: weakly cemented sandstone bedrock.	Good to unsuitable; possible source of gravel where dolomite is present.	Good to unsuitable: source of sand where sandstone bedrock is present.	Unsuitable: light; thin; variable.
Troxel: TrB	Poor in substratum: unstable where wet; moderate compressibility and elasticity; low bearing capacity.	Unsuitable: silty	Unsuitable: silty	Good in surface layer and subsoil: thick.

properties of the soils—Continued

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderate permeability.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has poor stability and compaction characteristics; pervious; piping hazard.	Natural drainage adequate.	High available water capacity; deep soil; moderate intake rate.	Low stability; highly erodible.	([3]).
Moderate permeability; seasonal high water table; dugout pond feasible in places.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and compaction characteristics; pervious; piping hazard.	Moderate permeability; seasonal high water table; substratum generally unstable; subsurface or surface drainage feasible.	Medium available water capacity; deep soil; moderate intake rate; somewhat poorly drained.	Substratum difficult to stabilize.	Wetness hinders construction in places; water-tolerant grasses suited; erodible.
Moderate permeability; lower substratum needs a seal blanket in some places.	Subsoil and substratum have fair stability and compaction characteristics; semipervious.	Natural drainage adequate.	Very high and high available water capacity; deep soil; moderate intake rate; sloping.	Fair stability; highly erodible.	Some waterways are kept wet by seepage; soil is highly susceptible to gullying; needs oversizing in some places.
Pervious to semipervious; bottom should be scarified and compacted.	Semipervious to impervious; fair stability; piping hazard.	Natural drainage adequate.	High available water capacity; deep soil; moderately rapid intake rate; sloping to steep.	Difficult to vegetate; erodible.	Difficult to vegetate: erodible.
Moderate permeability in surface layer; fractured dolomite at a depth of less than 2 feet.	Subsoil is very thin or absent. Substratum is fractured dolomite.	Natural drainage adequate.	Very low available water capacity; thin soil; moderate intake rate; sloping.	Shallow to dolomite bedrock.	Shallow to dolomite bedrock.
Rapid permeability.	Subsoil and substratum have poor to fair stability and fair compaction characteristics; pervious to semipervious; erodible; piping hazard.	Natural drainage adequate.	Low available water capacity; deep soil; rapid intake rate; subject to soil blowing; sloping.	Sandy material; difficult to vegetate and stabilize.	Highly erodible difficult to maintain cover.
Shallow over bedrock.	Shallow over bedrock.	Natural drainage adequate.	Steepness	Steepness	Difficult to establish and maintain vegetation; subject to gullying.
Moderate permeability.	Subsoil and substratum have fair stability and compaction characteristics; semipervious; piping hazard.	Natural drainage adequate.	Very high available water capacity; deep soil; moderate intake rate.	Few or no limitations.	Few or no limitations for use.

TABLE 9.—*Interpretations of engineering*

Soil series and map symbols	Suitability as a source of—			
	Road fill	Gravel	Sand	Topsoil
Virgil: VrB	Poor in subsoil: low bearing capacity; unstable where wet. Fair in substratum: low stability unless confined.	Poor: pockets of poorly graded gravel in the substratum in places; seasonal high water table.	Poor: pockets of poorly graded sand in the substratum in places; seasonal high water table.	Good in surface layer: thin. Fair in subsoil: erodible.
VwA	Poor in subsoil: moderate shrink-swell potential and low bearing capacity; unstable where wet. Good in substratum: highly stable.	Unsuitable: substratum contains little gravel of commercial value.	Poor: poorly graded sands and some fines in substratum; thick overburden.	Good in surface layer: dark; thick; medium texture. Fair in subsoil: moderately fine texture; seasonal high water table.
Wacousta: Wa	Poor in subsoil and substratum; low bearing capacity; unstable where wet; seasonal high water table.	Unsuitable: silty	Unsuitable: silty	Fair in surface layer: dark; medium texture; thick; seasonal high water table. Unsuitable in subsoil.
Warsaw: WrB, WrC2	Fair in subsoil: moderate shrink-swell potential and bearing capacity. Good in substratum: highly stable.	Fair: poorly graded to well graded gravel in substratum.	Fair: poorly graded to well graded sand in substratum.	Good in surface layer: dark; medium texture; thick. Fair in subsoil: light; medium texture.
Watseka: Wt	Fair in substratum: low stability unless confined; moderately high seasonal water table; erodible.	Unsuitable: little or no gravel.	Fair: substratum is poorly graded sand; seasonal high water table at depth of 1 to 3 feet.	Poor in surface layer and subsoil: sandy; droughty; erodible.
Westville: WvB, WvC2, WvD2.	Fair in subsoil: moderate shrink-swell potential. Good in substratum: moderately stable.	Poor: pockets of poorly graded gravel in substratum in some places.	Poor: pockets of poorly graded sand in substratum in some places.	Good in surface layer: dark; thick; silty. Fair in subsoil: light; moderately fine texture.
Whalan: WwE2, WxB, WxC2, WxD2.	Fair in subsoil: moderate shrink-swell potential and bearing capacity. Substratum is dolomite bedrock.	Poor: dolomite bedrock is a source of gravel when crushed.	Unsuitable: dolomite bedrock.	Good in surface layer: thin. Fair in subsoil: clayey; shallow over bedrock.

[1] Practice not applicable or needed on this soil.

properties of the soils—Continued

Soil features affecting—					
Pond reservoir areas	Embankments, dikes, and levees	Drainage of crops and pasture	Irrigation	Terraces and diversions	Grassed waterways
Moderately slow permeability in subsoil; seasonal high water table; dugout pond feasible.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair to good compaction; pervious; piping hazard.	Moderately slow permeability; seasonal high water table; surface and subsurface drainage feasible.	High available water capacity; deep soil; moderate intake rate; somewhat poorly drained.	Wetness hinders construction in places.	Wetness hinders construction in places; water-tolerant grasses suited.
Moderately slow permeability through subsoil; sand and gravel substratum; seasonal high water table; dugout pond feasible in places.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and fair to good compaction characteristics; very pervious.	Moderately slow permeability; seasonal high water table; subsurface or surface drainage feasible.	High available water capacity; moderately deep soil; moderate intake rate; somewhat poorly drained.	Sand and gravel at a depth of 20 to 40 inches.	Wetness hinders construction in places; water-tolerant grasses suited.
Moderately slow permeability; substratum unstable; dugout pond feasible; seasonal high water table.	Subsoil has poor stability and compaction characteristics; impervious. Substratum has poor stability and compaction; impervious; piping hazard.	Moderately slow permeability; seasonal high water table; substratum unstable.	High available water capacity; moderately slow intake rate; requires drainage before irrigating.	For diversion: poor stability; wetness hinders construction in places.	Highly erodible; wetness hinders construction in places; water-tolerant grasses suited; subject to flooding.
Moderate permeability through subsoil; rapid permeability in sand and gravel substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability; very pervious.	Natural drainage adequate.	Medium available water capacity; moderately deep soil; moderate intake rate.	Sand and gravel at a depth of 20 to 40 inches.	Sand and gravel substratum should not be exposed.
Rapid permeability throughout; suitable for dugout pond in places; seal blanket needed over sands.	Subsoil and substratum have poor stability and fair compaction characteristics; very pervious; erodible; piping hazard.	Rapid permeability; seasonal high water table; substratum generally unstable; subsurface drainage feasible.	Very low available water capacity; rapid intake rate; subject to soil blowing; somewhat poorly drained.	Sandy material difficult to vegetate and stabilize.	Sandy material difficult to vegetate and stabilize; wetness hinders construction in places; water-tolerant grasses suited.
Moderate permeability through subsoil; moderately rapid permeability in substratum.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum has fair stability and good compaction characteristics; pervious.	Natural drainage adequate.	Moderate intake rate; high available water capacity; sloping.	Stones hinder construction in places.	Stones hinder construction in places.
Moderate permeability through subsoil; fractured dolomite at a depth of 2 to 4 feet.	Subsoil has fair to good stability and compaction characteristics; semipervious. Substratum is fractured dolomite bedrock.	Natural drainage adequate.	Medium available water capacity; moderately deep soil; moderate intake rate; sloping.	Dolomite bedrock at a depth of 2 to 4 feet.	Bedrock substratum should not be exposed.

[2] All features favorable.

TABLE 10.—*Engineering*

[Tests performed by the State Highway Commission of Wisconsin, in accordance with standard test procedures of the

Soil name and location	Parent material	Depth	Moisture density [1]	
			Maximum dry density	Optimum moisture
		In	*Lb per cu ft*	*Pct*
Dodgeville silt loam: SE¼ sec. 9, T.6 N., R. 6 E. (Modal)	Silt over clay over dolomite.	15–25 29–38	99 93	23 24
Elburn silt loam, gravelly substratum: SW¼SW¼NW¼ sec. 34, T. 6 N., R. 11 E. (Gravelly substratum)	Thick silt over sand and gravel.	20–28 28–40	--- ---	--- ---
Kidder loam: NE¼SW¼SE¼ sec. 16, T. 5 N., R. 10 E. (Modal)	Loamy drift over sandy loam glacial till.	20–30 38–50	--- ---	--- ---
McHenry silt loam: NW¼NE¼NE¼ sec. 13, T. 9 N., R. 12 E. (Modal)	Moderately thick silt over loamy drift over sandy loam glacial till.	13–16 33–60	105.1 134.5	19.0 7.6

[1] Based on AASHO Designation T 99–57, Method A (*2*).

[2] Mechanical analyses according to AASHO Designation T 88–57 (*2*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that

Formation and Classification of the Soils

This section has two parts. In the first part the factors of soil formation are explained and their effects on the development of soils in Dane County are discussed. In the second part the system of soil classification is explained, and each soil series is placed in its proper categories in the system.

Factors of Soil Formation

Soil is produced through the process of natural agents acting on geologic material in a particular environment. The characteristics of soil are determined by the physical and mineralogical composition of the parent material; the climate under which the material has accumulated and 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 climate and living organisms have acted on the parent material.

These factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made about the effect of any one factor unless conditions for the other four are specified. Many of the processes of soil development are unknown.

The parent material affects the kind of soil that can be formed and, in extreme cases, determines it almost entirely. Climate and plant and animal life, chiefly plant life, are the active factors of soil formation. They act on the parent material to slowly change it into a natural body that has genetically related horizons. Relief conditions the effects of climate and plant and animal life. Finally, time is needed to change parent material into a soil. It may be of long or short duration, but some time is always required for the differentiation of soil horizons. Generally, a long time is required for the formation of distinct horizons.

Parent material

The soils of Dane County formed in loess, the glacial till of two geologic ages, acid outwash, calcareous outwash, products of the disintegration of limestone and sandstone bedrock, lacustrine deposits, and alluvial deposits (*1*). The composition of these deposits and formations differs physically and mineralogically. These differences in parent material are important in the determination of the kinds of soil that formed in the county.

Dane County is in the south-central part of Wisconsin. The western part of the county is in the driftless area of the State, and the middle and eastern parts of the county are in the glaciated area.

The soils in the driftless area formed in loess, limestone, and sandstone. A mantle of loess, possibly of Peorian age, covers most of the county. Most of the soils on the driftless uplands formed at least partly in loess. The loess ranges from a few inches to 6 feet or more in thickness (*8*). It commonly is thickest on uplands where the soils are level or nearly level and on

test data

American Association of State Highway Officials (AASHO) (*2*). Absence of an entry indicates no determination was made]

Mechanical analysis[2]										Plasticity index	Classification	
Percentage passing sieve—							Percentage smaller than—					
1 in	¾ in	⅜ in	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.005 mm	0.002 mm		AASHO	Unified
---	100	99	98	98	98	98	95	45	36	19	A–7–6	CL
99	98	97	95	94	93	91	90	61	53	30	A–7–5	MH
---	---	---	---	100	100	99	---	37	---	19	A–7–6	CL
---	---	---	---	100	99	94	---	30	---	16	A–6	CL
97	96	95	93	91	83	40	39	24	20	16	A–6	SC
92	90	85	82	79	70	28	26	6	4	[3] NP	A–2–4	SM
---	---	---	---	100	98	84	84	42	35	33.6	A–7–6	CH
96	94	90	87	84	75	28	25	7	6	NP	A–2–4	SM

coarser than 2 millimeters in diameter. In the SCS soil survey procedure, the fine material is analyzed by the pipette method and the material coarser than 2 millimeters is excluded from calculations of grain-size fractions. The mechanical analyses used in this table are not suitable for use in naming textural classes for soils.

[3] NP=Nonplastic.

colluvial foot slopes where the soils are sloping. In these areas the thickness of the loess averages 30 to 100 inches. The Seaton, Port Byron, Ashdale, Dodgeville, and NewGlarus soils are the dominant soils in these areas.

Where loess has been removed, the soils formed in the unconsolidated and partially weathered rock. At one time a continuous dolomite cap may have covered the surface. Geologic erosion, however, has probably deeply dissected the dolomite formation and in places worn it away. Dolomite gives way to sandstone in the lower levels of some stream channels. The parent material of Hixton and Eleva soils is mostly the product of the weathering of this sandstone.

The Dunbarton, Edmund, Elkmound, and Gale soils are on the tops of ridges and side slopes adjacent to the marginal breaks of Stony and rocky land. The Dunbarton and Edmund soils formed over dolomite, and the Elkmound and Gale soils formed over sandstone. The lower part of the solum of these soils formed in residuum from the parent rock.

The soils in the glaciated part of the county formed in till, outwash, and lacustrine sediment.

Glacial till covers about 35 percent of Dane County. At least two different ice sheets have covered this part of the county (*1*). The first glaciation deposited till long before the loess mantle began to accumulate. Then soils formed in till without the influence of loess. These loess-free soils extend to a depth of 45 to 60 inches or more. Where loess was subsequently deposited, the activity of soil formation became increasingly concentrated in the loess and decreasingly concentrated in the till. These soils are now considered to be paleosols beneath soils that developed in different thicknesses of loess. A very small area of these soils is west of Brooklyn along the Green County line. Pecatonica and Westville soils are representative of these soils.

The soils that formed in the most recent till deposits also formed in the loess mantle. In the soils that formed in sandy loam till, the subsoil is sandy clay loam and clay loam. The Kidder, McHenry, and Griswold soils are representative of these soils. In the soils that formed where there is less than 15 inches of loess, the subsoil formed in till. In the soils that formed where there is 20 to 40 inches of loess, half of the subsoil formed in loess and half in till. These soils are relatively young and extend to a depth of 24 to 45 inches. The Dodge and Ringwood soils are representative of such soils. The soils that formed in areas where there is a loess mantle more than 50 inches thick have a solum that formed mostly in loess. The Plano, St. Charles, Virgil, and Elburn soils are representative of these soils.

Where the landscape is determined by bedrock, the thickness of the soil, loess plus till, ranges from 20 to 40 inches. No calcareous till is in the solum. The Whalan, Rockton, and Military soils are representative of such soils.

The soils of the outwash plains formed either in acid sand outwash or calcareous sand and gravel outwash.

TABLE 11.—*Degree and kinds of limitations of*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The instructions for referring to other series

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Adrian: Ad	Very severe: seasonal high water table.	Very severe: seasonal high water table; rapidly permeable.	Very severe: seasonal high water table; subject to flooding.
Alluvial land, wet: Af	Very severe: seasonal high water table; subject to frequent flooding.	Very severe: subject to frequent, severe flooding.	Very severe: subject to frequent flooding; seasonal high water table; poor stability.
Ashdale:			
AsB	Severe: filter fields have short life because of dispersion of silt; crevassed dolomite at a depth of 3 to 5 feet.	Moderate: moderately permeable subsoil.	Moderate: slope; bedrock at a depth of 3 to 5 feet.
AsC2	Severe: filter fields have short life because of dispersion of silt; crevassed dolomite at a depth of 3 to 5 feet.	Severe: slope; moderately permeable subsoil.	Moderate: bedrock at a depth of 3 to 5 feet.
Basco:			
BaB2	Very severe: clayey subsoil; very slow permeability in subsoil and underlying material.	Moderate: clayey subsoil has slow permeability.	Severe: bedrock at a depth of 2 to 4 feet; poor stability; tends to pond.
BaC2	Very severe: clayey subsoil; very slow permeability in subsoil and underlying material.	Severe: slope; clayey subsoil has slow permeability.	Severe: slope; bedrock at a depth of 2 to 4 feet; poor stability; tends to pond.
BaD2, BaE2	Very severe: clayey subsoil; very slow permeability in subsoil and underlying material.	Severe: slope; clayey subsoil has slow permeability.	Severe: slope; bedrock at a depth of 2 to 4 feet; poor stability; tends to pond.
Batavia:			
BbA, BbB	Moderate: silty material shortens life of filter fields.	Severe: substratum has rapid permeability.	Slight: fair stability
BbC2	Moderate: slope; silty material shortens life of filter fields.	Severe: substratum has rapid permeability.	Moderate: slope; fair stability.
Boyer:			
BoB	Moderate: danger of contaminating ground water.	Severe: substratum has rapid permeability.	Slight
BoC2	Moderate: slope; danger of contaminating ground water.	Severe: substratum has rapid permeability.	Moderate: slope; poor stability.
BoD2	Severe: slope; danger of contaminating ground water.	Severe: substratum has rapid permeability.	Severe: slope; poor stability.

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soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the that appear in the first column of this table]

Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Very severe: seasonal high water table; underlying sand has high bearing capacity.	Very severe: seasonal high water table.	Severe: organic soil; seasonal high water table.	Severe: seasonal high water table; high bearing capacity in substratum.
Very severe: seasonal high water table; subject to frequent flooding.	Very severe: seasonal high water table at a depth of less than 1 foot; subject to frequent, severe flooding.	Very severe: seasonal high water table; subject to frequent flooding; high shrink-swell potential; low bearing capacity.	Very severe: poorly graded material; subject to frequent flooding; seasonal high water table.
Moderate: slope; receives runoff from higher lying soils; bedrock at a depth of 3 to 5 feet.	Moderate: danger of contaminating ground water.	Moderate: low frost heave potential; substratum is highly plastic.	Moderate: silty soil has low bearing value; frost heave potential; erodible; dolomite difficult to excavate.
Moderate: receives runoff from higher lying soils; bedrock at a depth of 3 to 5 feet.	Moderate: danger of contaminating ground water.	Moderate: low frost heave potential; substratum is highly plastic.	Moderate slope; silty soil has low bearing capacity; low frost heave potential; erodible; dolomite difficult to excavate.
Severe: erodible; subject to slippage; very low bearing capacity when wet; high shrink-swell potential.	Severe: bedrock at a depth of 2 to 4 feet.	Moderate: slope; very low bearing capacity when wet; high shrink-swell potential; subject to slippage; rock removal necessary in deep cuts; seep spots.	Very severe: clayey subsoil has very low bearing capacity; high shrink-swell potential; some seep spots; rock removal necessary in cuts.
Severe: erodible; subject to slippage; very low bearing capacity when wet; high shrink-swell potential.	Severe: bedrock at a depth of 2 to 4 feet.	Moderate: slope; very low bearing capacity when wet; high shrink-swell potential; subject to slippage; rock removal necessary in deep cuts; seep spots.	Very severe: clayey subsoil has very low bearing capacity; high shrink-swell potential; some seep spots; rock removal necessary in cuts.
Severe: erodible; subject to slippage; very low bearing capacity when wet; high shrink-swell potential.	Severe: slope; bedrock at a depth of 2 to 4 feet.	Severe: slope; very low bearing capacity where wet; high shrink-swell potential; subject to slippage; rock removal necessary in deep cuts; seep spots.	Very severe: clayey subsoil has very low bearing capacity; high shrink-swell potential; some seep spots; rock removal necessary in cuts.
Slight	Moderate: danger of contaminating ground water.	Moderate: erodible; subsoil has moderate frost heave potential.	Moderate: subsoil has low bearing capacity and moderate shrink-swell potential; frost heave potential.
Moderate: slope	Moderate: danger of contaminating ground water.	Moderate: erodible; subsoil has moderate frost heave potential.	Moderate: slope; subsoil has low bearing capacity and moderate shrink-swell potential; frost heave potential.
Slight	Severe: danger of contaminating ground water.	Slight	Slight.
Moderate: slope	Severe: danger of contaminating ground water.	Moderate: slope; loose sand hinders hauling in places; subject to soil blowing.	Moderate: slope; subsoil has high bearing capacity; loose sand unstable under wheel loads.
Severe: slope	Severe: danger of contaminating ground water.	Moderate: slope; loose sand hinders hauling in places; subject to soil blowing.	Severe: slope; subsoil has high bearing capacity; loose sand unstable under wheel loads.

