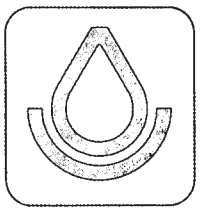
SOIL SURVEY OF

Wood County, Wisconsin



United States Department of Agriculture
Soil Conservation Service

In cooperation with
Wisconsin Research Division
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 1960–70. Soil names and descriptions were approved in 1971. Unless otherwise indicated, statements in the publication refer to conditions in the county in 1971. This survey was made cooperatively by the Soil Conservation Service and the Wisconsin Research Division of the College of Agricultural and Life Sciences, University of Wisconsin. The survey was financed in part by Wood County and the Wood County Soil and Water Conservation District. It is part of the technical assistance furnished to the Wood 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 of the soils of Wood 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 group, shrub and vine group, wildlife group, and recreation 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 of woodland management.

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 and recreation areas in the section "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 Wood 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 Information About the County."

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SOIL SURVEY OF WOOD COUNTY, WISCONSIN

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

WOOD COUNTY is near the center of Wisconsin (fig. 1). The total area of the county is 516,544 acres, or about 807 square miles (*19*).[1] The county has 22 civil towns. Wisconsin Rapids, in the east-central part of the county on the Wisconsin River, and Marshfield, in the northwestern part of the county, are the two largest cities. Wisconsin Rapids is the county seat.

The population of Wood County in 1970 was 65,362. Most workers are engaged in farming, but many who farm also work in local industries.

Dairying is the chief farm enterprise, but beef herds have become more numerous in recent years, particularly among those who work off the farm. Wood County is the leading cranberry-producing county in the State.

The northern two-thirds of the county is part of the Northern Highlands. The soils in this area are silty or loamy, are nearly level to sloping, and commonly have restricted permeability in the subsoil. If properly drained and fertilized, they are suitable for such general farm crops as corn, oats, and alfalfa or clover hay. The southern one-third of the county is part of the Central Sand Plain. The soils in this area are sandy, are nearly level to gently sloping, and commonly have a high water table. They are generally not well suited to the commonly grown crops, because of low fertility, low available water capacity, and a severe hazard of soil blowing. They have potential for the production of irrigated specialty crops. There are large areas of organic soils that are well suited to cranberries. Much of the southern third of the county is in forest and wildlife habitat.

Wood County, along with many other counties in Wisconsin, is experiencing the rapid growth of suburban developments. Some 75 percent of the area of the county is soils that are severely limited for septic tank filter fields.

How This Survey Was Made

Soil scientists made this survey to learn what kinds of soil are in Wood 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.

Figure 1.—Location of Wood County in Wisconsin.

[1] Italic numbers in parentheses refer to Literature Cited, p. 102.

They observed the steepness, length, and shape of slopes, the size 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 of the soils in 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. Marshfield and Altdorf, for example, are the names of two soil series. All of the soils in the United States that have 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 surface 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, Fenwood silt loam, 2 to 6 percent slopes, is one of several phases in the Fenwood 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.

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. Alluvial land is a land type in Wood 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 kinds 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 kinds of soil. Yields under defined management are estimated for all of the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants and as material, foundation, 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 on a given kind of soil, and they relate this to the slow permeability of the soil or its 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 consultations. 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.

The names, descriptions, and delineations of soils in this published soil survey do not always agree or join fully with soil maps of adjoining counties published at an earlier date. Differences are brought about by better knowledge about soils or modification and refinements in soil series concepts. In addition, the correlation of a recognized soil is based upon the acreage of that soil and the dissimilarity to adjacent soils within the survey area. Frequently, it is more feasible to include soils, small in extent, with similar soils, where management and response is much the same, rather than set them apart as individuals. The soil descriptions reflect these combinations. Other differences are brought about by the dominance of different soils in taxonomic units made up of two or three series. Still another difference may be caused by the range in slope allowed within one mapping unit for each survey.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Wood 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.

The soil associations in this survey have been grouped into 3 general textural classes for broad interpretative purposes. Each of the broad groups and the soil associations in each group are described in the following pages.

Loamy Soils

This group consists of associations of soils that have a surface layer of silt loam and a loamy to clayey subsoil.

1. Withee-Marshfield-Santiago association

Nearly level to moderately steep, poorly drained to well drained soils that have a heavy silt loam to silty clay loam subsoil; formed in a thin layer of loess and in loamy glacial till; on uplands

The soils of this association are on the glacial ground moraine in the northern and northwestern parts of the county. The soils mainly are nearly level to gently sloping, but they are gently sloping to moderately steep in an area from Marshfield through Bakerville and west to the county line.

This association covers about 13 percent of the county (fig. 2). Withee soils make up about 55 percent of the association, Marshfield soils about 25 percent, Santiago soils about 10 percent, and minor soils 10 percent.

The nearly level and gently sloping Withee soils are on the ground moraine. The soils are somewhat poorly drained. Slopes are long and uniform. These soils have a dark grayish-brown surface layer and a reddish-brown subsoil that has grayish mottles.

The nearly level Marshfield soils are in depressions and upland waterways. The soils are poorly drained. They have a dark-gray surface layer and a grayish-brown, mottled subsoil.

The gently sloping to moderately steep Santiago soils are on low ridges or hills that rise above the general level of the till plain. The soils are moderately well drained to well drained. They have a dark-brown surface layer and a reddish-brown subsoil.

The minor soils are mainly in the Mann, Poskin, and Rib series. Mann soils are in depressions in large drainageways or stream valleys. Rib and Poskin soils are on outwash terraces in stream valleys.

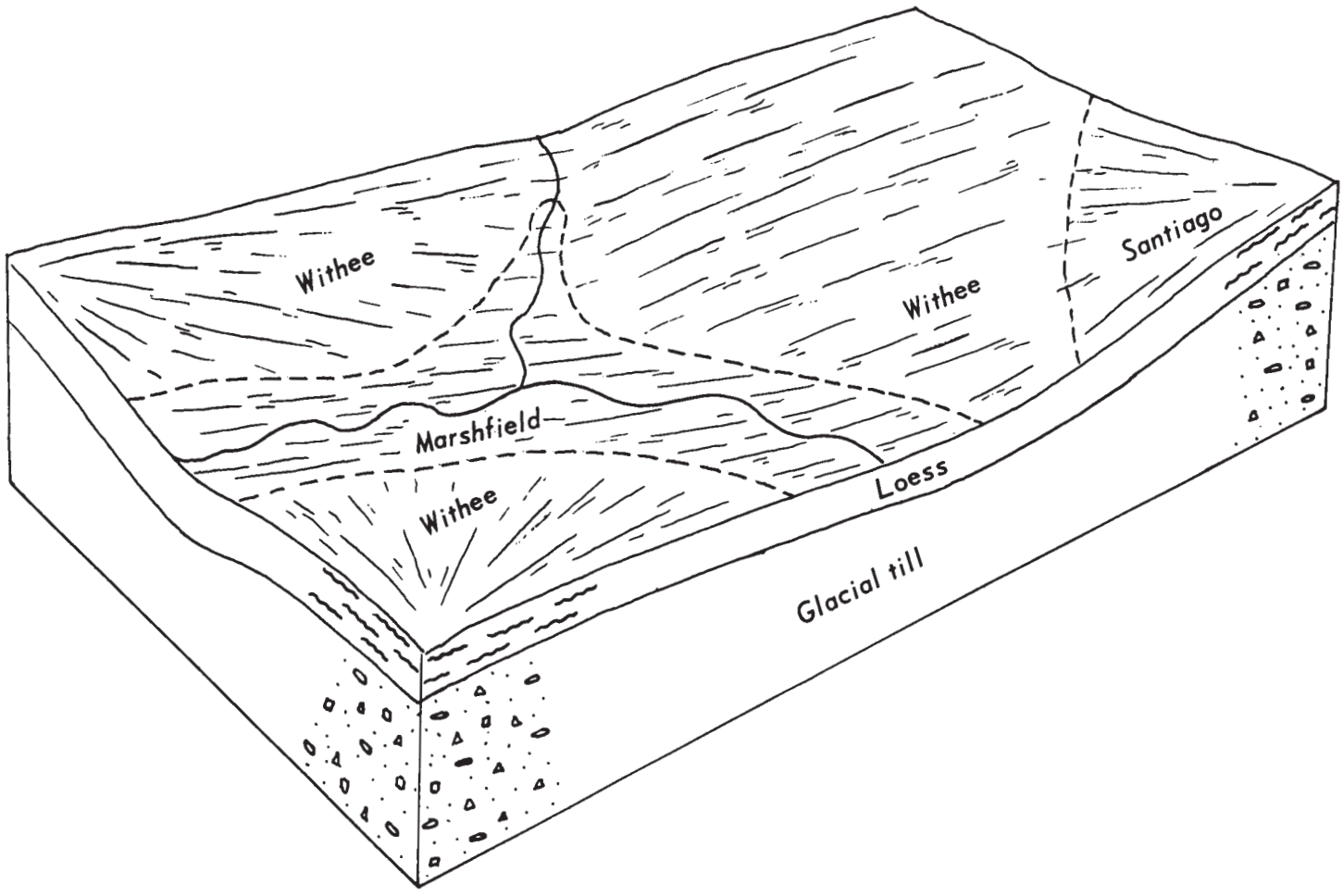

Figure 2.—Relationship of soils and parent material in association 1.

The soils of this association, except Santiago soils, are wet in spring. Tile drainage is not effective, because the permeability of the subsoil is restricted. Surface drainage, liming and fertilization, land smoothing, and erosion control are the main management practices used on these soils.