TABLE 11.—*Degree and kinds of limitations of*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Brems: BrA	Moderate: seasonal high water table; danger of contaminating ground water.	Severe: rapid permeability	Moderate: seasonal high water table at a depth of 3 to 5 feet; subject to occasional flooding.
Chaseburg: ChB	Very severe: subject to flooding.	Moderate: slope; moderately permeable; subject to flooding.	Severe: subject to flooding; poor stability.
Colwood: Co	Very severe: seasonal high water table.	Severe: seasonal high water table; moderately permeable; low stability when wet.	Very severe: subject to flooding; poor stability.
Cut and fill land: Cu. All characteristics variable.			
Dells: DeA	Very severe: seasonal high water table.	Severe: rapid permeability in substratum.	Severe: seasonal high water table; fair stability; subject to occasional flooding.
Del Rey: DfA	Very severe: seasonal high water table; slow permeability; systems will not operate.	Slight	Severe: substratum has poor stability; seasonal high water table.
Derinda:			
DgB2	Severe: moderately slow permeability in subsoil; bedrock at a depth of 2 to 4 feet.	Moderate: slope; shale bedrock in substratum.	Severe: bedrock at a depth of less than 4 feet; poor stability; many seeps.
DgC2	Severe: moderately slow permeability in subsoil; bedrock at a depth of 2 to 4 feet.	Severe: slope; shale bedrock in substratum.	Severe: bedrock at a depth of less than 4 feet; poor stability; many seeps.
Dickinson:			
DkA, DkB	Moderate: possible contamination of ground water.	Severe: rapid permeability	Slight: poor stability
DkC	Moderate: slope; possible contamination of ground water.	Severe: rapid permeability	Moderate: slope; poor stability.
Dickinson, sandy variant: DmA.	Moderate: danger of contaminating ground water.	Severe: very rapid permeability in substratum.	Severe: poor stability
*Dodge:			
DnB	Slight	Severe: substratum is moderately rapidly permeable.	Slight
DnC2	Moderate: slope	Severe: substratum is moderately rapidly permeable.	Moderate: slope
DoC2 For Kidder part of DoC2, see Kidder series.	Severe: slope	Severe: substratum is moderately rapidly permeable.	Moderate: slope

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Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Moderate: seasonal high water table restricts installation in places; subject to liquefaction and piping when wet.	Severe: rapid permeability	Moderate: seasonal high water table; loose sand hinders hauling; subject to soil blowing.	Slight.
Severe: high compressibility; very low bearing capacity; may liquify and flow when wet; subject to flooding.	Severe: subject to flooding in places.	Moderate: subject to flooding; high frost heave potential.	Severe: subject to flooding; low stability and very low bearing capacity; subject to frost heave.
Very severe: moderate bearing capacity; subject to liquefaction and piping; subject to wetness and flooding.	Very severe: seasonal high water table.	Severe: permanent or seasonal high water table at a depth of less than 1 foot; hauling and excavation difficult; high frost heave potential.	Very severe: seasonal high water table; subsoil has moderate bearing capacity; unstable when wet; highly susceptible to frost action; subject to flooding.
Severe: high bearing capacity; subject to liquefaction and piping when wet; seasonal high water table.	Severe: seasonal high water table; difficult to work during wet periods; danger of contaminating ground water.	Moderate: seasonal high water table at a depth of 1 to 3 feet; moderate frost heave potential.	Severe: subsoil has low bearing capacity and moderate shrink-swell potential; seasonal high water table; frost heave potential.
Severe: seasonal high water table; clayey sediment has moderate shrink-swell potential; low bearing capacity; needs water management.	Severe: some ponds in places; poor trafficability when wet; seasonal high water table.	Very severe: seasonal high water table; low bearing capacity; moderate shrink-swell potential; frost heave.	Very severe: subsoil has very low bearing capacity; seasonal high water table; high shrink-swell potential; moderate frost heave potential.
Very severe: subject to slippage; shale bedrock.	Severe: water ponds in pits; difficult to work during wet periods; bedrock at a depth of 2 to 4 feet.	Severe: bedrock at a depth of 2 to 4 feet; springs and seeps in places; highly plastic.	Severe: subsoil has low bearing capacity; unstable when wet; highly susceptible to frost heaving.
Very severe: subject to slippage; shale bedrock.	Severe: water ponds in pits; difficult to work in wet periods; bedrock at a depth of 2 to 4 feet.	Severe: bedrock at a depth of 2 to 4 feet; springs and seeps in places; highly plastic.	Severe: subsoil has low bearing capacity; unstable when wet; highly susceptible to frost heaving.
Slight	Severe: danger of contaminating ground water.	Slight	Slight.
Moderate: slope	Severe: danger of contaminating ground water.	Slight	Slight.
Slight	Severe: danger of contaminating ground water.	Moderate: poor stability unless confined.	Moderate: lacks stability under wheel loads unless confined.
Slight	Slight	Moderate: low bearing capacity in subsoil.	Moderate: subsoil has low bearing capacity; moderate shrink-swell potential and moderate stability.
Moderate: slope	Slight	Severe: slope; low bearing capacity in subsoil.	Moderate: slope; subsoil has low bearing capacity; moderate shrink-swell potential and moderate stability.
Severe: slope	Moderate: slope	Severe: slope; low bearing capacity in subsoil.	Severe: slope; subsoil has low bearing capacity; moderate shrink-swell potential and moderate stability.

TABLE 11.—*Degree and kinds of limitations of*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Dodgeville: DpB	Severe: bedrock. Moderate where underlain by loose very sandy dolomite to a depth of 6 feet or more.	Severe: dolomite bedrock	Moderate: generally rippable bedrock to a depth of about 5 feet.
DpC, DpD2	Severe: bedrock. Moderate where underlain by loose very sandy dolomite to a depth of 6 feet or more.	Severe: dolomite bedrock	Moderate: slope; generally rippable bedrock to a depth of about 5 feet.
Dresden: DrD2	Severe: slope; danger of contaminating ground water.	Severe: substratum has rapid permeability.	Severe: slope; moderately gravelly and sandy substratum has poor stability.
DrE2	Severe: slope; danger of contaminating ground water.	Severe: substratum has rapid permeability.	Severe: slope; moderately gravelly and sandy substratum has poor stability.
DsB	Moderate: danger of contaminating ground water.	Severe: substratum has rapid permeability.	Moderate: moderately gravelly and sandy substratum has poor stability.
DsC2	Moderate: slope; danger of contaminating ground water.	Severe: substratum has rapid permeability.	Moderate: moderately gravelly and sandy substratum has poor stability.
Dunbarton: DuB2, DuC2, DuD2, DuE2.	Very severe: bedrock at a depth of less than 2 feet; danger of contaminating ground water. Moderate where dolomite is loose and very sandy to a depth of 6 feet or more.	Very severe: dolomite bedrock at a depth of less than 2 feet.	Very severe: dolomite bedrock at a depth of less than 2 feet. Moderate where sandy to a depth of 6 feet or more.
Edmund: EdB2, EdC2, EdD2	Very severe: bedrock at a depth of less than 2 feet; danger of contaminating ground water. Moderate where dolomite is loose and very sandy to a depth of 6 feet or more.	Very severe: dolomite bedrock at a depth of less than 2 feet.	Very severe: dolomite bedrock at a depth of less than 2 feet. Moderate where sandy to a depth of 6 feet or more.
Elburn: EfB	Severe: seasonal high water table.	Moderate: substratum has moderately rapid permeability.	Moderate: seasonal high water table.
Elburn, gravelly substratum: EgA.	Severe: fluctuating water table; subject to frost heave; moderately slow permeability.	Moderate: substratum has rapid permeability.	Severe: seasonal high water table; material in subsoil unstable when wet.
Eleva: EhC2	Moderate: slope; bedrock at a depth of 2 to 4 feet; severe where bedrock is strongly cemented.	Severe: slope; soft sandstone substratum has rapid permeability.	Moderate: slope

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Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Moderate to severe: bedrock at a depth of 1 to 3 feet, but rippable to about 5 feet.	Severe: danger of contaminating ground water.	Moderate: dolomite bedrock at a depth of 1 to 3 feet; moderate frost heave potential; lower part of subsoil is highly plastic.	Moderate: subsoil has high shrink-swell potential and moderate compressibility; bedrock very difficult to excavate.
Severe: slope; bedrock at a depth of 1 to 3 feet, but rippable to about 5 feet.	Severe: danger of contaminating ground water.	Moderate: dolomite bedrock at a depth of 1 to 3 feet; moderate frost heave potential; lower part of subsoil is highly plastic.	Severe: subsoil has high shrink-swell potential and moderate compressibility; bedrock very difficult to excavate.
Severe: slope; erodible	Severe: danger of contaminating ground water.	Moderate: slope; erodible; subsoil is plastic.	Severe: slope; moderate bearing capacity and frost heave potential in subsoil; very high bearing capacity in substratum.
Severe: slope; erodible	Severe: danger of contaminating ground water.	Severe: slope; erodible; subsoil is plastic.	Severe: slope; moderate bearing capacity and frost heave potential in subsoil; very high bearing capacity in substratum.
Slight	Severe: danger of contaminating ground water.	Slight	Moderate: moderate bearing capacity and frost heave potential in subsoil; very high bearing capacity in substratum.
Moderate: slope; erodible	Severe: danger of contaminating ground water.	Moderate: slope; erodible; subsoil is plastic.	Moderate: slope; moderate bearing capacity and frost heave potential in subsoil; very high bearing capacity in substratum.
Severe: dolomite bedrock at a depth of less than 2 feet. Moderate where sandy to a depth of 6 feet or more.	Very severe: danger of contaminating ground water.	Severe: dolomite bedrock at a depth of less than 2 feet; subsoil is plastic.	Severe: dolomite bedrock at a depth of less than 2 feet; dolomite has high bearing capacity, but is difficult to excavate.
Severe: dolomite bedrock at a depth of less than 2 feet. Moderate where sandy to a depth of 6 feet or more.	Very severe: danger of contaminating ground water.	Severe: dolomite bedrock at a depth of less than 2 feet; subsoil is plastic.	Severe: dolomite at a depth of 1 to 2 feet; very difficult to excavate.
Severe: seasonal high water table restricts installation in places; wetness; substratum has high bearing capacity.	Moderate: seasonal high water table; difficult to work if wet.	Moderate: seasonal high water table at a depth of 1 to 3 feet; high frost heave potential in subsoil.	Severe: subsoil has low bearing capacity, is unstable when wet, and has high frost heave potential; seasonal high water at a depth of 1 to 3 feet.
Severe: subject to frost heave; fluctuating water table at a depth of 1 to 3 feet.	Moderate: seasonal high water table.	Moderate: fluctuating water table; subject to frost heave; seasonal high water table at a depth of 1 to 3 feet.	Severe: moderate bearing capacity and high frost heave potential in subsoil; seasonal high water table.
Moderate: slope; erodible; bedrock hinders excavation in places.	Severe: danger of contaminating ground water.	Slight	Moderate: subsoil and substratum have high bearing capacity; slope.

TABLE 11.—*Degree and kinds of limitations of*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Eleva (*continued*)			
EhD2	Severe: erodible; bedrock at a depth of 2 to 4 feet.	Severe: soft sandstone substratum has rapid permeability.	Severe: slope
EhE2	Severe: erodible; bedrock at a depth of 2 to 4 feet.	Severe: soft sandstone substratum has rapid permeability.	Severe: slope
Elkmound: EmC2, EmD2, EmE2, EmF.	Very severe: danger of contaminating ground water; bedrock at a depth of less than 2 feet.	Severe: sandstone bedrock at a depth of less than 2 feet; weakly cemented bedrock is rapidly permeable.	Severe: weakly cemented sandstone generally at a depth of less than 2 feet, but becomes more strongly cemented with depth.
Elvers: Ev	Very severe: seasonal high water table.	Severe: seasonal high water table; substratum is organic material.	Very severe: seasonal high water table at a depth of less than 1 foot; mineral and organic material are unstable.
Gale:			
GaB	Moderate: severe where sandstone is strongly indurated; danger of contaminating ground water.	Severe: sandstone is rapidly permeable.	Moderate: difficulty of excavating sandstone bedrock increases as depth increases.
GaC2	Moderate: slope; severe where sandstone is strongly indurated; danger of contaminating ground water.	Severe: sandstone is rapidly permeable.	Moderate: difficulty of excavating sandstone bedrock increases as depth increases.
GaD2	Severe: slope; danger of contaminating ground water.	Severe: sandstone is rapidly permeable.	Severe: slope; difficulty of excavating sandstone bedrock increases as depth increases.
Granby: Gn	Very severe: seasonal high water table.	Very severe: seasonal high water table; rapid permeability.	Very severe: seasonal high water table at a depth of less than 1 foot; sand has poor stability.
Grays:			
GsA, GsB	Moderate: filter fields difficult to maintain; liquids resist percolation through various layers. Severe if substratum is saturated during wet periods.	Moderate: moderate permeability; low stability when wet; difficult to compact.	Moderate: underlying material is saturated during wet seasons and has poor stability.
GsC2	Moderate: slope; filter fields difficult to maintain; liquids resist percolation through various layers. Severe if substratum is saturated during wet periods.	Severe: slope; moderate permeability; low stability when wet; difficult to compact.	Moderate: slope; underlying material is saturated during wet periods and has poor stability.
Griswold:			
GwB	Slight	Severe: substratum has moderately rapid permeability.	Slight
GwC	Moderate: slope	Severe: substratum has moderately rapid permeability.	Moderate: slope
GwD2	Severe: slope	Severe: substratum has moderately rapid permeability.	Severe: slope

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Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Severe: slope; erodible; bedrock hinders excavation in places.	Severe: danger of contaminating ground water.	Moderate: slope; bedrock hinders excavation in places.	Severe: subsoil and substratum have high bearing capacity; slope.
Severe: slope; erodible; bedrock hinders excavation in places.	Severe: danger of contaminating ground water.	Severe: slope; bedrock hinders excavation in places.	Severe: subsoil and substratum have high bearing capacity; slope.
Moderate: weakly cemented bedrock generally at a depth of less than 2 feet. Severe where bedrock is strongly cemented.	Severe: bedrock generally at a depth of less than 2 feet; danger of contaminating ground water.	Severe: sandstone bedrock at a depth of less than 2 feet.	Severe: slope; erodible; bedrock difficult to excavate.
Very severe: very low bearing capacity; high compressibility; seasonal high water table; subject to wetness.	Very severe: seasonal high water table; subject to flooding.	Very severe: seasonal water table at a depth of less than 1 foot; high frost heave potential; organic material below a depth of 2 to 3 feet.	Very severe: high shrink-swell potential; very low bearing capacity; subject to frequent flooding; seasonal high water table.
Slight	Severe: danger of contaminating ground water.	Moderate: sandstone bedrock at a depth of 2 to 4 feet; subsoil has low bearing capacity.	Moderate: subsoil has low bearing capacity and is unstable when wet; substratum has high bearing capacity.
Moderate: slope; sandstone bedrock is relatively easy to excavate in upper part.	Severe: danger of contaminating ground water.	Moderate: sandstone bedrock at a depth of 2 to 4 feet; subsoil has low bearing capacity.	Moderate: slope; subsoil has low bearing capacity and is unstable when wet; substratum has high bearing capacity.
Severe: slope; sandstone bedrock is relatively easy to excavate in upper part.	Severe: danger of contaminating ground water.	Severe: slope; sandstone bedrock at a depth of 2 to 4 feet.	Severe: slope; subsoil has low bearing capacity and is unstable when wet; substratum has high bearing capacity.
Severe: moderate bearing capacity; subject to liquefaction and piping; subject to wetness.	Severe: seasonal high water table.	Severe: seasonal high water table; erodible; subject to liquefaction and piping; water table at a depth of less than 1 foot.	Severe: seasonal high water table; high bearing capacity; unstable unless confined.
Moderate: moderate bearing capacity; subject to liquefaction and piping.	Moderate: danger of contaminating ground water; cell walls unstable when wet.	Severe: cuts and fills have low stability; moderate frost heave potential; highly erodible.	Moderate: subsoil has low bearing capacity, poor stability, and is subject to liquefaction if substratum is saturated during wet periods.
Moderate: slope; moderate bearing capacity; subject to liquefaction and piping.	Moderate: danger of contaminating ground water; cell walls unstable when wet.	Severe: cuts and fills have low stability; moderate frost heave potential; highly erodible.	Moderate: subsoil has low bearing capacity, poor stability, and is subject to liquefaction if substratum is saturated during wet periods; slope.
Slight	Slight	Slight	Moderate: subsoil has moderate bearing capacity, stability, and shrink-swell potential; erodible.
Moderate: slope	Slight	Moderate: erodible	Moderate: slope; subsoil has moderate bearing capacity, stability, and shrink-swell potential; erodible.
Severe: slope; erodible	Moderate: slope	Moderate: erodible	Severe: slope; subsoil has moderate bearing capacity, stability, and shrink-swell potential; erodible.

TABLE 11.—*Degree and kinds of limitations of*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Hayfield: HaA	Severe: seasonal high water table; danger of contaminating ground water.	Severe: substratum has rapid permeability.	Severe: seasonal high water table at a depth of 1 to 3 feet; poorly stable material in substratum.
Hixton:			
HbB	Moderate: severe where sandstone is strongly cemented; danger of contaminating ground water.	Severe: sandstone substratum has rapid permeability.	Moderate: slope; difficulty of excavating sandstone bedrock increases as depth increases.
HbC2	Moderate: slope; severe where sandstone is strongly cemented; danger of contaminating ground water.	Severe: sandstone substratum has rapid permeability.	Moderate: slope; difficulty of excavating sandstone bedrock increases as depth increases.
HbD2	Severe: slope; danger of contaminating ground water.	Severe: sandstone substratum has rapid permeability.	Severe: slope; sandstone bedrock is increasingly difficult to excavate as depth increases.
Houghton: Ho	Very severe: seasonal high water table.	Very severe: seasonal high water table; moderately rapid permeability.	Very severe: seasonal high water table; subject to flooding; low bearing capacity; organic material will not bear weight of machines near edge of excavation.
Huntsville: HuA, HuB	Very severe: subject to flooding.	Severe: moderate permeability; subject to flooding.	Severe: subject to flooding; substratum has poor stability.
Kegonsa: KeA, KeB	Moderate: erodible; danger of contaminating ground water.	Severe: substratum has rapid permeability.	Moderate: fair stability
Kickapoo: KcB	Severe: subject to flooding	Moderate: moderately permeable; subject to flooding.	Severe: subject to frequent flooding of short duration; poor stability.
Kidder:			
KdB	Slight	Severe: substratum is moderately rapidly permeable; stony in places.	Slight
KdC2	Moderate: slope	Severe: substratum is moderately rapidly permeable; stony in places.	Moderate: slope
KdD2, KrD2	Severe: slope	Severe: substratum is moderately rapidly permeable; stony in places.	Severe: slope
KrE2	Severe: slope	Severe: substratum is moderately rapidly permeable; stony in places.	Severe: slope
Made land: Ma. All characteristics variable.			
Marsh: Mb	Very severe: nearly continuous high water table.	Very severe: flooded	Very severe: flooded most of the year.

the soils for town and country planning—Continued

Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Moderate: seasonal high water table; high bearing capacity in substratum.	Severe: danger of contaminating ground water.	Moderate: seasonal high water table; subsoil subject to frost heave.	Moderate: moderate bearing capacity and frost heave potential; seasonal high water table at a depth of 1 to 3 feet.
Moderate: weakly cemented sandstone bedrock rippable to a depth of 5 feet.	Severe: danger of contaminating ground water.	Moderate: slope; sandstone bedrock at a depth of 2 to 4 feet.	Moderate: subsoil has moderate bearing capacity and is subject to frost heave; substratum has high bearing capacity; erodible.
Moderate: slope; weakly cemented sandstone bedrock rippable to a depth of 5 feet in most places.	Severe: danger of contaminating ground water.	Moderate: slope; sandstone bedrock at a depth of 2 to 4 feet.	Moderate: slope; subsoil has moderate bearing capacity and is subject to frost heave; substratum has high bearing capacity; erodible.
Severe: slope; weakly cemented sandstone bedrock rippable to a depth of 5 feet in most places.	Severe: danger of contaminating ground water.	Severe: slope; sandstone bedrock at a depth of 2 to 4 feet.	Severe: slope; subsoil has moderate bearing capacity and is subject to frost heave; substratum has high bearing capacity; erodible.
Very severe: high compressibility; very low bearing capacity; seasonal high water table.	Very severe: seasonal high water table.	Very severe: organic material must be removed; seasonal water table.	Very severe: seasonal high water table; very low bearing capacity.
Severe: very low bearing capacity; high shear strength and moderate compressibility; subject to flooding.	Severe: subject to flooding	Severe: subject to flooding; high frost heave potential; seasonal high water table within a depth of 3 to 5 feet.	Severe: subject to flooding; high frost heave potential; very low bearing capacity.
Slight	Severe: danger of contaminating ground water.	Slight	Moderate: subsoil has low bearing capacity and moderate shrink-swell potential.
Severe: erodible; liquefies easily; high bearing capacity; subject to frost heave; subject to frequent flooding of short duration.	Severe: subject to flooding	Moderate: subject to flooding; unstable unless confined; subject to liquefaction and piping.	Severe: moderate bearing capacity; subject to frost heave; subject to frequent flooding; highly erodible.
Slight	Slight	Slight	Moderate: moderate bearing capacity and shrink-swell potential.
Moderate: slope	Slight	Moderate: slope; stones hinder hauling and grading.	Moderate: slope; subsoil has moderate bearing capacity, shrink-swell potential, and stability.
Severe: slope	Moderate: slope	Severe: slope; stones hinder hauling and grading in places.	Severe: slope; subsoil has moderate bearing capacity, shrink-swell potential, and stability.
Severe: slope	Severe: slope	Severe: slope; stones hinder hauling and grading in places.	Severe: slope; subsoil has moderate bearing capacity, shrink-swell potential, and stability.
Very severe: flooded most of the year.	Very severe: nearly continuous high water table.	Very severe: flooded most of the year.	Very severe: nearly continuous high water table; subject to frequent flooding and frost heave.

TABLE 11.—*Degree and kinds of limitations of*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Marshan: Mc	Very severe: seasonal high water table.	Very severe: substratum has rapid permeability; seasonal high water table.	Severe: seasonal high water table: poor stability in substratum.
McHenry: MdB	Slight	Severe: substratum is moderately rapidly permeable.	Slight
MdC2	Moderate: slope	Severe: substratum is moderately rapidly permeable.	Moderate: slope
MdD2	Severe: slope	Severe: substratum is moderately rapidly permeable.	Severe: slope
Meridian: MeA, MeB	Moderate: danger of contaminating ground water.	Severe: substratum has rapid permeability.	Moderate: substratum has poor stability.
Military: MhC2	Moderate: slope; danger of contaminating ground water; bedrock strongly cemented in some places.	Severe: permeable sandstone substratum.	Moderate: slope; in places difficulty of excavating bedrock increases as depth increases; loose sand is unstable.
MhD2, MhE2	Severe: slope; danger of contaminating ground water; bedrock strongly cemented in some places.	Severe: permeable sandstone substratum.	Severe: slope; in places difficulty of excavating bedrock increases as depth increases; loose sand is unstable.
Montgomery: MoA	Very severe: seasonal high water table and slow permeability makes sanitary systems inoperative.	Moderate: seasonal high water table.	Very severe: seasonal high water table; poor stability in substratum; subject to occasional flooding.
NewGlarus: NeB2	Severe: bedrock at a depth of about 2 to 4 feet. Moderate where dolomite is loose and very sandy to a depth of 6 feet or more.	Severe: dolomite bedrock at a depth of about 2 to 4 feet.	Moderate: dolomite rippable to a depth of 5 feet in some places; severe where not rippable.
NeC2	Severe: bedrock at a depth of about 2 to 4 feet. Moderate where dolomite is loose and very sandy to a depth of 6 feet or more.	Severe: dolomite bedrock at a depth of about 2 to 4 feet.	Moderate: slope; dolomite rippable to a depth of 5 feet in some places; severe where not rippable.
NeD2, NeE2	Severe: bedrock at a depth of about 2 to 4 feet. Moderate where dolomite is loose and very sandy to a depth of 6 feet or more.	Severe: dolomite bedrock at a depth of about 2 to 4 feet.	Severe: slope; dolomite generally rippable to a depth of 5 feet; very severe where bedrock is not rippable.
Orion: Or	Very severe; subject to flooding.	Very severe: subject to flooding; unstable when wet.	Very severe: subject to flooding; seasonal high water table; poor stability throughout.

the soils for town and country planning—Continued

Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Severe: high bearing capacity; subject to liquefaction and piping; subject to wetness.	Very severe: seasonal high water table.	Severe: permanent or seasonal high water table at a depth of less than 1 foot; hauling and excavation difficult.	Severe: seasonal high water table; subject to ponding; moderate bearing capacity in upper part of subsoil; unstable when wet.
Slight	Slight	Slight	Moderate: slope; subsoil has low bearing capacity and moderate shrink-swell potential and stability.
Moderate: slope; erodible	Slight	Moderate: slope; erodible; low shrink-swell potential in subsoil.	Moderate: slope; subsoil has low bearing capacity and moderate shrink-swell potential and stability.
Severe: slope; erodible	Moderate: slope	Severe: slope; erodible; low shrink-swell potential in subsoil.	Severe: slope; subsoil has low bearing capacity and moderate shrink-swell potential and stability.
Slight	Severe: danger of contaminating ground water.	Slight	Moderate: subsoil has moderate bearing capacity; substratum has high bearing capacity and is unstable unless confined.
Moderate: slope; sandstone bedrock at a depth of 2 to 4 feet hinders excavation in places.	Severe: danger of contaminating ground water.	Moderate: slope; sandstone bedrock at a depth of 2 to 4 feet.	Severe: subsoil has moderate bearing capacity; bedrock difficult to excavate; erodible.
Severe: slope; sandstone bedrock at a depth of 2 to 4 feet hinders excavation in places.	Severe: danger of contaminating ground water.	Severe: slope; sandstone bedrock at a depth of 2 to 4 feet.	Severe: subsoil has moderate bearing capacity; bedrock difficult to excavate; erodible.
Very severe: moderate shrink-swell potential; low bearing capacity; moderate shear strength; subject to wetness.	Severe: seasonal high water table.	Severe: permanent or seasonal high water table at a depth of less than 1 foot; highly plastic.	Very severe: subsoil has very low bearing capacity; seasonal high water table; highly susceptible to frost heaving.
Severe: dolomite at a depth of about 2 to 4 feet; very high bearing capacity.	Severe: danger of contaminating ground water.	Moderate: dolomite bedrock at a depth of 2 to 4 feet; lower part of subsoil is plastic.	Moderate: clayey subsoil is plastic; dolomite is highly stable and has high bearing capacity; dolomite difficult to excavate.
Severe: dolomite at a depth of about 2 to 4 feet; very high bearing capacity.	Severe: danger of contaminating ground water.	Moderate: dolomite bedrock at a depth of 2 to 4 feet; lower part of subsoil is plastic.	Moderate: slope; clayey subsoil is plastic; dolomite is highly stable and has high bearing capacity; dolomite difficult to excavate.
Severe: dolomite at a depth of about 2 to 4 feet; very high bearing capacity.	Severe: danger of contaminating ground water.	Severe: dolomite bedrock at a depth of 2 to 4 feet; lower part of subsoil is plastic.	Severe: clayey subsoil is plastic; dolomite is highly stable and has high bearing capacity; dolomite difficult to excavate.
Very severe: high compressibility; very low bearing capacity; subject to liquefaction and piping when wet; subject to flooding.	Very severe: subject to flooding.	Severe: subject to flooding; high frost heave potential; seasonal high water table at a depth of 1 to 3 feet.	Severe: very low bearing capacity; high frost heave potential; high compressibility; subject to flooding; seasonal high water table.

TABLE 11.—*Degree and kinds of limitations of*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Orion (*continued*) Os	Very severe: seasonal high water table.	Severe: seasonal high water table; subsoil is moderately slowly permeable; low stability when wet; subject to flooding.	Very severe: subject to flooding; seasonal high water table; poor stability throughout.
Otter: Ot	Very severe: subject to flooding; seasonal high water table.	Severe: subject to flooding; moderately slowly permeable; low stability where wet.	Very severe: seasonal high water table; subject to flooding; fair stability.
Palms: Pa	Very severe: seasonal high water table.	Very severe: seasonal high water table; moderately slowly permeable in substratum; subject to flooding.	Very severe: subject to flooding; seasonal high water table; substratum has poor stability.
Pecatonica: PeB	Slight	Moderate: slope; substratum has moderately rapid permeability.	Slight
PeC2	Moderate: slope	Severe: slope; substratum has moderately rapid permeability.	Moderate: slope
Plainfield: PfB	Moderate: danger of contaminating ground water.	Severe: rapidly permeable	Severe: loose sand has poor stability.
Plano: PnA, PnB	Moderate: filter fields have shorter life because of dispersion of silt.	Moderate: substratum is moderately rapidly permeable.	Slight
PnC2	Moderate: slope; filter fields have short life because of dispersion of silt.	Severe: slope; substratum is moderately rapidly permeable.	Moderate: slope
PoA, PoB	Moderate: filter fields have short life because of dispersion of silt.	Severe: substratum is rapidly permeable.	Moderate: sand and gravel in substratum have poor stability.
PoC2	Moderate: slope; filter fields have short life because of dispersion of silt.	Severe: slope; substratum is rapidly permeable.	Moderate: slope; sand and gravel in substratum have poor stability.
Port Byron: PrB, PrC	Severe: moderately slow permeability; fine soil pores clog rapidly; requires onsite investigation; seasonal high water table at a depth of 3 to 5 feet.	Moderate: silt has low clay content.	Moderate: poor stability where saturated.
Radford: RaA	Very severe: seasonal high water table; subject to flooding.	Severe: moderate permeability; receives runoff from higher areas; subject to flooding.	Very severe: fair stability; seasonal high water table; subject to flooding.
Ringwood: RnB	Slight	Severe: substratum has moderately rapid permeability.	Slight

the soils for town and country planning—Continued

Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Very severe: moderate shrink-swell potential and low bearing capacity; subject to frequent flooding; seasonal high water table.	Very severe: seasonal high water table; subject to flooding.	Severe: seasonal high water table at a depth of less than 1 foot; subsoil has high frost heave potential.	Very severe: moderate compressibility and elasticity; very low bearing capacity; seasonal high water table; subject to flooding.
Very severe: low shrink-swell potential; moderate shear strength and compressibility; low bearing capacity; subject to flooding; seasonal high water table.	Very severe: subject to flooding.	Severe: subject to flooding; water table at a depth of less than 1 foot; high frost heave potential.	Very severe: high frost heave potential; very low bearing capacity; seasonal high water table; subject to severe flooding.
Very severe: seasonal high water table; subject to flooding; low bearing capacity.	Very severe: seasonal high water table.	Severe: organic material; seasonal high water table.	Very severe: seasonal high water table; subject to frost heave; low bearing capacity in loam.
Slight	Slight	Slight	Moderate: subsoil has low bearing capacity; moderate frost heave potential; erodible.
Moderate: slope	Slight	Moderate: slope; subsoil plastic in places.	Moderate: slope; subsoil has low bearing capacity; moderate frost heave potential; erodible.
Slight	Severe: danger of contaminating ground water.	Moderate: loose sand hinders hauling; subject to soil blowing.	Slight.
Slight	Slight	Moderate: subsoil has low bearing capacity.	Moderate: subsoil is thick and has moderate shrink-swell potential and low bearing capacity.
Moderate: slope	Slight	Moderate: subsoil has low bearing capacity.	Moderate: subsoil is thick and has moderate shrink-swell potential and low bearing capacity; slope.
Slight	Slight	Moderate: subsoil has low bearing capacity.	Moderate: subsoil has low bearing capacity; erodible.
Moderate: slope; erodible; liquefies and flows when wet; substratum has very high bearing capacity.	Slight	Moderate: subsoil has low bearing capacity.	Moderate: slope; subsoil has low bearing capacity; erodible.
Moderate: low bearing capacity and shear strength; moderate compressibility.	Moderate: unpaved roads are impassable where soil is saturated; slope.	Moderate: moderate frost heave potential; low bearing capacity.	Moderate: low bearing capacity; unstable where wet; erodible; moderate frost heave potential.
Very severe: subject to flooding; seasonal high water table; very low bearing capacity and shear strength; high compressibility; subject to liquefaction and piping.	Severe: seasonal high water table; subject to flooding.	Moderate: seasonal high water table at a depth of 1 to 3 feet; subsoil has high frost heave potential; low stability.	Very severe: very low bearing capacity; unstable where wet; seasonal high water table; subject to flooding.
Slight	Slight	Moderate: subsoil has low bearing capacity.	Moderate: low bearing capacity; moderate shrink-swell potential and stability; erodible.

TABLE 11.—*Degree and kinds of limitations of*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Ringwood (*continued*) RnC2	Moderate: slope	Severe: slope; substratum has moderately rapid permeability.	Slight
Rockton: RoB	Severe: bedrock at a depth of 2 to 4 feet.	Severe: dolomite bedrock at a depth of 2 to 4 feet.	Very severe: massive dolomite at a depth of about 3 feet precludes extensive trenching or ditching.
RoC2	Severe: bedrock at a depth of 2 to 4 feet.	Severe: dolomite bedrock at a depth of 2 to 4 feet.	Very severe: massive dolomite at a depth of about 3 feet precludes extensive trenching or ditching.
RoD2	Severe: bedrock at a depth of 2 to 4 feet.	Severe: dolomite bedrock at a depth of 2 to 4 feet.	Very severe: massive dolomite at a depth of about 3 feet precludes extensive trenching or ditching.
Rodman: RpE	Severe: slope; droughty; stony; danger of contaminating ground water.	Severe: substratum has rapid permeability.	Severe: steepness; poor stability throughout.
Sable: SaA	Very severe: seasonal high water table.	Moderate: seasonal high water table; moderate permeability.	Severe: seasonal high water table; subject to flooding; fair stability to a depth of about 5 feet.
St. Charles: ScA, ScB	Moderate: subject to frost heave; filter fields have short life because of dispersion of silt.	Moderate: substratum has moderately rapid permeability.	Slight
ScC2	Moderate: slope; subject to frost heave; filter fields have short life because of dispersion of silt.	Severe: slope; substratum has moderately rapid permeability.	Moderate: slope; fair to good stability throughout.
ScD2	Severe: slope; subject to frost heave; filter fields have short life because of dispersion of silt.	Severe: slope; substratum has moderately rapid permeability.	Severe: slope; fair to good stability throughout.
Salter: SeB, SeC2	Moderate: moderately slow permeability in lower part of subsoil restricts use of systems; contrasting material at a depth of about 3 feet slows percolation.	Moderate: lower part of substratum has rapid permeability; upper part of substratum is a good source of seal blanket material.	Moderate: poor stability in subsoil.
SfA, SfB2	Moderate: filter fields difficult to maintain.	Moderate: low stability; difficult to compact; rapid permeability in lower substratum.	Slight
Salter, wet variant: ShA	Very severe: seasonal high water table.	Moderate: moderate permeability; low stability.	Moderate: seasonal high water table; subsoil and substratum have fair stability.

the soils for town and country planning—Continued

Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Moderate: slope	Slight	Moderate: subsoil has low bearing capacity.	Moderate: slope; low bearing capacity; moderate shrink-swell potential and stability; erodible.
Severe where bedrock needs to be excavated: massive dolomite at a depth of about 3 feet.	Severe: danger of contaminating ground water.	Moderate: dolomite bedrock at a depth of 2 to 4 feet.	Moderate: dolomite at a depth of 2 to 4 feet; subsoil has moderate bearing capacity; unstable where wet.
Severe where bedrock needs to be excavated: massive dolomite at a depth of about 3 feet.	Severe: danger of contaminating ground water.	Moderate: dolomite bedrock at a depth of 2 to 4 feet.	Moderate: slope; dolomite at a depth of 2 to 4 feet; subsoil has moderate bearing capacity; unstable where wet.
Very severe: slope; massive dolomite at a depth of about 3 feet.	Very severe: danger of contaminating ground water.	Severe: slope; dolomite bedrock at a depth of 2 to 4 feet.	Severe: slope; dolomite at a depth of 2 to 4 feet; subsoil has moderate bearing capacity; unstable where wet.
Severe: steepness; erodible; droughty.	Severe: danger of contaminating ground water.	Moderate: slope; stony	Severe: steepness.
Very severe: low bearing capacity; moderate shear strength and compressibility; subject to flooding; seasonal high water table.	Very severe: seasonal high water table.	Severe: permanent or seasonal high water table at a depth of less than 1 foot; high frost heave potential.	Severe: seasonal high water table at a depth of less than 1 foot; subsoil has moderate bearing capacity and compressibility; unstable where wet; high frost heave.
Slight	Slight	Moderate: subsoil has low bearing capacity.	Moderate: subsoil has low bearing capacity and moderate shrink-swell potential.
Moderate: slope	Slight	Moderate: subsoil has low bearing capacity.	Moderate: slope; subsoil has low bearing capacity and moderate shrink-swell potential.
Severe: slope	Moderate: slope	Severe: slope; subsoil has low bearing capacity.	Severe: slope; subsoil has low bearing capacity and moderate shrink-swell potential.
Moderate to a depth of 3 to 6 feet: low bearing capacity; low shrink-swell potential. Slight at a depth of 6 to 10 feet.	Moderate: danger of contaminating ground water if underlying sand and gravel are exposed.	Moderate: silt layer has low bearing capacity and low shrink-swell potential.	Severe: substratum has low bearing capacity; cuts need to be above a depth of 3 feet so as not to expose silt.
Moderate to depth of substratum: low bearing capacity; subject to liquefaction and piping. Slight in lower substratum: highly stable; high bearing capacity.	Moderate: danger of contaminating ground water if lower substratum is exposed.	Moderate to depth of substratum: cuts and fills have low stability; highly erodible. Slight in lower substratum: highly stable.	Moderate: subsoil has moderate bearing capacity; cuts should not expose silty material in substratum.
Severe: moderate bearing capacity; frost heave; seasonal high water table; subject to seasonal wetness.	Severe: seasonal high water table; danger of contaminating ground water; unstable when wet.	Moderate: seasonal high water table at a depth of 1 to 3 feet; high frost heave potential.	Severe: subsoil has moderate bearing capacity; subject to frost heave; low stability; seasonal high water table at a depth of 1 to 3 feet.