Most of this association is cultivated, but woodlots are common, especially on the wetter soils. Corn, oats, alfalfa, and red clover are the main crops. Small areas of canning peas are also grown. Most of the corn is grown for silage, but in some years ripe corn is harvested.

The soils of this association have a moderate volume change with change in moisture content. They have moderate bearing capacity when wet.

In recent years extensive residential development has taken place in parts of this association, particularly around Marshfield, Hewitt, and Auburndale. Except for Santiago soils, the soils of this association have a seasonal high water table and a moderately slowly permeable subsoil. For these reasons special care must be taken in locating building sites and in designing sewage disposal systems. Santiago soils do not have a seasonal high water table, and they have a moderately permeable subsoil. They are slightly to moderately limited for use as filter fields. About 90 percent of the area of this association is severely limited for use as filter fields. This association has moderate potential for recreational use.

2. *Milladore-Eaupleine-Sherry association*

Nearly level to sloping, poorly drained to well drained soils that have a loam to silty clay loam subsoil; formed in a thin layer of loess and in loamy residuum from gneissic rocks; on uplands

The soils of this association are on the broad upland plains in the northeastern part of the county and in the eastern part of the county around Rudolph. In most of this association the soils are nearly level to gently sloping, but they are steeper along the major drainageways.

This association covers about 12 percent of the county. Milladore soils make up about 40 percent of the association, Eaupleine soils about 30 percent, Sherry soils about 20 percent, and minor soils 10 percent (fig. 3).

The nearly level Milladore soils are on the upland plain. The soils are somewhat poorly drained. Slopes are long and uniform. The soils have a dark-brown

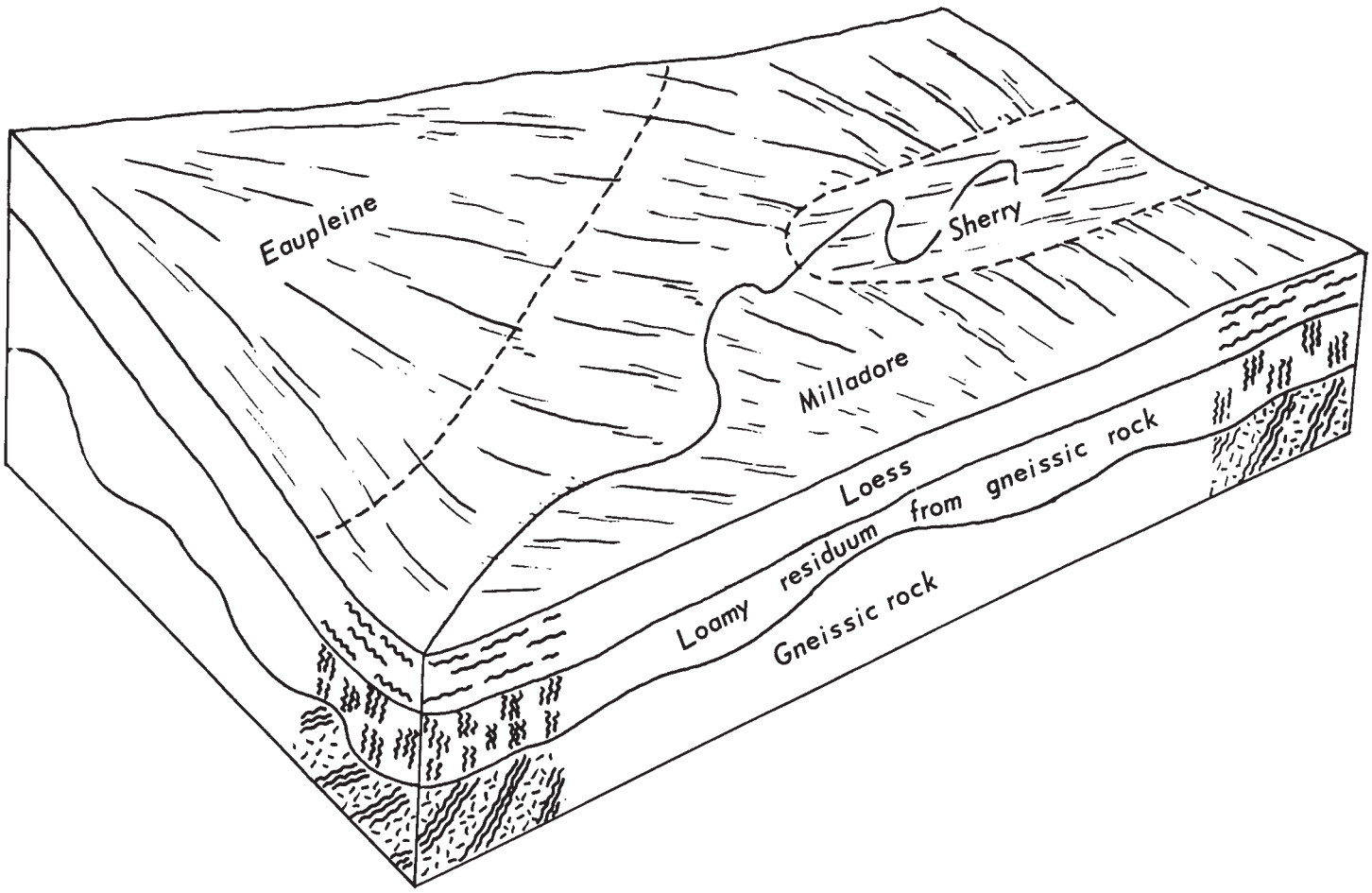

Figure 3.—Relationship of soils and parent material in association 2.

surface layer and a brown subsoil that has yellowish and grayish mottles.

Eaupleine soils are on the tops and sides of low hills and along the sides of major drainageways. These soils are well drained. Slopes are gently sloping and sloping and are uniform. These soils have a surface layer of dark-brown silt loam and a subsoil of dark-brown, micaceous loam.

Sherry soils are in drainageways. The soils are poorly drained. Slopes are nearly level and uniform. The surface layer of these soils is black and very dark brown, and the subsoil is dark gray and has brown mottles.

The minor soils are mainly in the Dolph, Altdorf, Antigo, Poskin, Rib, Norgo, and Marathon series. Dolph and Altdorf soils are in positions similar to those of Milladore and Sherry soils, respectively, but they have a clayey subsoil. Antigo, Poskin, and Rib soils are on small outwash terraces along the streams. Norgo and Marathon soils are on hillsides along the stream valleys.

Except for Eaupleine soils, the major soils of this association are wet in spring, so that tillage is occasionally delayed. Because of the restricted permeability of the subsoil, tile drainage is not effective. Surface drainage, land smoothing, liming and fertilizing, and controlling erosion are the main management needs on these soils.

Most of this association is cultivated, but some areas of the wetter soils are in woodlots. Corn, oats, alfalfa, and red clover are the main crops. Most of the corn is grown for silage, but in some years when frosts are late in fall, ripe corn is harvested.

The soils of this association have a moderate volume change with changes in moisture content and have a moderate bearing capacity when wet.

Most of the soils of this association have a seasonal high water table and a moderately slowly permeable subsoil. For these reasons, the soils are severely limited for use as septic tank filter fields. Wet basements are common. Eaupleine, Antigo, and Marathon soils are moderately limited for use as filter fields. The potential for recreational use is moderate to good.

3. *Dolph-Altdorf association*

Nearly level, poorly drained and somewhat poorly drained soils that have a clay subsoil; formed in a thin layer of loess and in clayey residuum from schistose rocks; on uplands

The soils of this association are on the broad upland plains in the eastern part of the county around Rudolph and in an area north of Powers Bluff.

This association covers about 4 percent of the county. Dolph soils make up about 55 percent of the association, Altdorf soils about 30 percent, and minor soils 15 percent.

The nearly level Dolph soils are on the upland plain. They are somewhat poorly drained. Slopes are long and uniform. These soils have a dark grayish-brown silty surface layer and a dark reddish-brown, mottled clay subsoil.

The nearly level Altdorf soils are in upland drainageways and depressions. They have a very dark grayish-brown silty surface layer, a grayish-brown silty subsurface layer, and a dusky-red clay subsoil.

The minor soils are mainly in the Norgo, Milladore, and Sherry series and Eaupleine series, clayey subsoil variant. Norgo soils are on ridges that rise conspicuously above the plain and on some gently sloping parts of the plain. Milladore and Sherry soils are in positions similar to those of Dolph and Altdorf soils, but they lack a clay subsoil. Eaupleine soils, clayey subsoil variant, are on low hills and rises on the upland plain.

The soils of this association are wet in spring. Because of the slowly permeable subsoil, tile drainage is not effective. Surface drainage, land smoothing, liming, and fertilizing are the main management needs on these soils.

About half of this association is cultivated, and the rest, mostly the wetter sites, is in woodland or native pasture. Corn, oats, alfalfa, and red clover are the main crops and they grow well on these soils if adequate drainage and fertilization are provided.

The soils of this association have a moderate to large volume change with changes in moisture content, and they have a low bearing capacity when wet.

A small amount of residential development has taken place around Rudolph. The major soils of this association are severely limited for use as septic tank filter fields by a seasonal high water table and slow permeability in the subsoil. Therefore, special care should be taken in selecting a site and in designing a sewage disposal system.

The wetter soils of this association, especially the Altdorf soils, have good potential for wildlife habitat.