TABLE 11.—*Degree and kinds of limitations of*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Seaton:			
SmB	Moderate: seasonal high water table at a depth of 3 to 5 feet because of seepage from higher areas; filter field has short life because of dispersion of silt.	Moderate: moderate permeability.	Slight
SmC2	Moderate: slope; seasonal high water table at a depth of 3 to 5 feet because of seepage from higher areas; filter field has short life because of dispersion of silt.	Severe: slope; moderate permeability.	Moderate: slope; saturated at a depth of 3 to 5 feet during wet periods; fair stability.
SmD2, SmE2	Severe: moderately steep and steep.	Severe: slope; moderate permeability.	Severe: slope; saturated at a depth of 3 to 5 feet during wet periods; fair stability.
Seaton, loamy variant:			
SnC2	Moderate: slope; moderate permeability; filter fields have shorter life due to dispersion of silt.	Severe: slope; moderate permeability.	Moderate: slope
SnD2	Severe: slope; erodible; moderately permeable; filter fields have short life because of dispersion of silt.	Severe: slope; moderate permeability.	Severe: slope
SnE	Severe: slope; erodible; moderately permeable; filter fields have short life because of dispersion of silt.	Severe: slope; moderate permeability.	Severe: slope
Sogn: SoD, SoE	Very severe: bedrock at a depth of less than 2 feet; danger of contaminating ground water; erodible.	Severe: dolomite bedrock at a depth of less than 2 feet.	Very severe: dolomite bedrock at a depth of less than 2 feet; generally not rippable to a depth of 5 feet.
*Spinks:			
SpB	Moderate: danger of contaminating ground water.	Severe: rapidly permeable; difficult to compact.	Severe: poor stability
SpC	Moderate: slope; danger of contaminating ground water.	Severe: rapidly permeable; difficult to compact.	Severe: poor stability
SpD	Severe: slope	Severe: rapidly permeable; difficult to compact.	Severe: poor stability
For Plainfield part of SpB, SpC, and SpD, see Plainfield series.			
Stony and rocky land: St	Very severe: steepness; shallow to bedrock.	Very severe: steepness; rapid permeability.	Very severe: steepness; shallow to bedrock.
Troxel: TrB	Very severe in areas: subject to flooding; seasonal high water table at a depth of 3 to 5 feet.	Moderate: moderately permeable; low stability when wet; subject to frequent flooding of short duration.	Severe: subject to frequent flooding; seasonal high water table at a depth of 3 to 5 feet; fair stability in lower part of profile.
Virgil:			
VrB	Severe: seasonal high water table; danger of contaminating ground water.	Moderate: substratum has moderately rapid permeability.	Severe: seasonal high water table; subsoil has fair stability.

the soils for town and country planning—Continued

Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Moderate: low bearing capacity where wet; subject to frost heave; erodible.	Slight	Moderate: subsoil has low bearing capacity; highly erodible.	Moderate: subsoil has low bearing capacity; unstable where wet; highly erodible.
Moderate: slope; low bearing capacity where wet; subject to frost heave; erodible.	Slight	Moderate: subsoil has low bearing capacity; highly erodible.	Moderate: slope; subsoil has low bearing capacity; unstable where wet; highly erodible.
Severe: slope; low bearing capacity where wet; subject to frost heave; erodible.	Severe: steepness	Severe: slope; subsoil has low bearing capacity; highly erodible.	Severe: slope; subsoil has low bearing capacity; unstable where wet; highly erodible.
Moderate: slope; low bearing capacity; moderate compressibility and high shear strength.	Slight	Moderate: subsoil has low bearing capacity.	Moderate: slope; low bearing capacity where wet; erodible.
Severe: slope; low bearing capacity; moderate compressibility and high shear strength.	Moderate: slope	Moderate: slope; low bearing capacity where wet; erodible.	Severe: slope; low bearing capacity where wet; erodible.
Severe: slope; low bearing capacity; moderate compressibility and high shear strength.	Severe: slope	Severe: slope; low bearing capacity where wet; erodible.	Severe: slope; low bearing capacity where wet; erodible.
Severe: erodible; bedrock hinders excavation; difficult to install utilities.	Severe: bedrock at a depth of less than 2 feet.	Severe: bedrock hinders excavation; erodible.	Severe: dolomite bedrock at a depth of less than 2 feet; steepness.
Slight	Severe: danger of contaminating ground water.	Slight	Slight.
Moderate: slope; subject to liquefaction and piping where wet; high bearing capacity where confined.	Severe: danger of contaminating ground water.	Slight	Moderate: slope; substratum is highly erodible and unstable.
Severe: slope; subject to liquefaction and piping where wet; high bearing capacity where confined.	Severe: danger of contaminating ground water.	Moderate: slope; loose sand hinders hauling; subject to soil blowing.	Severe: slope; substratum is highly erodible and unstable.
Severe: steepness; unstable.	Very severe: steepness; shallow to bedrock.	Severe: subject to landslides and severe erosion.	Very severe: highly erodible; steepness; subject to landslides.
Severe: low bearing capacity; high shear strength and moderate compressibility; subject to flooding.	Severe: subject to frequent flooding of short duration.	Severe: high frost heave potential; subject to seasonal flooding.	Severe: low bearing capacity in subsoil and substratum; subject to frequent flooding.
Severe: seasonal high water table hinders installation; subject to seasonal wetness; substratum has high bearing capacity.	Moderate: seasonal high water table; difficult to work in wet season.	Moderate: seasonal high water table at a depth of 1 to 3 feet; subsoil has a high frost heave potential.	Severe: subsoil has low bearing capacity and is unstable where wet; seasonal high water table at a depth of 1 to 3 feet; high frost heave potential.

TABLE 11.—*Degree and kinds of limitations of*

Soil series and map symbols	Septic tank absorption fields	Sewage lagoons	Shallow excavations
Virgil (*continued*) VwA	Severe: seasonal high water table.	Moderate: moderately rapid permeability in substratum.	Severe: seasonal high water table; fair stability in subsoil; poor stability in substratum.
Wacousta: Wa	Very severe: seasonal high water table.	Moderate: seasonal high water table; moderately slow permeability.	Very severe: seasonal high water table at a depth of less than 1 foot; poor stability.
Warsaw: WrB	Moderate: danger of contaminating ground water.	Severe: substratum is rapidly permeable.	Moderate: subsoil has good stability; substratum has poor stability.
WrC2	Moderate: slope; danger of contaminating ground water.	Severe: substratum is rapidly permeable.	Moderate: slope; subsoil has good stability; substratum has poor stability.
Watseka: Wt	Very severe: seasonal high water table; danger of contaminating ground water.	Severe: high permeability	Severe: poor stability throughout; seasonal high water table at a depth of 1 to 3 feet.
Westville: WvB	Slight	Moderate: substratum has moderately rapid permeability.	Slight
WvC2	Moderate: slope	Severe: slope; substratum has moderately rapid permeability.	Moderate: slope; thick subsoil has good stability.
WvD2	Severe: slope	Severe: slope; substratum has moderately rapid permeability.	Severe: slope; thick subsoil has good stability.
Whalan: WwE2, WxD2	Severe: bedrock at a depth of 2 to 4 feet; possible contamination of ground water.	Severe: dolomite bedrock at a depth of 2 to 4 feet.	Severe: massive dolomite at a depth of 2 to 4 feet; not rippable at a depth of 5 feet.
WxB, WxC2	Severe: bedrock at a depth of 2 to 4 feet; possible contamination of ground water.	Severe: dolomite bedrock at a depth of 2 to 4 feet.	Severe: massive dolomite at a depth of 2 to 4 feet; not rippable at a depth of 5 feet.

[1] Onsite studies of the underlying strata, water table, and hazard of aquifer pollution and drainage into ground water need to be

These soils mainly are on extensive benches in the south-central part of the county.

In the valleys where the outwash and rivers have created successions of terraces, the deposits on the higher benches are earlier than the deposits on the lower benches. The age of the material on the various benches, however, is sometimes masked by later deposits of Peorian loess (*8*). The benches on the lower levels formed more recently than the higher benches and in places are still receiving deposits from periodic flooding. The benches that formed more recently are visible along most large streams.

The soils of the acid sand outwash plains formed either in areas where there is no loess or in areas where the mantle of loess is as much as 2 feet thick. The thickness of loess determines the degree of soil development in the underlying outwash. Where there is no loess, the soils have a subsoil of sandy loam to sandy clay loam and extend to a depth of 24 to 36 inches. Dickinson and Meridian soils are representative of soils

the soils for town and country planning—Continued

Dwellings with basements	Sanitary landfill [1]	Highway location	Local streets and roads
Severe: seasonal high water table; high bearing capacity in substratum; subject to liquefaction and piping when wet; subject to seasonal wetness.	Severe: seasonal high water table; difficult to work in wet periods; partial amelioration of leachate; subject to flooding.	Moderate: seasonal high water table at a depth of 1 to 3 feet; high frost heave potential.	Severe: subsoil has low bearing capacity; unstable when wet; subject to frost heave; seasonal high water table at a depth of 1 to 3 feet.
Very severe: low bearing capacity; moderate shear strength and compressibility; seasonal high water table at a depth of less than 1 foot.	Very severe: seasonal high water table.	Severe: permanent or seasonal high water table at a depth of less than 1 foot; high frost heave potential.	Very severe: seasonal high water table; low bearing capacity; moderate compressibility; subject to frequent flooding.
Slight	Severe: danger of contaminating ground water.	Slight	Moderate: moderate bearing capacity and shrink-swell potential in subsoil.
Moderate: slope	Severe: danger of contaminating ground water.	Moderate: slope; erodible; highly stable at all moisture content.	Moderate: slope; subsoil has moderate bearing capacity and shrink-swell potential; substratum has very high bearing capacity.
Severe: seasonal high water table hinders installation; subject to liquefaction and piping when wet; subject to seasonal wetness.	Severe: danger of contaminating ground water; seasonal high water table.	Moderate: seasonal high water table at a depth of 1 to 3 feet; loose sand hinders hauling in places; subject to soil blowing.	Moderate: seasonal high water table at a depth of 1 to 3 feet; sand is unstable unless confined.
Slight	Slight	Moderate: subsoil has low bearing capacity.	Moderate: low bearing capacity and moderate shrink-swell potential; erodible.
Moderate: slope	Slight	Moderate: subsoil has low bearing capacity.	Moderate: low bearing capacity and moderate shrink-swell potential; erodible.
Severe: slope	Moderate: slope	Severe: slope; subsoil has low bearing capacity.	Severe: low bearing capacity and moderate shrink-swell potential; erodible.
Severe: bedrock at a depth of 2 to 4 feet; must be excavated.	Severe: danger of contaminating ground water.	Severe: slope; dolomite bedrock at a depth of 2 to 4 feet.	Severe: dolomite bedrock at a depth of 2 to 4 feet; subsoil has moderate bearing capacity; unstable where wet; bedrock difficult to excavate.
Severe: bedrock at a depth of 2 to 4 feet; must be excavated.	Severe: danger of contaminating ground water.	Moderate: dolomite bedrock at a depth of 2 to 4 feet.	Severe: dolomite bedrock at a depth of 2 to 4 feet; subsoil has moderate bearing capacity; unstable where wet; bedrock difficult to excavate.

made for landfill deeper than 5 or 6 feet.

that formed in these areas. Where there is a thin loess mantle, part of the subsoil formed in the underlying sand. The Dells soils are representative of soils that formed in these areas.

Soils of the calcareous outwash plains formed in calcareous, loamy outwash deposits. The depth and intensity of weathering were probably determined by the texture, thickness, and calcium carbonate equivalent of the outwash material. Soils that formed in moderately thick, loamy deposits that have a high calcium carbonate equivalent extend to a depth of 24 to 40 inches and have a subsoil of sandy clay loam to clay loam. The Dresden and Hayfield soils are representative of soils that formed in these areas. The soils that formed in areas of thick loess deposits over thin loamy outwash extend to a depth of 40 to 60 inches and have a subsoil of silty clay loam. The Batavia soils, Plano soils, gravelly substratum, Virgil soils, gravelly substratum, and Elburn soils, gravelly substratum, are representative of the soils that formed in these areas.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow carefully the instructions for referring to other series that appear in the first column of this table]