4. *Fenwood-Rietbrock association*

Gently sloping to moderately steep, somewhat poorly drained and well drained soils that have a loam to light silty clay loam subsoil; formed in a thin layer of loess and in loamy residuum from granitic and greenstone rocks; on uplands

This association consists of soils on prominent hills in the north-central and west-central parts of the county, especially on and around Powers and Cary Bluffs. It is characterized by distinct topographic features that project well above the upland plain. The soils are underlain by rock.

This association covers about 1 percent of the county. Fenwood soils make up about 60 percent of the association, Rietbrock soils about 25 percent, and minor soils 15 percent.

Fenwood soils are gently sloping on hilltops to moderately steep on hillsides. The soils are well drained. Slopes are long and uniform. These soils have a very dark grayish-brown surface layer and a yellowish-brown or brown subsoil. Below a depth of about 45 inches are mostly angular fragments of hard granitic and greenstone rocks. In some places so many large stones are on the surface that clearing and cultivating are impractical.

The gently sloping and sloping Rietbrock soils are on lower hillsides and in upland drainageways. The soils are somewhat poorly drained. Slopes are moderately long and uniform. The surface layer is very dark grayish brown, and the subsoil is yellowish brown and has grayish mottles. Below a depth of about 48 inches are mostly angular fragments of hard granitic and greenstone rocks.

The minor soils are mainly in the Kert, Vesper, Mill-

adore, and Sherry series and Eaupleine series, clayey subsoil variant. Kert and Milladore soils are gently sloping and are in areas below Rietbrock soils. Vesper and Sherry soils are in drainageways on the lower parts of hillsides. Eaupleine soils, clayey subsoil variant, are on low hills around the edges of the association.

Controlling water erosion, liming, and fertilizing are the main management practices used on these soils. Surface drainage is effective on the Rietbrock, Milladore, and Kert soils.

Most of this association is in woodland and native pasture, but some areas are cultivated. Corn, oats, and alfalfa or red clover hay are the main crops.

The soils of this association have a low to moderate volume change with changes in moisture content and have a low bearing capacity in the subsoil when wet. The bearing value in the rocky substratum is high, and depth to bedrock is 3 to 5 feet.

Scattered residential development has taken place in this association. Fenwood soils are moderately limited for use as filter fields by rock fragments in the substratum. Rietbrock soils have a seasonal high water table and are severely limited for use as filter fields. Care must be exercised in site selection and sewage system design in this association. The potential for recreational use is good.

5. *Vesper-Kert association*

Nearly level, poorly drained and somewhat poorly drained soils that have a loam to clay subsoil; formed in a thin layer of loess and in residuum from stratified sandstone and shale; on uplands

The soils of this association are on the upland plain in a broad belt across the middle of the county.

The association covers about 31 percent of the county. Vesper soils make up about 33 percent of the association, Kert soils about 25 percent, Veedum soils 10 percent, and other minor soils 32 percent (fig. 4).

Vesper soils are in depressions and drainageways. The soils are poorly drained. They have a very dark grayish-brown surface layer and a gray subsoil that has yellowish-brown mottles.

The nearly level Kert soils are on the upland plain. They are somewhat poorly drained. The soils have a very dark grayish-brown surface layer and a pale-brown to reddish-brown, mottled subsoil.

The minor soils are mainly in the Veedum, Hiles, Norgo, and Gale series and Santiago series, clayey sub-