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Adrian: Ad	Severe: seasonal high water table; poor trafficability.	Severe: seasonal high water table; poor trafficability; water ponds for short periods in places.	Severe: seasonal high water table; poor trafficability; water ponds for short periods in places.	Severe: seasonal high water table; wet for long periods; poor trafficability; difficult to maintain.	Severe: seasonal high water table; sites remain wet and soft for long periods; poor trafficability; turf easily damaged when wet.
Alluvial land, wet: Af.	Severe: frequent flooding during period of use.	Severe: subject to frequent flooding; seasonal high water table; sod easily damaged when wet.	Severe: subject to frequent flooding; seasonal high water table; low trafficability; sod easily damaged when wet.	Severe: frequent flooding during period of use; muddy.	Severe: turf may be severely damaged during periods of high water; subject to frequent flooding; very low relief.
Ashdale:					
AsB	Moderate: remains wet and soft for short periods; erodible.	Slight	Moderate: slope; compacts easily and is muddy and slippery when wet; erodible.	Moderate: erodible; muddy and slippery when wet.	Slight.
AsC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; erodible.	Moderate: erodible; muddy and slippery when wet.	Moderate: slope; erodible.
Basco:					
BaB2	Moderate: remains wet and soft for short periods.	Moderate: erodible; compacts easily when wet.	Moderate: slope; erodible; extensive leveling may expose clayey subsoil or sandstone bedrock; compacts easily when wet.	Moderate: muddy and slippery when wet.	Moderate: erodible on slope.
BaC2	Moderate: slope; remains wet and soft for short periods.	Moderate: slope; erodible; compacts easily when wet.	Severe: slope; erodible; extensive leveling may expose clayey subsoil or sandstone bedrock; compacts easily when wet.	Moderate: muddy and slippery when wet.	Moderate: erodible on slope.
BaD2, BaE2	Severe: slope; remains wet and soft for short periods.	Severe: slope; erodible; compacts easily when wet.	Severe: slope; erodible; extensive leveling may expose clayey subsoil or sandstone bedrock; compacts easily when wet.	Severe: slope; muddy and slippery when wet.	Severe: slope; erodible.
Batavia:					
BbA, BbB	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Moderate: erodible; compacts easily when wet.	Moderate: erodible; muddy and slippery when wet.	Slight.
BbC2	Moderate: slope; remains wet and soft for short periods; surface compacts easily.	Moderate: slope; erodible; compacts easily when wet.	Severe: slope; erodible; compacts easily when wet.	Moderate: erodible; muddy and slippery when wet.	Moderate: slope; erodible.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Boyer:					
BoB	Slight	Slight	Moderate: slope; slightly droughty; difficult to maintain a good sod; erodible.	Slight	Moderate: erodible; slightly droughty; difficult to maintain a good turf.
BoC2	Moderate: slope; erodible.	Moderate: slope; slightly droughty; erodible.	Severe: slope; slightly droughty; difficult to maintain a good sod; erodible.	Slight	Moderate: erodible; slightly droughty; difficult to maintain a good turf.
BoD2	Severe: slope; erodible.	Severe: slope; slightly droughty; erodible.	Severe: slope; slightly droughty; difficult to maintain a good sod; erodible.	Moderate: slope; erodible.	Severe: slope; erodible; slightly droughty; difficult to maintain a good turf.
Brems: BrA	Moderate: erodible; droughty; adequate vegetation hard to maintain.	Moderate: droughty; difficult to maintain a good sod; erodible.	Moderate: droughty; difficult to maintain a good sod; erodible.	Moderate: erodible; poor stability on slopes; difficult to maintain.	Moderate: erodible; droughty; difficult to maintain a good turf.
Chaseburg: ChB	Severe: occasional flooding during period of use.	Moderate: occasional flooding of short duration during period of use.	Moderate: occasional flooding; compacts easily and is muddy and slippery when wet.	Moderate: muddy and slippery when wet; erodible.	Moderate: occasional flooding during period of use; turf easily damaged when wet.
Colwood: Co	Severe: remains wet and soft for long periods; poor trafficability when wet.	Severe: seasonal high water table; poor trafficability and sod easily damaged when wet; water ponds for short periods in places.	Severe: seasonal high water table; poor trafficability and sod easily damaged when wet.	Severe: seasonal high water table; wet for long periods; poor trafficability; muddy and slippery when wet.	Severe: seasonal high water table; remains wet and soft for long periods; poor trafficability and turf easily damaged when wet.
Cut and fill land: Cu.	Too variable to be rated.				
Dells: DeA	Moderate: remains wet for moderate periods.	Moderate: seasonal high water table; compacts easily when wet.	Moderate: seasonal high water table; compacts easily when wet.	Moderate: wet for moderate periods; muddy and slippery when wet.	Moderate: seasonal high water table; turf easily damaged when wet.
Del Rey: DfA	Severe: wet for long periods; remains soft, muddy, and slippery for long periods.	Severe: seasonal high water table; needs water management; compacts easily when wet.	Moderate: seasonal high water table; needs water management; compacts very easily when wet.	Severe: wet for long periods; very soft, muddy, and slippery when wet.	Moderate: seasonal high water table; heavy foot traffic may damage turf during wet periods; nearly level to gently sloping relief; needs water management.
Derinda:					
DgB2	Moderate: remains wet and soft for short periods.	Slight	Severe: compacts easily and is muddy and slippery when wet; extensive leveling may expose shale bedrock.	Moderate: muddy and slippery when wet; erodible.	Moderate: slow permeability; remains wet and soft for short periods; turf easily damaged when wet.
DgC2	Moderate: slope; remains wet and soft for short periods.	Moderate: slope; erodible.	Severe: compacts easily and is muddy and slippery when wet; extensive leveling may expose shale bedrock.	Moderate: muddy and slippery when wet; erodible.	Moderate: slow permeability; remains wet and soft for short periods; turf easily damaged when wet.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Dickinson:					
DkA	Slight	Slight	Slight	Slight	Moderate: erodible on slopes.
DkB	Slight	Slight	Moderate: slope; erodible; extensive leveling may expose sandy substratum.	Slight	Moderate: erodible on slopes.
DkC	Moderate: slope; erodible.	Moderate: slope; erodible; slightly droughty.	Severe: slope; erodible; extensive leveling may expose sandy substratum.	Slight	Moderate: erodible on slopes.
Dickinson, sandy variant: DmA.	Moderate: erodible; droughty; difficult to maintain; adequate plant cover.	Moderate: droughty; difficult to maintain a good sod; erodible.	Moderate: too sandy; droughty; difficult to maintain a good sod; erodible.	Slight: erodible; poor stability on slopes; difficult to maintain.	Moderate: erodible; droughty; difficult to maintain a good turf.
*Dodge:					
DnB	Moderate: remains wet and soft for short periods; erodible.	Slight	Moderate: slope; compacts easily and is muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Slight.
DnC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; remains wet and soft for short periods; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
DoC2 For Kidder part of DoC2, see Kidder series.	Severe: slope; remains wet and soft for short periods; erodible.	Severe: slope; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; erodible.	Severe: slope; muddy and slippery when wet; erodible.	Severe: slope; erodible.
Dodgeville:					
DpB	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Moderate: slope; compacts easily and is muddy and slippery when wet; extensive leveling may expose dolomite bedrock.	Moderate: muddy and slippery when wet; erodible on slopes.	Moderate: slow permeability; remains wet and soft for short periods.
DpC	Moderate: slope; remains wet and soft for short periods; surface compacts easily.	Moderate: slope; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; extensive leveling may expose dolomite bedrock.	Moderate: muddy and slippery when wet; erodible on slopes.	Moderate: slow permeability; remains wet and soft for short periods.
DpD2	Severe: slope; remains wet and soft for short periods; surface compacts easily.	Severe: slope; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; extensive leveling may expose dolomite bedrock.	Moderate: slope; muddy and slippery when wet; erodible.	Severe: slope; slow permeability; remains wet and soft for short periods.
Dresden:					
DrD2, DrE2	Severe: slope; erodible.	Severe: slope; erodible.	Severe: slope; erodible; extensive leveling may expose the sand and gravel substratum.	Moderate if slopes are 12 to 20 percent. Severe if slopes are more than 20 percent.	Severe: slope; erodible.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Dresden (*continued*)					
DsB	Slight	Slight	Moderate: slope; erodible; extensive leveling may expose the sand and gravel substratum.	Slight	Moderate: erodible.
DsC2	Moderate: slope; erodible.	Moderate: slope; erodible.	Severe: slope; erodible; extensive leveling may expose the sand and gravel substratum.	Slight	Moderate: erodible.
Dunbarton:					
DuB2	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Severe: compacts easily and is muddy and slippery when wet; extensive leveling exposes the clay subsoil and dolomite bedrock.	Moderate: muddy and slippery when wet; erodible; stony in places.	Moderate: erodible; slightly droughty; stony in places.
DuC2	Moderate: slope; remains wet and soft for short periods; surface compacts easily.	Moderate: slope; slightly droughty; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; extensive leveling exposes the clay subsoil and dolomite bedrock.	Moderate: muddy and slippery when wet; erodible; stony in places.	Moderate: erodible; slightly droughty; stony in places.
DuD2, DuE2	Severe: slope; remains wet and soft for short periods; surface compacts easily.	Severe: slope; slightly droughty; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; extensive leveling exposes the clay subsoil and dolomite bedrock.	Moderate if slopes are 12 to 20 percent: muddy and slippery when wet; erodible; stony in places. Severe if slopes are more than 20 percent.	Severe: slope; erodible; slightly droughty; stony in places.
Edmund:					
EdB2	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Severe: compacts easily and is muddy and slippery when wet; extensive leveling exposes the clay subsoil and dolomite bedrock.	Moderate: muddy and slippery when wet; erodible; stony in places.	Moderate: thin over bedrock; slightly droughty; erodible.
EdC2	Moderate: slope; remains wet and soft for short periods; surface compacts easily.	Moderate: slope; slightly droughty; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; extensive leveling exposes the clay subsoil and dolomite bedrock.	Moderate: muddy and slippery when wet; erodible; stony in places.	Moderate: thin over bedrock; slightly droughty; erodible.
EdD2	Severe: slope; remains wet and soft for short periods; surface compacts easily.	Severe: slope; slightly droughty; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; extensive leveling exposes the clay subsoil and dolomite bedrock.	Moderate: slope; muddy and slippery when wet; erodible; stony in places.	Severe: slope; thin over bedrock; slightly droughty; erodible.
Elburn:					
EfB	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Moderate: compacts easily and is muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Slight.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Elburn (*continued*) EgA	Moderate: remains wet and soft for moderate periods; surface compacts easily.	Severe: seasonal high water table; compacts easily when wet; low trafficability when wet; sod easily damaged.	Moderate: seasonal high water table; compacts easily when wet.	Moderate: wet for moderate periods; muddy and slippery when wet.	Severe: seasonal high water table; low trafficability and turf easily damaged when wet.
Eleva: EhC2	Moderate: slope; erodible; difficult to maintain good vegetative cover.	Moderate: slope; erodible; slightly droughty.	Moderate; slope; erodible; extensive leveling may expose sand substratum.	Slight	Moderate: erodible; slightly droughty; difficult to maintain good turf.
EhD2, EhE2	Severe: slope; erodible; difficult to maintain good vegetative cover.	Severe: slope; erodible; slightly droughty.	Severe: slope; erodible; extensive leveling may expose sand substratum.	Moderate if slopes are 12 to 20 percent. Severe if slopes are more than 20 percent.	Severe: slope; erodible; slightly droughty; difficult to maintain good turf.
Elkmound: EmC2	Moderate: slope; difficult to maintain vegetative cover.	Moderate: slope; erodible; stony or rocky in places.	Severe: slope; erodible; stony or rocky in places; difficult to maintain good sod.	Slight	Moderate: erodible.
EmD2	Severe: slope; difficult to maintain vegetative cover.	Severe: slope; erodible; stony or rocky in places.	Severe: slope; erodible; stony or rocky in places; difficult to maintain good sod.	Moderate: slope; droughty; erodible.	Severe: slope; erodible.
EmE2, EmF	Severe: slope; difficult to maintain vegetative cover.	Severe: slope; erodible; stony or rocky in places.	Severe: slope; erodible; stony or rocky in places; difficult to maintain good sod.	Severe: slope; droughty; erodible.	Severe: slope; erodible.
Elvers: Ev	Severe: frequent flooding during period of use.	Severe: frequent flooding of short duration during period of use.	Severe: seasonal high water table; frequent flooding; poor trafficability; sod easily damaged; muddy and slippery when wet.	Severe: frequent flooding during period of use; wet for long periods; poor trafficability; muddy and slippery when wet.	Severe: frequent flooding during period of use; remains wet and soft for long periods.
Gale: GaB	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Moderate: slope; compacts easily and is muddy and slippery when wet; erodible; extensive leveling may expose sandstone bedrock.	Moderate: muddy and slippery when wet; erodible.	Slight.
GaC2	Moderate: slope; remains wet and soft for short periods; surface compacts easily.	Moderate: slope; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; erodible; extensive leveling may expose sandstone bedrock.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Gale (*continued*) GaD2	Severe: slope; remains wet and soft for short periods; surface compacts easily.	Severe: slope; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; erodible; extensive leveling may expose sandstone bedrock.	Moderate: slope; muddy and slippery when wet; erodible.	Severe: slope; erodible.
Granby: Gn	Severe: remains wet for long periods; erodible.	Severe: seasonal high water table; erodible; supports limited vegetation.	Severe: seasonal high water table; erodible; supports limited vegetation.	Severe: seasonal high water table; wet for long periods; erodible.	Severe: seasonal high water table; erodible.
Grays: GsA, GsB	Moderate: remains wet and soft for short periods; erodible.	Slight	Moderate: slope; erodible.	Moderate: muddy and slippery when wet; erodible.	Slight.
GsC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible.	Severe: slope; erodible.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope.
Griswold: GwB	Slight	Slight	Moderate: slope; erodible; slightly droughty.	Slight	Slight.
GwC	Moderate: slope; erodible.	Moderate: slope; slightly droughty; erodible.	Severe: slope; erodible; slightly droughty.	Slight	Moderate: slope; erodible.
GwD2	Severe: slope; erodible.	Severe: slope; slightly droughty; erodible.	Severe: slope; erodible; slightly droughty.	Moderate: slope; erodible.	Severe: slope; erodible.
Hayfield: HaA	Moderate: remains wet for moderate periods.	Moderate: seasonal high water table; compacts easily when wet.	Moderate: seasonal high water table; compacts easily when wet.	Moderate: wet for moderate periods; muddy and slippery when wet.	Moderate: seasonal high water table; turf easily damaged when wet.
Hixton: HbB	Slight	Slight	Moderate: slope; slightly droughty; erodible; extensive leveling may expose sandstone bedrock.	Slight	Slight.
HbC2	Moderate: slope; erodible.	Moderate: slope; slightly droughty; erodible.	Severe: slope; slightly droughty; erodible; extensive leveling may expose sandstone bedrock.	Slight	Moderate: slope; erodible.
HbD2	Severe: slope; erodible.	Severe: slope; slightly droughty; erodible.	Severe: slope; slightly droughty; erodible; extensive leveling may expose sandstone bedrock.	Moderate: slope; erodible.	Severe: slope; erodible.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Houghton: Ho	Severe: remains wet and soft for long periods; poor trafficability.	Severe: seasonal high water table; poor trafficability and sod easily damaged when wet; water ponds for short periods in places.	Severe: seasonal high water table; poor trafficability when wet; sod easily damaged; erodible.	Severe: seasonal high water table; wet for long periods; poor trafficability; erodible; difficult to maintain.	Severe: seasonal high water table; remains wet and soft for long periods; poor trafficability; erodible.
Huntsville: HuA, HuB.	Severe: subject to occasional flooding during period of use.	Moderate: subject to occasional flooding for short duration during period of use.	Severe: subject to frequent flooding; poor trafficability, muddy and slippery and compacts easily when wet.	Moderate: subject to occasional flooding during period of use; muddy and slippery when wet.	Moderate: subject to occasional flooding during period of use.
Kegonsa: KeA, KeB	Moderate: remains wet and soft for short periods: surface compacts easily.	Slight	Moderate: extensive leveling may expose gravelly substratum; erodible; compacts easily when wet.	Moderate: erodible; muddy and slippery when wet.	Slight.
Kickapoo: KcB	Severe: occasional flooding during period of use.	Moderate: occasional overflow; erodible.	Severe: occasional overflow; erodible.	Slight: erodible	Moderate: occasional overflow; erodible.
Kidder:					
KdB	Slight	Slight	Moderate: slope; slightly droughty; stony in places.	Slight	Slight.
KdC2	Moderate: slope; erodible; stony in places.	Moderate: slope; slightly droughty; erodible; stony in places.	Severe: slope; slightly droughty; stony in places.	Slight	Moderate: slope; erodible.
KdD2, KrD2, KrE2.	Severe: slope; erodible; stony in places.	Severe: slope; slightly droughty; erodible; stony in places.	Severe: slope; erodible; slightly droughty; stony in places.	Moderate if slope is 12 to 20 percent: erodible; stony in places. Severe if slopes are more than 20 percent.	Severe: slope; erodible.
Made land: Ma. Too variable to rate.					
Marsh: Mb	Severe: flooded most of the year.	Severe: flooded most of the year.	Severe: flooded most of the year.	Severe: flooded most of the year.	Severe: can be used for ponds, hazards, or source of water for irrigation.
Marshan: Mc	Severe: remains wet and soft for long periods; poor trafficability when wet.	Severe: seasonal high water table; poor trafficability and sod easily damaged when wet; water ponds for short periods in places.	Severe: seasonal high water table; poor trafficability; sod easily damaged; muddy and slippery when wet.	Severe: seasonal high water table; wet for long periods; poor trafficability and muddy and slippery when wet.	Severe: seasonal high water table; remains wet and soft for long periods; poor trafficability and turf easily damaged when wet.
McHenry:					
MdB	Slight	Slight	Moderate: slope; erodible; compacts easily when wet.	Moderate: muddy and slippery when wet; erodible.	Slight.
MdC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible; compacts easily when wet.	Severe: slope; erodible; compacts easily when wet.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
MdD2	Severe: slope; remains wet and soft for short periods; erodible.	Severe: slope; erodible; compacts easily when wet.	Severe: slope; erodible; compacts easily when wet.	Severe: slope; muddy and slippery when wet; erodible.	Severe: slope; erodible.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Meridian:					
MeA	Slight	Slight	Slight	Slight	Slight.
MeB	Slight	Slight	Moderate: slope; slightly droughty; erodible; extensive leveling may expose sand substratum.	Slight	Slight.
Military:					
MhC2	Moderate: slope; erodible.	Moderate: slope; slightly droughty; erodible.	Severe: slope; slightly droughty; erodible; extensive leveling may expose sandstone bedrock.	Slight	Moderate: erodible.
MhD2, MhE2	Severe: slope; erodible.	Severe: slope; slightly droughty; erodible.	Severe: slope; slightly droughty; erodible; extensive leveling may expose sandstone bedrock.	Moderate if slopes are 12 to 20 percent. Severe if slopes are more than 20 percent.	Severe: slope; erodible.
Montgomery: MoA	Severe: remains wet and soft for long periods; poor trafficability when wet.	Severe: seasonal high water table; slow permeability; low trafficability when wet.	Severe: seasonal high water table; slow permeability; low trafficability; sod easily damaged when wet.	Severe: seasonal high water table; wet for long periods; muddy and slippery for long periods; poor trafficability when wet.	Severe: seasonal high water table; low trafficability; sod easily damaged when wet.
NewGlarus:					
NeB2	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Moderate: slope; compacts easily and is muddy and slippery when wet; extensive leveling may expose dolomite bedrock.	Moderate: muddy and slippery when wet; erodible.	Slight.
NeC2	Moderate: slope; remains wet and soft for short periods; surface compacts easily.	Moderate: slope; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; extensive leveling may expose dolomite bedrock.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
NeD2, NeE2	Severe: slope; remains wet and soft for short periods; surface compacts easily.	Severe: slope; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; extensive leveling may expose dolomite bedrock.	Moderate if slopes are 12 to 20 percent: muddy and slippery when wet; erodible. Severe if slopes are more than 20 percent.	Severe: slope; erodible.
Orion:					
Or	Severe: frequent flooding during period of use.	Severe: frequent flooding of short duration during period of use.	Severe: frequent flooding; compacts easily and muddy and slippery when wet.	Severe: frequent flooding during periods of use; muddy and slippery when wet.	Severe: frequent flooding during period of use; remains wet and soft for moderate periods.
Os	Severe: remains wet and soft for long periods; poor trafficability when wet.	Severe: seasonal high water table; poor trafficability and sod easily damaged when wet; occasional flooding of short duration during period of use.	Severe: seasonal high water table; poor trafficability; sod easily damaged; muddy and slippery when wet.	Severe: seasonal high water table; wet for long periods; occasional flooding during period of use; muddy and slippery when wet.	Severe: seasonal high water table; sites remain wet and soft for long periods; poor trafficability and turf easily damaged when wet.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Otter: Ot	Severe: remains wet and soft for long periods; subject to flooding; poor trafficability.	Severe: subject to frequent flooding; low trafficability when wet; sod easily damaged.	Severe: subject to frequent overflow; seasonal high water table; low trafficability when wet; sod easily damaged.	Severe: seasonal high water table; wet for long periods; subject to flooding during period of use; muddy and slippery when wet.	Severe: subject to frequent flooding; seasonal high water table; turf easily damaged; low trafficability when wet.
Palms: Pa	Severe: remains wet and soft for long periods; poor trafficability.	Severe: seasonal high water table; poor trafficability and sod easily damaged when wet; water ponds for short periods in places.	Severe: seasonal high water table; subject to occasional flooding; poor trafficability; sod easily damaged when wet; erodible.	Severe: seasonal high water table; wet for long periods; poor trafficability; erodible; difficult to maintain.	Severe: seasonal high water table; remains wet and soft for long periods; poor trafficability; sod easily damaged.
Pecatonica:					
PeB	Moderate: remains wet and soft for short periods; erodible.	Slight	Moderate: compacts easily and is muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Slight.
PeC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible.	Severe: slope; compacts easily and is muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
Plainfield: PfB	Moderate where slopes are 1 to 12 percent: too sandy. Severe where slopes are more than 12 percent: droughty.	Moderate where slopes are 1 to 12 percent: too sandy. Severe where slopes are more than 12 percent: droughty.	Severe: too sandy; droughty; difficult to maintain a good sod; erodible.	Moderate where slopes are 2 to 12 percent. Severe where slopes are more than 12 percent: erodible; poor stability; difficult to maintain.	Severe: erodible; droughty; difficult to maintain good turf.
Plano:					
PnA, PnB	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Moderate: compacts easily and muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Slight.
PnC2	Moderate: slope; remains wet and soft for short periods; surface compacts easily.	Moderate: slope; erodible.	Severe: slope; compacts easily and muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
PoA, PoB	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Moderate: erodible; subject to frost heave.	Moderate: muddy and slippery when wet; erodible.	Slight.
PoC2	Moderate: slope; remains wet and soft for short periods; surface compacts easily.	Moderate: slope; erodible; compacts easily when wet.	Severe: slope; erodible; subject to frost heave.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
Port Byron:					
PrB	Moderate: remains wet and soft for short periods; erodible.	Moderate: erodible; muddy after rains.	Moderate: slope; compacts easily and is muddy and slippery when wet.	Moderate: erodible; muddy and slippery when wet.	Slight.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Port Byron (*cont'd*) PrC	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible; muddy after rains.	Severe: slope; compacts easily and muddy and slippery when wet.	Moderate: erodible; muddy and slippery when wet.	Slight.
Radford: RaA	Severe: subject to occasional flooding during period of use.	Severe: subject to frequent flooding; compacts easily when wet.	Severe: subject to frequent flooding; compacts easily and muddy and slippery when wet.	Moderate: subject to occasional flooding during period of use; muddy and slippery when wet.	Severe: subject to frequent flooding; low trafficability; turf easily damaged when wet.
Ringwood: RnB	Moderate: remains wet and soft for short periods; erodible.	Slight	Moderate: slope; compacts easily and muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Slight.
RnC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible.	Severe: slope; compacts easily and muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
Rockton: RoB	Moderate: remains wet and soft for short periods; erodible.	Slight	Moderate: slope; compacts easily and muddy and slippery when wet; extensive leveling may expose dolomite bedrock.	Moderate: muddy and slippery when wet; erodible.	Slight.
RoC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible.	Severe: slope; compacts easily and muddy and slippery when wet; extensive leveling may expose dolomite bedrock.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
RoD2	Severe: slope; remains wet and soft for short periods; erodible.	Severe: slope; erodible.	Severe: slope; compacts easily and muddy and slippery when wet; extensive leveling may expose dolomite bedrock.	Moderate if slopes are 12 to 20 percent: muddy and slippery when wet; erodible. Severe if slopes are more than 20 percent.	Severe: slope; erodible.
Rodman: RpE	Severe: erodible; droughty; gravelly.	Severe: droughty; gravelly or stony in places; difficult to maintain vegetative cover.	Severe: droughty; difficult to maintain plant cover; supports limited vegetation; stony or gravelly in places.	Moderate if slopes are 12 to 20 percent. Severe if slopes are more than 20 percent.	Severe: droughty; erodible; difficult to maintain good turf; stony or gravelly in places.
Sable: SaA	Severe: remains wet and soft for long periods; poor trafficability when wet; water ponded in some areas.	Severe: seasonal high water table; compacts easily and low trafficability when wet; easily damaged.	Severe: seasonal high water table; compacts easily and low trafficability when wet; easily damaged.	Severe: seasonal high water table; wet for long periods; poor trafficability and muddy and slippery when wet.	Severe: seasonal high water table; low trafficability and turf easily damaged when wet.
St. Charles: ScA, ScB	Moderate: remains wet and soft for short periods; erodible.	Slight	Moderate: compacts easily and muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Slight.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
St. Charles (*cont'd*)					
ScC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible.	Severe: slope; compacts easily and muddy and slippery when wet; erodible.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
ScD2	Severe: slope; remains wet and soft for short periods; erodible.	Severe: slope; erodible.	Severe: slope; compacts easily and muddy and slippery when wet; erodible.	Severe: slope; muddy and slippery when wet; erodible.	Severe: slope; erodible.
Salter:					
SeB	Moderate: droughty; difficult to maintain good plant cover.	Moderate: erodible; droughty.	Moderate: erodible; droughty.	Moderate: poor stability.	Moderate: erodible; droughty.
SeC2	Moderate: slope; droughty; difficult to maintain good plant cover.	Moderate: erodible; droughty.	Severe: erodible; droughty.	Moderate: poor stability.	Moderate: erodible; droughty.
SfA, SfB2	Moderate: droughty; difficult to maintain good plant cover.	Slight	Moderate: erodible; droughty.	Moderate: poor stability.	Slight.
Salter, wet variant: ShA.	Moderate: remains wet for moderate periods.	Moderate: seasonal high water table; heavy foot traffic may damage sod when wet; erodible.	Moderate: seasonal high water table; needs water management; erodible.	Moderate: wet for moderate periods.	Moderate: will support a firm turf; seasonal high water table; erodible.
Seaton:					
SmB	Moderate: remains wet and soft for short periods; erodible.	Slight	Moderate: slope; erodible.	Moderate: slope; muddy and slippery when wet; erodible.	Slight.
SmC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible.	Severe: slope; erodible.	Moderate: slope; muddy and slippery when wet; erodible.	Moderate: slope; erodible.
SmD2, SmE2	Severe: slope; remains wet and soft for short periods; erodible.	Severe: slope; erodible.	Severe: slope; erodible.	Severe: slope; muddy and slippery when wet; erodible.	Severe: slope; erodible.
Seaton, loamy variant:					
SnC2	Moderate: slope; erodible.	Severe: erodible; stony in places.	Severe: slope; erodible; rocky in places.	Moderate: slope; erodible; difficult to maintain.	Moderate: slope; erodible.
SnD2, SnE	Severe: slope; erodible.	Severe: erodible; stony in places.	Severe: slope; erodible; rocky in places.	Severe: slope; erodible; difficult to maintain.	Severe: slope; erodible.
Sogn:					
SoD	Moderate or severe: slope; droughty; stony or rocky in many places.	Moderate or severe: slope; droughty; stony or rocky in places.	Severe: slope; bedrock restricts leveling operations; stony or rocky in places.	Moderate: slope; erodible; stony or rocky in most places.	Moderate: slope; erodible; droughty; difficult to maintain good turf.
SoE	Severe: slope; droughty; stony or rocky in many places.	Severe: slope; droughty; stony or rocky in places.	Severe: slope; bedrock restricts leveling operations; stony or rocky in places.	Severe: slope; erodible; stony or rocky in most places.	Severe: slope; erodible; droughty; difficult to maintain good turf.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
*Spinks: SpB	Moderate: too sandy; erodible; droughty; adequate vegetative cover difficult to maintain.	Moderate: droughty; difficult to maintain a good sod; erodible.	Severe: too sandy; very droughty; difficult to maintain good sod; erodible.	Moderate: erodible; poor stability on slopes; difficult to maintain.	Moderate: erodible; droughty; difficult to maintain good turf.
SpC	Severe: too sandy; slope; erodible; droughty; adequate vegetative cover difficult to maintain.	Moderate: too sandy; slope; droughty; difficult to maintain good sod; erodible.	Severe: too sandy; slope; very droughty; difficult to maintain good sod; erodible.	Moderate: erodible; poor stability on slopes; difficult to maintain.	Moderate: erodible; droughty; difficult to maintain good turf.
SpD For Plainfield part of units SpB, SpC, and SpD, see Plainfield series.	Severe: slope; erodible; droughty; adequate plant cover difficult to maintain.	Severe: slope; droughty; difficult to maintain good sod; erodible.	Severe: too sandy; slope; very droughty; difficult to maintain good sod; erodible.	Severe: slope; erodible; poor stability on slopes; difficult to maintain.	Severe: slope; droughty; difficult to maintain good turf.
Stony and rocky land: St.	Severe: steep	Severe: steep; bedrock very difficult to level.	Severe: steep slope; bedrock very difficult to level.	Severe: erodible; difficult to maintain.	Severe: steep slope; very droughty; difficult to maintain good turf.
Troxel: TrB	Severe: subject to occasional flooding during period of use.	Moderate: subject to occasional flooding; compacts easily when wet.	Moderate: subject to occasional flooding.	Moderate: subject to occasional flooding during period of use; muddy and slippery when wet.	Moderate: subject to occasional flooding; turf easily damaged when wet.
Virgil: VrB	Moderate: remains wet and soft for moderate periods; surface compacts easily.	Moderate: seasonal high water table; compacts easily when wet; water ponds for short periods in some low areas.	Moderate: seasonal high water table; compacts easily and is muddy and slippery when wet; erodible.	Moderate: wet for moderate periods; muddy and slippery when wet; erodible.	Moderate: seasonal high water table; remains wet and soft for moderate periods; turf easily damaged when wet.
VwA	Moderate: remains wet for moderate periods; surface compacts easily.	Moderate: seasonal high water table; heavy foot traffic may damage sod during wet seasons.	Severe: seasonal high water table; compacts easily when wet.	Moderate: wet for moderate periods; muddy and slippery when wet; erodible.	Moderate: seasonal high water table; very low relief; turf easily damaged when wet.
Wacousta: Wa	Severe: remains wet for long periods; subject to ponding; poor trafficability.	Severe: seasonal high water table; supports limited vegetation.	Severe: seasonal high water table; supports limited vegetation; compacts easily; subject to flooding.	Severe: seasonal high water table; wet for long periods; poor trafficability; muddy and slippery when wet.	Severe: seasonal high water table; turf easily damaged when wet; slow to dry.
Warsaw: WrB	Moderate: remains wet and soft for short periods; surface compacts easily.	Slight	Moderate: slope; erodible; extensive leveling may expose sand and gravel substratum.	Moderate: muddy and slippery when wet.	Slight.
WrC2	Moderate: slope; remains wet and soft for short periods; surface compacts easily.	Moderate: slope; erodible.	Severe: slope; erodible; extensive leveling may expose sand and gravel substratum.	Moderate: muddy and slippery when wet.	Moderate: slope; erodible.