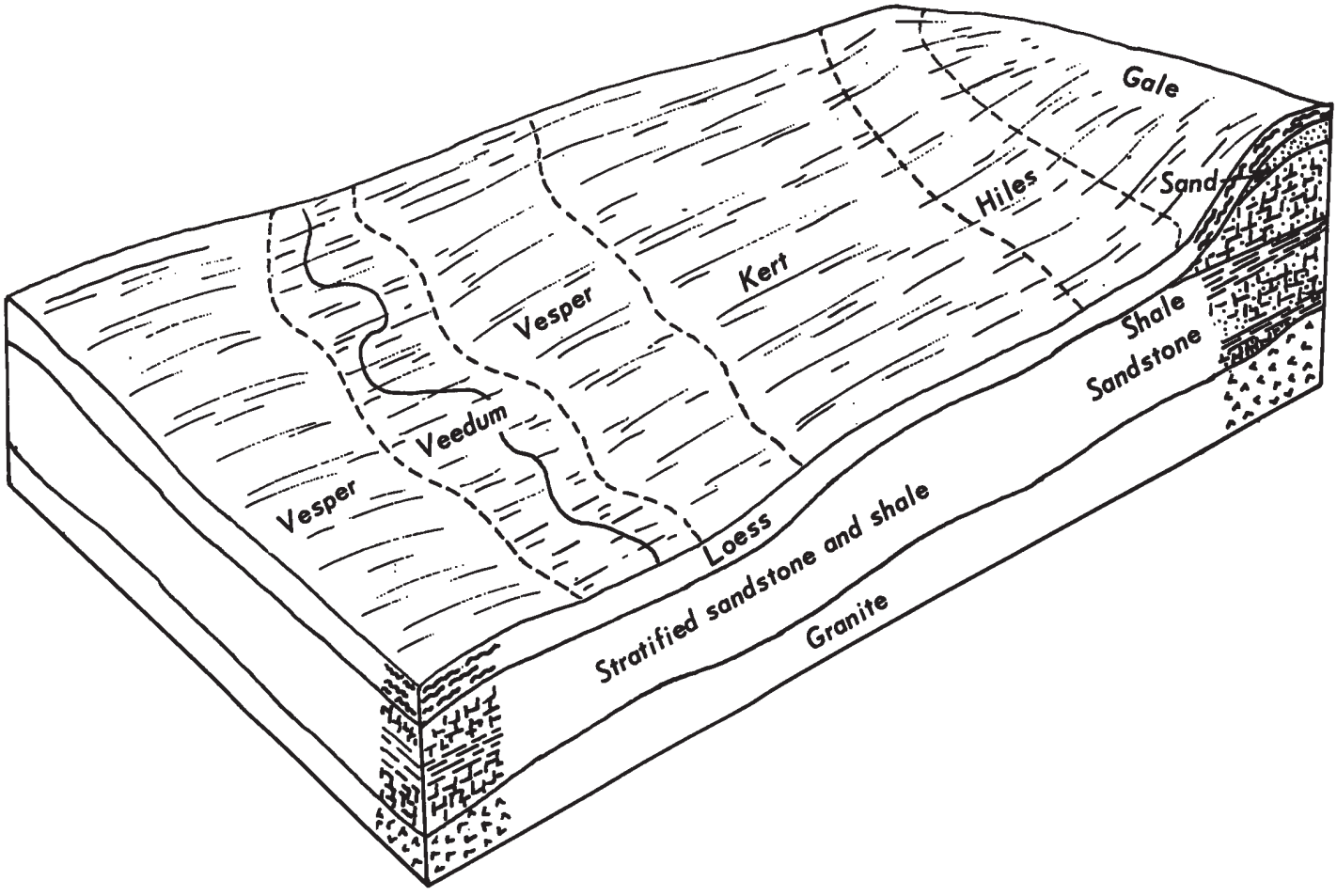

Figure 4.—**Relationship of soils and parent material in association 5.**

stratum. The very poorly drained, nearly level Veedum soils are in broad drainageways at slightly lower elevations than Vesper soils. They are wetter than Vesper soils. They have a black surface layer, a grayish subsurface layer, and a grayish, mottled subsoil. Hiles, Norgo, and Gale soils are on low hills and ridges that rise above the general level of the upland plain. Santiago soils, clayey substratum, are on a broad, low ridge that extends southward from Powers Bluff to the vicinity of Pittsville.

The dominant soils in the association are wet in spring. Because of the moderately slow to slow permeability of the subsoil and substratum, tile drainage is impractical. Because these soils are strongly acid to very strongly acid, liming is important. Other common management practices are surface drainage, land smoothing, and fertilizing.

About 60 percent of this association is cultivated. The rest is in woodland, native pasture, or wildlife habitat. Woodland is more common in the western part of the association. Corn, oats, and alfalfa or red clover hay are the main crops.

The soils of this association have a moderate volume change with changes in moisture content and have a moderate bearing capacity when wet.

Residential development has occurred in this association in recent years, particularly along the main roads. Most of the soils of this association are severely limited for use as filter fields.

Much of this association has good potential for wildlife habitat.

Sandy Soils

This group consists of associations of soils that have a surface layer of sand and loam and a sandy to clayey subsoil.

6. Elm Lake-Merrillan association

Nearly level, poorly drained and somewhat poorly drained soils that have a sandy to silty clay loam subsoil; formed in sandy sediments and in residuum from stratified sandstone and shale; on uplands

The soils of this association are on the northern edge of Glacial Lake Wisconsin in the area west of Dexterville and in a small area west of Wisconsin Rapids.

This association covers about 3 percent of the county. Elm Lake soils make up about 50 percent of the association, Merrillan soils about 35 percent, and minor soils 15 percent.

The nearly level Elm Lake soils are in depressions and drainageways on the upland plain. The soils are poorly drained. They have a thin, very dark brown surface layer and a dark grayish-brown to light brownish-gray sandy subsoil. The substratum is stratified silty clay loam and sand or sandstone.

Merrillan soils are on low rises on the plain. They are somewhat poorly drained. These soils have a black to grayish-brown surface layer and a pale-brown silty clay loam to clay loam subsoil. The substratum is stratified clayey shale and sandstone.