TABLE 12.—*Degree and kind of limitations of the soils for specified recreational uses*—Continued

Soil series and map symbols	Camp areas	Picnic areas	Playgrounds	Paths and trails	Golf fairways
Watseka: Wt	Moderate: remains wet for moderate periods; erodible.	Moderate: seasonal high water table; heavy foot traffic will damage sod; will not support a wide variety of trees and shrubs; erodible.	Severe: seasonal high water table; sod very easily damaged by foot traffic; erodible.	Moderate: wet for moderate periods; erodible.	Severe: seasonal high water table; heavy foot traffic may damage turf; nearly level to gently sloping relief; erodible.
Westville:					
WvB	Moderate: remains wet and soft for short periods; erodible.	Slight	Moderate: slope; erodible; compacts easily when wet.	Moderate: muddy and slippery when wet; erodible.	Slight.
WvC2	Moderate: slope; remains wet and soft for short periods; erodible.	Moderate: slope; erodible; compacts easily when wet.	Severe: slope; erodible; compacts easily when wet.	Moderate: muddy and slippery when wet; erodible.	Moderate: slope; erodible.
WvD2	Severe: slope; remains wet and soft for short periods; erodible.	Severe: slope; erodible; compacts easily when wet.	Severe: slope; erodible; compacts easily when wet.	Moderate: slope; muddy and slippery when wet; erodible.	Severe: slope; erodible.
Whalan:					
WwE2	Severe: slope; erodible; stony or rocky in places.	Severe: slope; erodible.	Severe: slope; erodible; extensive leveling may expose dolomite bedrock.	Severe: slope; erodible; stony or rocky in places.	Severe: slope; erodible.
WxB	Slight	Slight	Moderate: slope; erodible; extensive leveling may expose dolomite bedrock.	Slight	Slight.
WxC2	Moderate: slope; erodible; stony or rocky in places.	Moderate: slope; erodible.	Severe: slope; erodible; extensive leveling may expose dolomite bedrock.	Slight	Moderate: slope; erodible.
WxD2	Severe: slope; erodible; stony or rocky in places.	Severe: slope; erodible.	Severe: slope; erodible; extensive leveling may expose dolomite bedrock.	Moderate: slope; erodible; stony or rocky in places.	Severe: slope; erodible.

The soils that formed in lacustrine deposits have a very distinctive parent material. These soils formed in calcareous stratified silts, clays, and fine sands. They extend to a depth of 20 to 40 inches. The soils that formed in silts and clays are difficult to manage. They have a clayey subsoil and are moderately slowly permeable to air and water. The Del Rey and Montgomery soils are representative of the soils in these areas. The soils that formed in silts and fine sand have a subsoil of silt loam, silty clay loam, sandy loam, and loam. They are moderately permeable and easy to cultivate. The Salter soils, wet variant, and the Grays, Salter, and Colwood soils are representative of the soils in these areas.

The soils that formed in alluvium are mainly along major streams. These soils are the Elvers, Orion, Huntsville, and Otter soils and Orion soils, wet. Chaseburg, Troxel, and Radford soils formed only in colluvial-alluvial deposits in the drainageways of the uplands.

Soils that formed in large deposits of organic material are in the low bottom areas of the county. The parent material of these soils is primarily plant matter, such as sedges and grasses, in different stages of decomposition. The Houghton, Palms, and Adrian soils are representative of soils in these areas.

Climate

Climate has both direct and indirect effects on the formation of soils. The most important direct effect is

that clay content of the soils tends to increase as temperature or precipitation increases. Climate indirectly affects soil formation by providing energy and a suitable environment for organisms, which are especially significant in the accumulation of organic matter and in the increase of the fertility of the soils. The influence of climate on soil formation in Dane County is evident in the Dodgeville and Plano soils and in other soils that have a dark-colored surface layer.

Climatic conditions affect the formation of soils, and generalizations about the kind of soil that is formed under certain climatic conditions become broader or more specific as the area of the climatic region either increases or decreases in size. In a small localized area, such as a county, the emphasis in a survey of the soils is placed on local, or microclimatic, conditions and not on general, or macroclimatic, conditions. The effect of climate on the formation of soils is modified locally by variations in relief and by the aspect of the slopes.

The influence of microclimatic conditions can be seen in soils that formed in close association with one another. For example, the formation of shallow, well-drained, dark-colored soils, such as the Edmund soils, generally is attributed to the fact that more rain is lost through runoff on steep slopes than is lost on gentle slopes and that less water penetrates soils on steep terrain to furnish moisture for plant growth, microbiological activity, and rock disintegration than penetrates soils on gentle terrain. As a result, biological, physical, and chemical weathering agents are suppressed and the formation of soil is slowed.

Soils having slopes that face the sun and are exposed to the wind during the warmer part of the day, that is, soils that have south- or west-facing slopes, have a warmer and drier surface than soils that have north-facing slopes. Thus, the soils that have north-facing slopes are subject to more humid conditions and somewhat cooler temperatures and have a denser growth of trees than the soils that have opposite-facing slopes. The soils that have less humid, south-facing slopes are dominantly in grassy or sparsely wooded vegetation.

Plant and animal life

Plant cover and the accumulation of organic material are the main aspects of plant and animal life that affect soil formation. Also important are bacteria, fungi, earthworms, and man. Plant and animal life provides organic material and translocates plant nutrients from the lower layers of the soil to the upper layers.

Before Dane County was settled, the vegetation in the area was the most important element in the complex of living organisms that affect soil formation. The first settlers mainly found heavy stands of hickory, basswood, and oak in the western third of the county. In the north-central uplands they found grassland, and in the south they found both oak forest and grassland.

The influence of native vegetation on soil characteristics is evident in the contrast between dark-colored grassland soils and light-colored forest soils. Even where the parent material of the soils is similar, the presence of trees in one place and grass in another gives rise, respectively, to light-colored soils and to dark-colored soils. The difference in the amount of organic matter in the dark-colored grassland soils and the light-colored forest soils is partly attributable to the fact that forest soils are generally more acid than grassland soils. The relatively nonacid humus of grassland is more stable than the more soluble acid humus of forests.

Where the vegetation is a mixture of trees and grasses, the characteristics of the soils are intermediate between grassland and forest soils. Batavia soils are an example of soils that have these intermediate characteristics.

In the areas of the county in which the soils have been cultivated for a long time, man has brought about enough change in the original soils to require that they be interpreted and classified separately. These changes include alterations in the fertility and pH of acid soils as a result of liming, the perpetuation of grassland vegetation in normally wooded areas through repeated grass fires, humus losses through improper cropping and tillage practices, and accelerated erosion following the persistant removal of plant cover on terraces and uplands. The Otter soils formed through erosion and the transportation and deposition of silt from the uplands or terraces over wet, dark-colored soils on the stream flood plains.

Man also causes change in soil by the methods he uses to plant crops. For example, he may plant one field to row crops and leave a neighboring field that has a similar kind of soil in pasture. Differences in the two fields in fertility, organic-matter content, or other soil characteristics may be attributed in large part to man's influence on the direction and control of plant growth.

Man will, of course, continue to change the direction and rate of development of the soils in the county. The continued clearing of woodland, the cultivation of the soils, the introduction of new plant species, the building of water-control structures, and the artificial improvement of natural drainage are practices that affect the future formation of the soils.

Relief

In Dane County the hills, valleys, benches, and outwash plains are the product of rains, rivers, winds, glacial meltwaters, and glacial deposits. All these elements have acted on the land surface for long periods. Where bedrock is the central feature of the topography, the dip of the surface rock formations determines the direction of water movement. The resistance and the weakness of the rock to natural phenomena determined in what areas lowlands would be sculptured by stream erosion. East of Madison the topography is influenced by the thickness of the glacial till and the direction in which the ice moved. As the glaciers moved through the area, they filled the valleys with debris, or till, and scraped off the tops of the ridges. The landscape was smoothed in this way, and long gentle slopes and ridges that have broad tops were created. The Badfish and Yahara River Valleys were widened as the meltwaters from glaciers eroded the valley walls. As the meltwaters slowed, they dropped the sediment they were carrying and created broad, nearly level outwash plains.

Relief influences soil formation by controlling drainage, runoff, erosion, and other direct and indirect effects of water. Relative elevations or inequalities of the land surface of a given type of parent material

often can be related closely to drainage, thickness and organic-matter content of the A horizon, depth of the solum, and differentiation of horizons in the soils of that area.

Drainage characteristics commonly are reflected in the color, degree, and kind of mottling or gleying in the horizons of the soil. For example, the well-drained, gently undulating to rolling Military, Kidder, Ringwood, and Dodge soils on uplands and the well-drained Meridian, Dresden, and Kegonsa soils on stream benches have similar mottling characteristics. All are free of mottling in the A and B horizons but in places are mottled deep in the C horizon or below a depth of 5 feet. The well drained to moderately well drained, gently sloping to sloping Port Byron and Grays soils on stream benches and foot slopes of uplands have mottling in the lower part of the B horizon and in the C horizon. The somewhat poorly drained, nearly level Virgil soils, gravelly substratum; Elburn soils, gravelly substratum; and Hayfield soils on stream benches commonly have mottling below a depth of 8 to 16 inches in the upper part of the B horizon and in the C horizon. The poorly drained, plane to concave Sable, Wacousta, and Marshan soils on low stream benches and bottom lands are mottled in the A horizon and gleyed in the B horizon.

The thickness and the organic-matter content of the surface layer is commonly directly or indirectly related to relief. The steep soils are light-colored, and, as the slope becomes more gentle or as it changes from convex to concave, the soils have an increasingly darker and thicker surface layer. Surface runoff is slower and the total amount of water taken in increases where the soils are more nearly level. The improvement in the ratio of soil to water creates an environment that is favorable for increased plant growth. This produces an environment that is favorable for the deposit of a large amount of organic matter and the accumulation of a large amount of humus. If the moisture content is high enough the soil may produce more plant matter than can readily be decomposed by the micro-organisms in the soil. The result would be a buildup of organic matter. Waterlogging may occur in areas where gently sloping relief changes to concave, and conditions may arise that are compatible with the formation of a hydromorphic soil. Under such conditions, field plants give way to water-tolerant plants, most of the micro-organisms that decompose the organic material disappear, and the soil begins to form a black surface layer.

The thickness of the solum and differentiation of the horizon may also be related to relief. In the driftless part of the county, the steep soils generally are immature and skeletal, and the more gently sloping soils are deeper and have a more clayey subsoil. Sogn, Edmund, and Dodgeville soils are good examples of this sequence. They formed in the same parent material, but Sogn soils do not have the textural and structural B horizon that the deeper and more gently sloping Edmund and Dodgeville soils have.

Time

The length of time required for the formation of a given kind of soil depends on the other soil-forming factors involved. Time, therefore, never independently determines the characteristics of a soil.

In general, it is probable that the loess which makes up most of the land surface of Dane County was deposited during and after the passage of the Wisconsin glaciers through regions that are peripheral to the driftless area. The latest advance of the glacial ice sheet was approximately 11,000 years ago. This period of deposition of till and loess probably represents a period before the Plano, St. Charles, Seaton, Port Byron, and other loessal soils that have a major part of their solum formed in silt begin to develop. Some soils, such as Hixton and Dunbarton soils, that have a well-developed solum that formed partly or entirely in bedrock residuum may be much older. They have a well-developed solum that formed in till deposited by the earlier ice sheet.

Some soils have formed in recently deposited material and show little, if any, horizon development. Among such immature soils in Dane County are Orion, Chaseburg, Huntsville, and Otter soils. These soils have little or no horizon development, although layering is evident in places.

The age of the soils on the high stream benches in the county is difficult to determine, because winds have blanketed the material on the terraces and on the uplands with loess. It is common to refer to water-deposited material on the higher lying terraces as old alluvium and to that on the lower lying terraces as youthful alluvium. Among the silty soils that formed on terraces over old alluvium are the Plano soils, gravelly substratum; Virgil soils, gravelly substratum; Elburn soils, gravelly substratum; and Batavia and Kegonsa soils. Among the loamy soils that formed in more recent material on lower lying terraces are the Dickinson and Meridian soils.

Classification of the Soils

Soils are classified so that we can more easily remember their significant characteristics. Classification enables us to assemble knowledge about the soils, to see their relationship to one another and to the whole environment, and to develop principles that help us to understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas such as countries and continents.

The system of soil classification used was adopted by the National Cooperative Soil Survey in 1965. Because this system is under continual study, readers interested in developments of the system should search the latest literature available *(12, 14)*.

The system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. The criteria used as a basis for classification are soil properties that are observable and measurable. The properties are chosen, however, so that the soils of similar genesis, or mode of origin, are grouped. In

TABLE 13.—*Classification of soil series*

Series	Family	Subgroup	Order
Adrian	Sandy or sandy-skeletal, mixed, euic, mesic	Terric Medisaprists	Histosols.
Ashdale	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Basco	Fine, mixed, mesic	Mollic Hapludalfs	Alfisols.
Batavia	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols.
Boyer [1]	Coarse-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Brems	Mixed, mesic	Aquic Udipsamments	Entisols.
Chaseburg	Coarse-silty, mixed, nonacid, mesic	Typic Udifluvents	Entisols.
Colwood	Fine-loamy, mixed, mesic	Typic Haplaquolls	Mollisols.
Dells	Fine-silty over sandy or sandy-skeletal, mixed, mesic	Aquollic Hapludalfs	Alfisols.
Del Rey	Fine, illitic, mesic	Aeric Ochraqualfs	Alfisols.
Derinda	Fine, mixed, mesic (montmorillonitic)	Typic Hapludalfs	Alfisols.
Dickinson [2]	Coarse-loamy, mixed, mesic	Typic Hapludolls	Mollisols.
Dickinson, sandy variant	Sandy, mixed, mesic	Entic Hapludolls	Mollisols.
Dodge	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Dodgeville	Fine-silty over clayey, mixed, mesic	Typic Argiudolls	Mollisols.
Dresden	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Mollic Hapludalfs	Alfisols.
Dunbarton	Clayey, montmorillonitic, mesic	Lithic Hapludalfs	Alfisols.
Edmund	Clayey, montmorillonitic, mesic	Lithic Argiudolls	Mollisols.
Elburn	Fine-silty, mixed, mesic	Aquic Argiudolls	Mollisols.
Eleva	Coarse-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Elkmound	Loamy, mixed, mesic	Lithic Dystrochrepts	Inceptisols.
Elvers	Coarse-silty, mixed, nonacid, mesic	Thapto Histic Fluvaquents	Entisols.
Gale	Fine-silty over sandy or sandy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Granby	Sandy, mixed, mesic	Typic Haplaquolls	Mollisols.
Grays [3]	Fine-silty, mixed, mesic	Mollic Hapludalfs	Alfisols.
Griswold	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Hayfield	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Aquollic Hapludalfs	Alfisols.
Hixton	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Houghton	Euic, mesic	Typic Medisaprists	Histosols.
Huntsville	Fine-silty, mixed, mesic	Cumulic Hapludolls	Mollisols.
Kegonsa	Fine-silty over sandy or sandy-skeletal, mixed mesic	Mollic Hapludalfs	Alfisols.
Kickapoo	Coarse-loamy, mixed, nonacid, mesic	Typic Udifluvents	Entisols.
Kidder	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Marshan	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Typic Haplaquolls	Mollisols.
McHenry	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Meridian	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Mollic Hapludalfs	Alfisols.
Military	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Montgomery	Fine, mixed, mesic (Argiaquolls)	Typic Haplaquolls	Mollisols.
NewGlarus	Fine-silty over clayey, mixed, mesic	Typic Hapludalfs	Alfisols.
Orion	Coarse-silty, mixed, nonacid, mesic	Aquic Udifluvents	Entisols.
Otter	Fine-silty, mixed, mesic	Cumulic Haplaquolls	Mollisols.
Palms	Loamy, mixed, euic, mesic	Terric Medisaprists	Histosols.
Pecatonica	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Plainfield [5]	Sandy, mixed, mesic	Typic Udipsamments	Entisols.
Plano	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Port Byron	Fine-silty, mixed, mesic	Typic Hapludolls	Mollisols.
Radford	Fine-silty, mixed, mesic (Fluvaquent)	Fluventic Hapludolls	Mollisols.
Ringwood	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Rockton	Fine-loamy, mixed, mesic	Typic Argiudolls	Mollisols.
Rodman	Sandy-skeletal, mixed, mesic	Typic Hapludolls	Mollisols.
Sable	Fine-silty, mixed, mesic	Typic Haplaquolls	Mollisols.
St. Charles	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Salter [6]	Coarse-loamy, mixed, mesic	Typic Eutrochrepts	Inceptisols.
Salter, wet variant	Coarse-loamy, mixed, mesic	Aeric Haplaquents	Inceptisols.
Seaton	Fine-silty, mixed, mesic	Typic Hapludalfs	Alfisols.
Seaton, loamy variant	Fine-loamy, mixed, mesic	Mollic Dystrochrepts	Inceptisols.
Sogn	Loamy, mixed, mesic	Lithic Haplustolls	Mollisols.
Spinks	Sandy, mixed, mesic	Psammentic Hapludalfs	Alfisols.
Troxel	Fine-silty, mixed, mesic	Typic Argiudolls	Mollisols.
Virgil	Fine-silty, mixed, mesic	Udollic Ochraqualfs	Alfisols.
Wacousta	Fine-silty, mixed, mesic	Typic Haplaquolls	Mollisols.
Warsaw	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Typic Argiudolls	Mollisols.
Watseka	Sandy, mixed, mesic	Aquic Haplaquolls	Mollisols.
Westville	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Whalan	Fine-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.

[1] This soil is a taxadjunct of the series, because it has a surface layer that is darker in color than the surface layer that is normal for the series.

[2] This soil is a taxadjunct of the series, because there are areas of coarse sand and gravel within 40 inches of the surface.

[3] This soil is a taxadjunct of the series, because it has a color value and chroma of 4 in the B horizon in many places.

[4] This soil is a taxadjunct of the series, because it has free carbonates at a depth of 10 to 15 inches.

[5] This soil is a taxadjunct of the series, because it has a slightly higher pH at a depth of 10 to 40 inches.

[6] This soil is a taxadjunct of the series, because it is free of carbonates at a depth of more than 40 inches and it has a surface layer that is darker in color than the surface layer that is normal for the series.

table 13 the soil series of Dane County are placed in some categories of the system. Classes of the system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. The two exceptions to this are the Entisols and Histosols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* (Mollisol).

SUBORDER: Each order is subdivided into suborders that are based primarily on those soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders narrow the broad climatic range permitted in the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of waterlogging, or soil differences resulting from the climate or vegetation. The names of suborders have two syllables. The last syllable indicates the order. An example is *Aquoll* (*Aqu,* meaning water or wet, and *oll,* from Mollisol).

GREAT GROUP: Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of major soil horizons and features. The horizons used to make separations are those in which clay, iron, or humus have accumulated; those that have pans that interfere with growth of roots, movement of water, or both; and thick, dark-colored surface horizons. The features used are the self-mulching properties of clay, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), dark-red and dark-brown colors associated with basic rocks, and the like. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Haplaquolls (*Hapl,* meaning simple horizons, *aqu* for wetness or water, and *oll,* from Mollisols).

SUBGROUP: Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. Subgroups may also be made in those instances where soil properties intergrade outside of the range of any other great group, suborder, or order. The names of subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Haplaquolls (a typical Haplaquoll).

FAMILY: Soil families are separated within a subgroup primarily on the basis of properties important to the growth of plants or on the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae. An example is the fine-silty, mixed, noncalcareous, mesic family of Typic Haplaquolls.

Additional Facts About the County

In this section there are discussions on history, vegetation, physiography and drainage, and climate.

History

The first Europeans to enter this general area were hunters and trappers who reached the county by way of a portage between the Fox River and the Wisconsin River. The first permanent settlers were lead miners. About 1830, people looking for homes came to the area to farm. Most of the people who came to farm were from Illinois, Ohio, and the New England States. There was a great influx of people after the arrival of the farmers. The county was set off from parts of Iowa and Milwaukee Counties in 1836, but it was not organized as a separate county until 1839.

In Dane County there are 5 cities, 20 villages, and 35 towns. The population of the county in 1910 was 77,435. The population of Madison, which is both the capital of the State and the seat of Dane County, was 25,531 in 1910. The population of the county was 290,272 in 1970. This figure represents a 31 percent increase over the 1960 population, which was 222,095. Madison is a railroad and manufacturing center of considerable importance. The University of Wisconsin is located there.

Farming has changed considerably since the county was settled. Originally, the farming operations in the county were general. The first settlers chose wooded areas to develop their farmsteads and began cutting down the trees and using the lumber. Subsistence crops were planted in the small, cleared areas. As a result of these clearing operations, more and more land was opened, and dairying became an increasingly important farm enterprise. In the formerly glaciated part of the county, where there are large areas of soils suitable for farming, cash grain cropping is now more important than dairy farming. Dairying, however, is still the major farming enterprise in the unglaciated part.

Transportation is important to Dane County, because of the need to move its large production of farm goods. Three railroad companies have lines that pass through the county. The main line of the Chicago and Northwestern Railway crosses the county from northwest to southeast; a line of the Chicago, Milwaukee and St. Paul Railway crosses the county from east to west; and a branch of the Illinois Central Railroad extends from Freeport, Illinois, to Madison. Highways and roads generally are in good condition throughout the county, and each year large sums of money are spent on road improvement. Almost all roads in the county are now surfaced with a bituminous cover.

Five major areas of influence in the development of the county have been identified. The combination of these areas results in a series of stimulants and constraints to growth. The five areas are (1) the chain of lakes and the Yahara Basin, (2) the unglaciated western part of the county, (3) the glaciated eastern part of the county, (4) the urban area of Madison, and (5) the small communities that are scattered throughout the county. Each of these facts has certain implications for future development.

Between 1964 and 1970, the area in Dane County that was developed for various purposes increased from 75,400 acres to 83,300 acres. During this period, 5,000 acres of previously undeveloped land was diverted into residential land use. Almost 60 percent of this residential development took place outside of

Madison. Although only 11 percent of the county is presently urbanized, during the period from 1964 to 1970, an average of 1,650 acres was annually converted to urban uses. The average annual increase in population was 4,378 during this same period. The land consumption rate for this period then was 0.4 acre per capita. The increase in land converted to urban uses has resulted in a decrease, from 686,500 to 679,000, in the number of acres used for farming and open-space purposes.

Dane County has many of the characteristics of so-called post-industrial areas. The largest single occupational category is made up of professionals and technical workers. In 1970 there were 28,974 persons employed in this capacity. However, the fastest growing employment category was the service sector. Between 1960 and 1970 this employment category expanded by 65 percent, from 6,191 employees to 17,301. According to the 1970 census, the total number of employed persons was 123,248.

Vegetation

Most of Dane County is in the Central Hardwood Forest Region of the United States, but there is also prairie area that extends from Illinois into the county. The mapping of the soils indicates the general distribution of prairie, intergrade, and forest soils. Dane County is in a region described as a tension zone. In this zone minor changes in climate might have caused the extension of forests or of prairies. Areas in this tension zone have intergrade soils. Climate that is cool and wet tends to cause the extension of prairies. The original land surveyors observed that the county was about one-fourth prairie. The remainder, with the exception of small areas of dense underbrush, was covered with scattered timber. Much of this timber was on the valley slopes and consisted of white, black, red, and bur oak and of hickory and elm.

The presence of oak-hickory forests that have an understory of prairie plants and of isolated areas of prairie surrounded by forests is evidence that forests were probably increasing in size at the time settlers came to Dane County. The rate of extension of the forests probably was retarded by the Indians, who set fires in order to maintain openings for use as sites for camping and as areas for cultivation. The soils in the prairie areas in the county generally were nearly level to gently sloping, and the soils in the forested areas were more rolling and steeper.

Nearly all of the land in the county that is accessible and is suitable is now used for crops or pasture. A limited acreage of forest still exists. Some of this acreage could be cleared for crops, but the steeper areas are better suited to timber or to pasture than to most other uses.

Physiography and Drainage

Dane County has three major drainage basins. They are the Wisconsin River, Rock River, and Pecatonica River Basins. The Crystal Lake, Roxbury Spring Creek, Black Earth Creek, and East Branch Blue Mounds Creek watersheds all drain into the Wisconsin River Basin. The Rock River Basin drains three-fourths of the water sources of Dane County, which includes among others the Yahara-Mendota, Yahara-Monona, Yahara-Kegonsa, Six-Mile Creek-Pheasant Branch, Badfish Creek, Waterloo-Maunesha, Upper Koshkonong, Lower Koshkonong, Upper Sugar River, West Branch Sugar River, Little Sugar River, Blue Mounds Branch, and Story Creek-Sugar River watersheds. The Upper East Pecatonica Branch watershed drains less than 1 percent of the county. Almost all of the glaciated part of the county drains into the Rock River.

In the glaciated part of the county, the Yahara River, Sugar River, Koshkonong Creek, Badfish Creek, Maunesha River, and the other major streams have had their direction of flow influenced by outcrops of bedrock. Lake Mendota, Lake Monona, and Lake Wingra, which border the city of Madison, were formed when huge quantities of water that flowed out of retreating glaciers were forced to cut through valleys and, as a result, made the valleys deeper. Governor's Island and Eagle Heights, bordering Lake Mendota, are areas where rock outcrop were obvious influences on drainage patterns. Koshkonong Creek generally flows south but in places flows northwest to avoid bedrock. Gaps cut in the bedrock near Rockdale indicate that Koshkonong Creek, aided by glacial melt waters, attempted to cut a more direct route through the area.

The Yahara River, at one time a glacial spillway, follows a course dictated by bedrock and fills or plugs of glacial drift valleys. The land areas separating Lake Mendota, Monona, Waubesa, and Kegonsa are the high points of drifts that once were submerged in "Glacial Lake Yahara." At that time this lake drained into the Wisconsin River via Black Earth Creek. When meltwaters drained away, the Yahara River was unable to remove either the bedrock under Black Earth Creek or the drift plug in the south end of Lake Kegonsa, so it developed a new channel, and it remains in this geologically young channel until it joins Badfish Creek in the northern part of Rock County. The Badfish Creek Valley is probably the preglacial Yahara River Valley.

The Sugar River is also a glacial spillway, and its valley is cut into bedrock. Maps of glacial outwash show the three or four major outlets for glacial meltwaters into the Sugar River. Badger Mill Creek at Verona is a good example of such an outlet. The sand- and gravel-related industries of Verona mine the material dumped by melt water that slowed as it entered the larger Sugar River Valley and lost much of its ability to carry coarse material.

The Sugar River also drains most of the driftless part of the county south of Military Ridge. The drainage patterns in this area are dendritic. The location of the drainageways generally corresponds with the location of joints or fractures in the bedrock. The sidewalls of the valley are steep and high. Many springs and seep spots occur along the base of these sidewalls.

The drainage into the Wisconsin River is also well defined. The sidewalls of the valley are very steep and very high. The location of the stream is also determined by the location of joints. There is a difference in elevation of about 750 feet from Blue Mounds to the Wisconsin River. Because of the presence of layers of shale, there are many springs. These springs keep the narrow valleys waterlogged most of the year. Along Black

Earth Creek much of the outwash from old "Glacial Lake Yahara" is mined as sand and gravel.

The best known topographic feature in Dane County is the drumlin-marsh area in the east-central part of the county. In this area, high whaleback-shaped hills drop sharply into nearly level concave lowlands. Where old lakes once existed, there are deep peat marshes. These northeast-southwest-facing, teardrop-shaped hills rise and fall from the marsh in an extensive series.

The prairie area north of Madison that reaches to the Columbia County line is a good example of a gently rolling ground moraine. In this area the slopes are gentle. Most of this area is well drained. The hilltops are broad and rounded. The only high areas that have side slopes are areas that have kept their height because of underlying bedrock.

Terminal and recessional moraines occur as a broad band from Columbia County through Roxbury Township, passing on both sides of Madison and Oregon to the Rock County line next to Lake Koshkonong.

The terminal moraine, which marks the westernmost extension of Late Wisconsin ice, is known as the Johnstown Moraine. A recessional moraine known as Lake Mills Moraine is 4 to 8 miles to the northeast. The boundary of these two moraines is not always distinct, and they merge just north of Madison into one large terminal moraine. The terminal moraine is characterized by knob and swale topography. Swales lack outlets and, in areas where the soil is fine textured, most of the swales have little ponds. The drainage patterns are not well defined, and the slopes are complex and sloping to steep.

The western one-third of the county is driftless. In this area continental glaciers did not modify the landscape as in the eastern part of the county. South of Military Ridge, there is a thoroughly dissected plateau with ridges that have broad, rounded tops and valley side slopes that are short and relatively steep. North of the Military Ridge, the ridges are narrow and the valley side slopes are high and steep.

Climate [4]

The climate of Dane County is continental and is typical of the central areas of a continent in the middle latitudes. The winters are long, cold, and snowy, and the summers are warm and occasionally humid. Spring often lingers into June, while the change from summer to fall commonly is abrupt. The seasons vary widely from year to year. All seasons are marked by storms that accompany interchanges of airmasses, particularly the period from late in fall through the middle of spring, when changes occur every 2 or 3 days.

The data in tables 14 and 15 are representative of the climate of the county. The weather station at which most of the data were obtained is at the Madison Municipal Airport, which is northeast of the city.

The average number of days a year that have a temperature of 90° F or higher is 18, but the number has ranged from a high of 40 days in 1955 to a low of 1 day in 1969. The average number of days a year that have a temperature of 0° or less is 20, but the number has ranged from a high of 52 days in 1963 to a low of 2 days in 1931. During the growing season the number of heat growth units above a threshold of 50° averages 2,700.

[4] By HANS E. ROSENDAL, climatologist for Wisconsin, National Weather Service, United States Department of Commerce.

TABLE 14.—*Temperature and precipitation—Dane County*

[Data from Madison Muncipal Airport, Wisconsin]

Month	Temperature				Precipitation				
	Average daily maximum	Average daily minimum	Average maximum	Average minimum	Average total	One year in 10 will have—		Days with snow cover of 1.0 inch or more	Average depth of snow on days with snow cover
						Less than—	More than—		
	°F	°F	°F	°F	Inches	Inches	Inches	Number	Inches
January	26	9	44	−15	1.3	0.5	2.2	22	5.0
February	28	11	47	−10	1.0	.3	2.0	17	4.5
March	38	20	65	−1	2.0	1.0	3.1	8	2.8
April	54	35	78	22	2.6	1.3	4.1	2	1.8
May	66	46	86	29	3.3	1.7	5.2	[1]	
June	77	55	91	39	4.2	2.1	6.6	0	
July	82	60	93	45	3.9	1.8	6.2	0	
August	80	59	92	42	3.3	1.5	5.6	0	
September	72	50	88	32	3.1	.7	6.1	0	
October	60	40	80	23	2.2	.4	4.7	[1]	
November	42	26	64	8	2.0	.7	3.5	4	1.8
December	30	14	52	−9	1.4	.6	2.4	16	3.8
Year	55	35	[2] 95	[3] −18	30.3	21.5	39.0	69	4.1

[1] Less than 0.5 day.

[2] Average annual highest temperature.

[3] Average annual lowest temperature.

TABLE 15.—*Probabilities of last freezing temperature in spring and first in fall*

Probability	Dates for given probability and temperature				
	16° F or lower	20° F or lower	24° F or lower	28° F or lower	32° F or lower
Spring:					
1 year in 10 later than	April 3	April 9	April 14	April 24	May 10
2 years in 10 later than	March 29	April 3	April 9	April 19	May 5
5 years in 10 later than	March 18	March 23	March 31	April 10	April 26
Fall:					
1 year in 10 earlier than	November 7	October 31	October 23	October 14	October 3
2 years in 10 earlier than	November 13	November 5	October 29	October 20	October 9
5 years in 10 earlier than	November 24	November 16	November 9	October 31	October 19

About 55 percent of the total annual precipitation falls during the 5-month period from May through September. The moisture content of the soil commonly is adequate for the first part of the growing season. After June, crops get moisture mainly from the rain that falls during thunderstorms. Thunderstorms tend to be an erratic and unreliable source of water. The likelihood of 1 inch or more of rain in a 7-day period is greater during the first, second, and fourth weeks of June and less during the last part of August than during any other time of summer; the chances are 4 years in 10 and 2 years in 10, respectively. The likelihood of a trace of rain or less in a 7-day period is greater in the latter part of August than at any other time in summer; the chance is more than 3 years in 10. Precipitation intensities of 1.3 inches in 1 hour, 2.1 inches in 6 hours, and 2.9 inches in 24 hours can be expected about once in 2 years.

The amount of snow that falls seasonally averages 37 inches, but it has ranged from 13 inches during the winter of 1967–68 to 67 inches during 1958–59. The first inch or more of snow commonly falls about December 1. The chance of an inch of snowfall by November 5 is 1 year in 10, and by December 28 the chance is 9 years in 10. The possibility of a snow cover increases until the middle of February and then rapidly decreases.

Thunderstorms occur on an average of 41 days a year, but the number of days of occurrence ranges from 25 days to 55 days. Hail falls an average of 2 days a year, but the range is from none to 6 days a year. During June the greatest number of thunderstorms commonly occur, and during May the greatest number of hailstorms occur. During May hailstones commonly are small and do little damage. Near the middle of July, between 2 p.m. and 7 p.m., is the most probable time for severe hailstorms to occur. Since 1916 there have been 18 confirmed tornadoes in the county.

The prevailing winds are westerly in winter and southerly in summer. The months during which the most wind occurs are March, April, and November. During these months the windspeed averages 12 miles per hour. During July and August, the months when the least wind occurs, the windspeed averages 9 miles per hour. The wind velocity averages less than 4 miles per hour about 10 percent of the time, from 4 to 12 miles per hour 50 percent of the time, 13 to 31 miles per hour 40 percent of the time, and more than 31 miles per hour less than 1 percent of the time. The strongest winds commonly are from the west or southwest.

The average amount of possible sunshine received is about 40 percent during the months of November and December, 60 percent or more from May through October, and 50 to 60 percent from January to April.

The date of the last occurrence in spring of a temperature of 32° commonly is April 26, and the date of the first occurrence in fall of 32° commonly is October 19. The growing season, defined as the number of days between the last occurrence of 32° in spring and the first occurrence in fall, averages 176 days. In table 15 the probability of the occurrence of critical temperatures is given. The data for freezing temperatures are calculated for Madison; therefore, it must be remembered when considering the rest of the county that minimum temperatures depend on physical characteristics such as topography, the kind of soil, and the proximity to open water. Thus, minimum temperatures vary considerably on calm, clear nights.

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Available water capacity (also termed 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 capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Blinding. The practice of placing permeable material, such as sawdust, corn cobs, or fiberglass sheets, around newly installed drainage tile to filter out soil material. but to allow water to enter the tile freely.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

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.

Colluvium. Soil material, rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrations of compounds, or of soil grains cemented together. The composition of some concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are examples of materials commonly found in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material, and tends to stretch somewhat and pull apart, rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard and brittle; little affected by moistening.

Drainage class (natural). Refers to the conditions of frequency and duration of periods of saturation or partial saturation that existed during the development of the soil, 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 different classes of natural soil drainage are recognized.

Excessively drained soils are commonly very porous and rapidly permeable and have a low water-holding capacity.

Somewhat excessively drained soils are also very permeable and are free from mottling throughout their profile.

Well-drained soils are nearly free from mottling and are commonly of intermediate texture.

Moderately well drained soils commonly have a slowly permeable layer in or immediately beneath the solum. They have uniform color in the A and upper B horizons and mottling in the lower B and the C horizons.

Somewhat poorly drained soils are wet for significant periods but not all the time, and some soils commonly have mottling at a depth below 6 to 16 inches.

Poorly drained soils are wet for long periods and are light gray and generally mottled from the surface downward, although mottling may be absent or nearly so in some soils.

Very poorly drained soils are wet nearly all the time. They have a dark-gray or black surface layer and are gray or light gray, with or without mottling, in the deeper parts of the profile.

Diversion, or diversion terrace. A ridge of earth, generally a terrace, that is built to divert runoff from its natural course and, thus, to protect areas downslope from the effects of such runoff.

Driftless. Free from glacial drift.

Drumlin. A long ridge or oval-shaped hill formed of glacial drift.

Heat growth unit. A measure of the accumulation of temperature necessary for growth of corn and other warm-weather crops. A base of 50° F is considered the minimum for growth of these crops. The average daily temperature above 50° is considered to be heat growth units for that day.