The minor soils are mainly in the Humbird, Plainbo, Newson, and Plainfield series. Humbird and Plainbo soils are on low hills or ridges. Newson soils are in depressions in the southern part of the association. Plainfield soils are on outwash benches along the East Fork of the Black River.

The dominant soils in the association are wet in spring. Because of the clayey subsoil and substratum, tile drainage is impractical. Soil blowing is a hazard in cultivated areas. Surface drainage, cover crops, windbreaks, liming, and fertilization are the main management practices used on these soils.

Most of this association is in woodland, but some areas along U.S. Highway 54 and just west of Wisconsin Rapids are cultivated. Silage corn, oats, and red clover hay are the main crops. Because of early frosts, corn seldom ripens.

The soils of this association have a low to moderate volume change with changes in moisture content and have a low to moderate bearing capacity when wet.

Little residential development has taken place in this association. The dominant soils are severely limited for use as filter fields by a seasonal high water table and restricted permeability in the subsoil and substratum.

This association has moderate potential for woodland and good potential for wildlife habitat.

7. Plainfield-Friendship association

Nearly level to steep, moderately well drained and excessively drained soils that have a sandy subsoil; formed in deep sandy outwash; on outwash plains

The soils of this association are on outwash plains on either side of the Wisconsin River and extend from the vicinity of Wisconsin Rapids southward. In most of the association the soils are nearly level to gently sloping. The soils are moderately steep to steep along an escarpment on each side of the Wisconsin River and along the small streams tributary to it.

This association covers about 11 percent of the county. Plainfield soils make up about 54 percent of the association, Friendship soils about 25 percent, and minor soils 21 percent.

The nearly level to steep Plainfield soils are on the outwash plains. They are excessively drained. The soils have a very dark grayish-brown sandy surface layer and a yellowish-brown sandy subsoil.

Friendship soils are on nearly level parts of the plain. The soils have a seasonal high water table at a depth of 3 to 5 feet. They have a very dark grayish-brown sandy surface layer and a yellowish-brown sandy subsoil that has brownish-yellow and brown mottles.

Minor in this association are mainly Nymore and Meehan soils and Alluvial land, wet. Nymore soils are in positions similar to those of Plainfield soils on the nearly level plain south of Lake Wauzecha and around Nepco Lake. Meehan soils are in slight depressions near the eastern edge of the association. Alluvial land, wet, is on the flood plains of small tributary streams.

Available water capacity is low, and the hazard of soil blowing is very severe. Field windbreaks, cover crops, liming, fertilizing, and, in recent years, supplemental irrigation are the main management practices where the soils are cultivated.

Most of this association is in woodland. Large areas were once cultivated but have been planted to trees. A few small areas are still cultivated, but production is low. This association has good potential for irrigated crops.

The soils of this association have a low volume change with changes in moisture content and have a high bearing capacity when wet.

Extensive residential development has taken place in this association around Wisconsin Rapids, Port Edwards, and Nekoosa. Most of the soils in the association have a moderate limitation for use as filter fields.

8. Newson-Meehan association

Nearly level, poorly drained and somewhat poorly drained soils that have a sandy subsoil; formed in deep sandy outwash; on outwash plains and glacial lake deposits.

Most of the soils of this association are on nearly level outwash plains and glacial lake beds east of Wisconsin Rapids and in the southwestern and south-central parts of the county.

This association covers about 15 percent of the county. Newson soils make up about 38 percent of the association, Meehan soils about 27 percent, and minor soils 35 percent.

Newson soils are in depressions on sand plains. The soils are poorly drained. They have a black surface layer and a dark grayish-brown sandy subsoil that has yellowish-brown mottles.

Meehan soils are on low rises on the sand plain. They are somewhat poorly drained. The soils have a very dark gray surface layer and a brown sandy subsoil that has yellowish-brown and light-gray mottles.

The minor soils are mainly in the Au Gres, Croswell, Friendship, and Plainfield series. The somewhat poorly drained Au Gres soils and the moderately well drained Croswell soils are on low rises in the area south of Wisconsin Highway 54 and west of the Yellow River. The moderately well drained Friendship soils are on low hills in the rest of the association. The excessively drained Plainfield soils are on outwash terraces along the Yellow River.

If the soils of this association are cultivated, the hazard of soil blowing is severe. Wetness is a moderate to severe limitation. Field windbreaks, cover crops, surface drainage, and liming and fertilization are the main management practices used on these soils.

Most of this association is in woodland. Some areas were once cultivated but have been planted to trees or have reverted to woodland. A few small areas are cultivated and are in general farm crops. Production of cultivated crops is low. Some areas of Newson soils are in cranberries.

The soils of this association have a low volume change with changes in moisture content and have a high bearing capacity when wet. They also have a seasonal high water table that must be considered when designing highway or building foundations.

The dominant soils of this association are severely limited for use as septic tank filter fields by the high water table.