Horizon, soil. A layer of soil, approximately parallel to the surface, that has distinct characteristics produced by soil-forming processes. These are the major horizons:

O horizon.—The layer of organic matter on the surface of a mineral soil. This layer consists of decaying plant residue.

A horizon.—The mineral horizon at the surface or just below an O horizon. This horizon is the one in which living organisms are most active and therefore is marked by the accumulation of humus. The horizon may have lost one or more of soluble salts, clay, and sesquioxides (iron and aluminum oxides.)

B horizon.—The mineral horizon below an A horizon. The B horizon is in part a layer of change from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics caused (1) by accumulation of clay, sesquioxides, humus, or some combination of these; (2) by prismatic or blocky structure; (3) by redder or stronger colors than the A horizon; or (4) by some combination of these. Combined A and B horizons are usually called the solum, or true soil. If a soil lacks a B horizon, the A horizon alone is the solum.

C horizon.—The weathered rock material immediately beneath the solum. In most soils this material is presumed to be like that in which the overlying horizons formed. If the material is known to be different from that in the solum, a Roman numeral precedes the letter C.

R layer.—Consolidated rock beneath the soil. The rock usually underlies a C horizon but may be immediately beneath an A or B horizon.

Loess. Fine-grained material, dominantly of silt-sized particles, that has been deposited by wind.

Mottling, soil. Irregularly marked with spots of different colors that vary in number and size. Mottling in soils usually indicates poor aeration and lack of 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 these: *fine,* less than 5 millimeters (about 0.2 inch) in diameter along the greatest dimension; *medium,* ranging from 5 millimeters to 15 millimeters (about 0.2 to 0.6 inch) in diameter along the greatest dimension; and *coarse,* more than 15 millimeters (about 0.6 inch) in diameter along the greatest dimension.

Munsell notation. A system for designating color by degrees of the three simple variables—hue, value, and chroma. For

example, a notation of 10YR 6/4 is a color with a hue of 10YR, a value of 6, and a chroma of 4.

Ped. An individual natural soil aggregate, such as a crumb, a prism, or a block, in contrast to a clod.

Permeability. The quality that enables the soil to transmit water or air. Terms used to describe permeability are as follows: *very slow, slow, moderately slow, moderate, moderately rapid, rapid,* and *very rapid.*

Profile, soil. A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, soil. The degree of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction because it is neither acid nor alkaline. An acid, or "sour," soil is one that gives an acid reaction; an alkaline soil is one that is alkaline in reaction. In words, the degrees of acidity or alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

Soil. A natural, three-dimensional body on the earth's surface that supports plants and that 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.

Solum. The upper part of a soil profile, above the parent material, in which the processes of soil formation are active. The solum in mature soil includes the A and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and other plant and animal life characteristic of the soil are largely confined to the solum.

Structure, soil. The arrangement of primary soil particles into compound particles or clusters that are separated from adjoining aggregates and have properties unlike those of an equal mass of unaggregated primary soil particles. The principle 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 together without any regular cleavage, as in many claypans and hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tillage of a soil below normal depth ordinarily to shatter a hardpan or claypan.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

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."

Tilth, soil. The condition of the soil in relation to the growth of plants, especially soil structure. Good tilth refers to the friable state and is associated with high noncapillary porosity and stable, granular structure. A soil in poor tilth is nonfriable, hard, nonaggregated, and difficult to till.

Variant, soil. A soil having properties sufficiently different from those of other known soils to suggest establishing a new soil series, but a soil of such limited known area that creation of a new series is not believed to be justified.

Water table. The highest part of the soil or underlying rock material that is wholly saturated with water. In some places an upper, or perched, water table may be separated from a lower one by a dry zone.

GUIDE TO MAPPING UNITS

For a full description of a mapping unit, read both the description of the mapping unit and the description of the soil series to which the mapping unit belongs. In referring to a capability unit or woodland group, read the introduction to the section it is in for general information about its management. Other information is given in tables as follows:

Acreage and extent, table 1, pages 9 and 10.
Predicted yields, table 2, pages 88 through 90.
Woodland, tables 3, 4, and 5, pages 91 through 103.
Wildlife, tables 6 and 7, pages 104 through 118.
Engineering uses of the soils, tables 8, 9, and 10, pages 120 through 151.
Town and country planning, tables 11 and 12, pages 152 through 184.

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Symbol
Ad	Adrian muck	8	IVw-7	84	---
Af	Alluvial land, wet	8	Vw-14	84	4w5
AsB	Ashdale silt loam, 2 to 6 percent slopes	11	IIe-1	77	---
AsC2	Ashdale silt loam, 6 to 12 percent slopes, eroded	11	IIIe-1	80	---
BaB2	Basco silt loam, 2 to 6 percent slopes, eroded	12	IIe-6	77	2o1
BaC2	Basco silt loam, 6 to 12 percent slopes, eroded	12	IIIe-6	81	2o1
BaD2	Basco silt loam, 12 to 20 percent slopes, eroded	12	IVe-6	83	2r2
BaE2	Basco silt loam, 20 to 30 percent slopes, eroded	12	VIe-6	85	2r2
BbA	Batavia silt loam, gravelly substratum, 0 to 2 percent slopes	13	I-3	76	2o1
BbB	Batavia silt loam, gravelly substratum, 2 to 6 percent slopes	13	IIe-1	77	2o1
BbC2	Batavia silt loam, gravelly substratum, 6 to 12 percent slopes, eroded	13	IIIe-1	80	2o1
BoB	Boyer sandy loam, 2 to 6 percent slopes	14	IIIs-4	81	3o1
BoC2	Boyer sandy loam, 6 to 12 percent slopes, eroded	14	IIIe-7	81	3o1
BoD2	Boyer sandy loam, 12 to 20 percent slopes, eroded	14	IVe-7	83	3r2
BrA	Brems loamy sand	15	IVs-3	83	3s1
ChB	Chaseburg silt loam, 2 to 6 percent slopes	15	IIe-5	77	2o1
Co	Colwood silt loam	17	IIw-1	78	1w5
Cu	Cut and fill land	17	VIIs-6	87	4f2
DeA	Dells silt loam, 0 to 3 percent slopes	18	IIw-5	79	3o1
DfA	Del Rey silt loam, 0 to 3 percent slopes	18	IIw-2	78	3o1
DgB2	Derinda silt loam, 2 to 6 percent slopes, eroded	19	IIe-6	77	2o1
DgC2	Derinda silt loam, 6 to 12 percent slopes, eroded	19	IIIe-6	81	2o1
DkA	Dickinson sandy loam, 0 to 2 percent slopes	20	IIIs-4	81	3o1
DkB	Dickinson sandy loam, 2 to 6 percent slopes	20	IIIs-4	81	3o1
DkC	Dickinson sandy loam, 6 to 12 percent slopes	20	IIIe-7	81	3o1
DmA	Dickinson loamy fine sand, sandy variant, 1 to 4 percent slopes	21	IVs-3	83	3o1
DnB	Dodge silt loam, 2 to 6 percent slopes	22	IIe-1	77	2o1
DnC2	Dodge silt loam, 6 to 12 percent slopes, eroded	22	IIIe-1	80	2o1
DoC2	Dodge and Kidder soils, 6 to 20 percent slopes, eroded	23	IVe-1	82	2o1
DpB	Dodgeville silt loam, 2 to 6 percent slopes	23	IIe-2	77	---
DpC	Dodgeville silt loam, 6 to 12 percent slopes	23	IIIe-2	80	---
DpD2	Dodgeville silt loam, 12 to 20 percent slopes, eroded	24	IVe-2	82	---
DrD2	Dresden loam, 12 to 20 percent slopes, eroded	24	IVe-2	82	2r2
DrE2	Dresden loam, 20 to 30 percent slopes, eroded	24	VIe-2	84	2r2
DsB	Dresden silt loam, 2 to 6 percent slopes	25	IIe-2	77	2o1
DsC2	Dresden silt loam, 6 to 12 percent slopes, eroded	25	IIIe-2	80	2o1
DuB2	Dunbarton silt loam, 2 to 6 percent slopes, eroded	25	IIIe-3	80	3d1
DuC2	Dunbarton silt loam, 6 to 12 percent slopes, eroded	26	IVe-3	83	3d1
DuD2	Dunbarton silt loam, 12 to 20 percent slopes, eroded	26	VIe-3	85	3d2
DuE2	Dunbarton silt loam, 20 to 30 percent slopes, eroded	26	VIIe-3	86	3d2
EdB2	Edmund silt loam, 2 to 6 percent slopes, eroded	27	IIIe-3	80	5d1
EdC2	Edmund silt loam, 6 to 12 percent slopes, eroded	27	IVe-3	83	5d1
EdD2	Edmund silt loam, 12 to 20 percent slopes, eroded	27	VIe-3	85	5d2
EfB	Elburn silt loam, 1 to 4 percent slopes	28	IIw-2	78	4o1
EgA	Elburn silt loam, gravelly substratum, 0 to 3 percent slopes	28	IIw-2	78	4o1
EhC2	Eleva sandy loam, 6 to 12 percent slopes, eroded	29	IIIe-7	81	3o1

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Symbol
EhD2	Eleva sandy loam, 12 to 20 percent slopes, eroded	29	IVe-7	83	3r2
EhE2	Eleva sandy loam, 20 to 30 percent slopes, eroded	29	VIe-7	85	3r2
EmC2	Elkmound sandy loam, 6 to 12 percent slopes, eroded	30	IVe-3	83	3d1
EmD2	Elkmound sandy loam, 12 to 20 percent slopes, eroded	30	VIe-3	85	3d2
EmE2	Elkmound sandy loam, 20 to 30 percent slopes, eroded	30	VIIe-3	86	3d2
EmF	Elkmound sandy loam, 30 to 60 percent slopes	30	VIIe-3	86	3d3
Ev	Elvers silt loam	31	IIw-13	79	4w5
GaB	Gale silt loam, 2 to 6 percent slopes	32	IIe-2	77	2o1
GaC2	Gale silt loam, 6 to 12 percent slopes, eroded	32	IIIe-2	80	2o1
GaD2	Gale silt loam, 12 to 20 percent slopes, eroded	32	IVe-2	82	2r2
Gn	Granby loamy sand	33	IVw-5	84	3w4
GsA	Grays silt loam, 0 to 2 percent slopes	34	I-3	76	2o1
GsB	Grays silt loam, 2 to 6 percent slopes	34	IIe-1	77	2o1
GsC2	Grays silt loam, 6 to 12 percent slopes, eroded	34	IIIe-1	80	2o1
GwB	Griswold loam, 2 to 6 percent slopes	35	IIe-1	77	---
GwC	Griswold loam, 6 to 12 percent slopes	35	IIIe-1	80	---
GwD2	Griswold loam, 12 to 20 percent slopes, eroded	35	IVe-1	82	---
HaA	Hayfield silt loam, 0 to 3 percent slopes	36	IIw-5	79	3r2
HbB	Hixton loam, 2 to 6 percent slopes	37	IIe-2	77	2o1
HbC2	Hixton loam, 6 to 12 percent slopes, eroded	37	IIIe-2	80	2o1
HbD2	Hixton loam, 12 to 20 percent slopes, eroded	37	IVe-2	82	2r2
Ho	Houghton muck	38	IIIw-9	81	---
HuA	Huntsville silt loam, 0 to 2 percent slopes	38	IIw-11	79	2o1
HuB	Huntsville silt loam, 2 to 6 percent slopes	38	IIe-5	77	2o1
KeA	Kegonsa silt loam, 0 to 2 percent slopes	40	IIs-1	78	2o1
KeB	Kegonsa silt loam, 2 to 6 percent slopes	40	IIe-2	77	2o1
KcB	Kickapoo fine sandy loam, 2 to 6 percent slopes	40	IIIw-12	82	3r2
KdB	Kidder loam, 2 to 6 percent slopes	41	IIe-1	77	2o1
KdC2	Kidder loam, 6 to 12 percent slopes, eroded	41	IIIe-1	80	2o1
KdD2	Kidder loam, 12 to 20 percent slopes, eroded	41	IVe-1	82	2r2
KrD2	Kidder soils, 10 to 20 percent slopes, eroded	42	VIe-4	85	2r2
KrE2	Kidder soils, 20 to 35 percent slopes, eroded	42	VIIe-4	86	2r2
Ma	Made land	42	VIIIs-10	87	4f2
Mb	Marsh	42	VIIIw-15	87	6w5
Mc	Marshan silt loam	43	IIw-5	79	4w5
MdB	McHenry silt loam, 2 to 6 percent slopes	43	IIe-1	77	2o1
MdC2	McHenry silt loam, 6 to 12 percent slopes, eroded	44	IIIe-1	80	2o1
MdD2	McHenry silt loam, 12 to 20 percent slopes, eroded	44	IVe-1	82	2r2
MeA	Meridian loam, 0 to 2 percent slopes	45	IIs-1	78	2o1
MeB	Meridian loam, 2 to 6 percent slopes	45	IIe-2	77	2o1
MhC2	Military loam, 6 to 12 percent slopes, eroded	46	IIIe-2	80	2o1
MhD2	Military loam, 12 to 20 percent slopes, eroded	46	IVe-2	82	2r2
MhE2	Military loam, 20 to 30 percent slopes, eroded	46	VIe-2	84	2r2
MoA	Montgomery silty clay loam, 0 to 3 percent slopes	47	IIw-1	78	3w5
NeB2	NewGlarus silt loam, 2 to 6 percent slopes, eroded	47	IIe-2	77	2o1
NeC2	NewGlarus silt loam, 6 to 12 percent slopes, eroded	48	IIIe-2	80	2o1
NeD2	NewGlarus silt loam, 12 to 20 percent slopes, eroded	48	IVe-2	82	2r2
NeE2	NewGlarus silt loam, 20 to 30 percent slopes, eroded	48	VIe-2	84	2r2
Or	Orion silt loam	49	IIw-13	79	3o1
Os	Orion silt loam, wet	49	IIIw-3	81	3o1
Ot	Otter silt loam	50	IIw-1	78	1w5
Pa	Palms muck	50	IIw-8	79	---
PeB	Pecatonica silt loam, 2 to 6 percent slopes	51	IIe-1	77	2o1
PeC2	Pecatonica silt loam, 6 to 12 percent slopes, eroded	51	IIIe-1	80	2o1
PfB	Plainfield sand, 1 to 6 percent slopes	52	VIs-9	86	4s1
PnA	Plano silt loam, 0 to 2 percent slopes	53	I-3	76	---
PnB	Plano silt loam, 2 to 6 percent slopes	53	IIe-1	77	---
PnC2	Plano silt loam, 6 to 12 percent slopes, eroded	54	IIIe-1	80	---
PoA	Plano silt loam, gravelly substratum, 0 to 2 percent slopes	54	I-3	76	---

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Described on page	Capability unit		Woodland suitability group
			Symbol	Page	Symbol
PoB	Plano silt loam, gravelly substratum, 2 to 6 percent slopes-----	54	IIe-1	77	---
PoC2	Plano silt loam, gravelly substratum, 6 to 12 percent slopes, eroded----------	54	IIIe-1	80	---
PrB	Port Byron silt loam, 2 to 6 percent slopes----------	55	IIe-1	77	---
PrC	Port Byron silt loam, 6 to 12 percent slopes----------	56	IIIe-1	80	---
RaA	Radford silt loam, 0 to 3 percent slopes----------	57	IIw-2	78	4w5
RnB	Ringwood silt loam, 2 to 6 percent slopes----------	57	IIe-1	77	---
RnC2	Ringwood silt loam, 6 to 12 percent slopes, eroded----------	57	IIIe-1	80	---
RoB	Rockton silt loam, 2 to 6 percent slopes----------	58	IIe-2	77	---
RoC2	Rockton silt loam, 6 to 12 percent slopes, eroded----------	58	IIIe-2	80	---
RoD2	Rockton silt loam, 12 to 30 percent slopes, eroded----------	58	IVe-2	82	---
RpE	Rodman sandy loam, 12 to 35 percent slopes----------	59	VIIs-5	86	4f2
SaA	Sable silty clay loam, 0 to 3 percent slopes----------	60	IIw-1	78	4w5
ScA	St. Charles silt loam, 0 to 2 percent slopes----------	60	I-3	76	1o1
ScB	St. Charles silt loam, 2 to 6 percent slopes----------	60	IIe-1	77	1o1
ScC2	St. Charles silt loam, 6 to 12 percent slopes, eroded----------	61	IIIe-1	80	1o1
ScD2	St. Charles silt loam, 12 to 20 percent slopes, eroded----------	61	IVe-1	82	1r2
SeB	Salter sandy loam, 2 to 6 percent slopes----------	62	IIIs-4	81	1o1
SeC2	Salter sandy loam, 6 to 12 percent slopes, eroded----------	62	IIIe-7	81	1o1
SfA	Salter silt loam, 0 to 2 percent slopes----------	62	I-4	76	1o1
SfB2	Salter silt loam, 2 to 6 percent slopes, eroded----------	62	IIe-1	77	1o1
ShA	Salter sandy loam, wet variant, 0 to 3 percent slopes----------	63	IIw-2	78	1o1
SmB	Seaton silt loam, 2 to 6 percent slopes----------	64	IIe-1	77	1o1
SmC2	Seaton silt loam, 6 to 12 percent slopes, eroded----------	64	IIIe-1	80	1o1
SmD2	Seaton silt loam, 12 to 20 percent slopes, eroded----------	64	IVe-1	82	1r2
SmE2	Seaton silt loam, 20 to 30 percent slopes, eroded----------	64	VIe-1	84	1r2
SnC2	Seaton fine sandy loam, loamy variant, 6 to 12 percent slopes, eroded----------	66	IIIe-1	80	1o1
SnD2	Seaton fine sandy loam, loamy variant, 12 to 20 percent slopes, eroded----------	66	IVe-1	82	1r2
SnE	Seaton fine sandy loam, loamy variant, 20 to 30 percent slopes--	66	VIe-1	84	1r2
SoD	Sogn silt loam, 2 to 20 percent slopes----------	67	VIs-5	86	5d2
SoE	Sogn silt loam, 20 to 35 percent slopes----------	67	VIIs-5	86	5d2
SpB	Spinks and Plainfield loamy sands, 2 to 6 percent slopes--------	67	IVs-3	83	3s1
SpC	Spinks and Plainfield loamy sands, 6 to 12 percent slopes-------	67	VIIs-3	86	3s1
SpD	Spinks and Plainfield loamy sands, 12 to 25 percent slopes------	68	VIIs-3	86	3s2
St	Stony and rocky land----------	68	VIIs-6	87	4d2
TrB	Troxel silt loam, 1 to 4 percent slopes----------	68	IIe-5	77	2o1
VrB	Virgil silt loam, 1 to 4 percent slopes----------	69	IIw-2	78	3o1
VwA	Virgil silt loam, gravelly substratum, 0 to 3 percent slopes----	69	IIw-2	78	3o1
Wa	Wacousta silty clay loam----------	70	IIIw-3	81	3w5
WrB	Warsaw silt loam, 2 to 6 percent slopes----------	71	IIe-2	77	---
WrC2	Warsaw silt loam, 6 to 12 percent slopes, eroded----------	71	IIIe-2	80	---
Wt	Watseka loamy sand----------	71	IVw-5	84	3w4
WvB	Westville silt loam, 2 to 6 percent slopes----------	72	IIe-1	77	1o1
WvC2	Westville silt loam, 6 to 12 percent slopes, eroded----------	72	IIIe-1	80	1o1
WvD2	Westville silt loam, 12 to 20 percent slopes, eroded----------	72	IVe-1	82	1r2
WwE2	Whalan loam, 20 to 30 percent slopes, eroded----------	73	VIe-2	84	2r2
WxB	Whalan silt loam, 2 to 6 percent slopes----------	73	IIe-2	77	2o1
WxC2	Whalan silt loam, 6 to 12 percent slopes, eroded----------	73	IIIe-2	80	2o1
WxD2	Whalan silt loam, 12 to 20 percent slopes, eroded----------	74	IVe-2	82	2r2

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