This association has good potential for wildlife habitat.

Organic and Alluvial Soils

This group consists of associations of organic soils that have an organic subsoil and of sandy to loamy alluvium on the flood plains of streams.

9. Markey-Rifle association

Nearly level, very poorly drained organic soils that have an organic subsoil over sand, and deep organic soils; formed in partly decomposed plant remains; in basins and depressions

The soils of this association are on the glacial lake plain in the south-central part of the county and in a small area in the northeastern part of the county.

This association covers about 3 percent of the county. Markey soils make up about 50 percent of the association, Rifle soils about 40 percent, and minor soils 10 percent.

Markey soils are in the smaller basins or around the edges of the larger basins. They are black mucky peat 16 to 50 inches deep over sand.

Rifle soils generally are in the central parts of large basins. They are black or brownish mucky peat more than 50 inches deep.

The minor soils are mainly in the Cathro and Newson series. Cathro and Newson soils are around the edges of peat bogs or on islands in the bogs.

Most of the association is in woodland or wildlife habitat. A few small areas are used for native pasture, and larger areas are in cranberries. Some of the association has been diked and flooded to serve as water reservoirs for cranberries.

The soils of this association have a very low bearing capacity when wet, which is important in designing foundations for highways.

The soils of this association are very severely limited for use as residential sites, except for small scattered areas of moderately well drained and well drained soils.

These soils have good potential for use as wildlife habitat.

10. Dawson-Greenwood association

Nearly level, very poorly drained, very acid organic soils that have an organic subsoil over sand, and deep, very acid organic soils; formed in partly decomposed plant remains; in basins and depressions

The soils of this association are on the glacial lake plain in the extreme southwestern part of the county, south of Wisconsin Highway 54 and west of the Yellow River.

This association covers about 3 percent of the county. Dawson soils make up about 67 percent of the association, Greenwood soils about 18 percent, and minor soils 15 percent.

Dawson soils are in the smaller basins and around the edges of the larger basins. They are black, very acid mucky peat 16 to 50 inches deep over sand.

Greenwood soils are generally in the central part of the basins. They are black, very acid mucky peat more than 50 inches deep.

The minor soils are mainly in the Newson and Au Gres series. Newson soils are around the borders of peat bogs or on islands in the bogs. The somewhat

poorly drained Au Gres soils are on slight rises in and around the bogs.

Most of this association is in woodland or wildlife habitat. Some areas are used for growing cranberries or for water storage associated with cranberry production. Wild sphagnum moss is harvested in some areas.

The soils in this association have a very low bearing capacity when wet, which is important in designing foundations for roads and highways.

The soils of this association are very severely limited for use as residential sites by the seasonal high water table.

These soils have good potential for wildlife habitat.

11. Alluvial land, wet, association

Nearly level, poorly drained, sandy and loamy soils that have a sandy and loamy subsoil; formed in recent alluvium; on the flood plains of streams

This association consists of bottom lands, islands, and sloughs along the Wisconsin and Yellow Rivers.

This association covers about 4 percent of the county. Alluvial land, wet, makes up about 45 percent of the association, and minor soils make up the remaining 55 percent.

Minor in this association are mainly Markey, Newson, Friendship, and Dunnville soils, Marsh, and Alluvial land. Markey and Newson soils and Marsh are in the sloughs. Dunnville and Friendship soils are on low rises on the flood plain; they flood only at times of extremely high water. Alluvial land is on the higher parts of flood plains.

Most of this association is in woodland and wildlife habitat, but some areas are in native pasture. Floods are frequent, and the water table is high.

Descriptions of the Soils

This section describes the soil series and mapping units in Wood 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 unit in the 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 underlying 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. 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 are apparent in the name of the mapping unit. Color terms are for moist soil unless otherwise stated.

As mentioned in the section "How This Survey Was Made," not all mapping units are members of a soil series. Alluvial land and Marsh, for example, are not soil series, but nevertheless are 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 are 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 learned 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 (*15*).

Alluvial Land

Alluvial land consists of water-laid sediment on flood plains or in depressions. The material generally is variable. Flooding is a hazard.

Alluvial land (1 to 4 percent slopes) (Aa).—This land type is on the higher parts of the flood plains of small streams. The slopes generally are short and choppy and range from 1 to 4 percent. In many places Alluvial land is separated from the uplands by sloughs or by tracts of Alluvial land, wet, and is inaccessible during part of the growing season.

Generally the flood plain is dissected or the stream has cut its bed down so that the water table is at a depth of 4 feet or more. In most places the soils are moderately well drained and only slightly mottled. This land type generally has good surface drainage, and water does not pond on it when floodwater recedes. Permeability ranges from slow to rapid. Because of variations in the soil material, available water capacity and natural fertility range from low to medium.

The hazard of flooding is moderate, but floods are usually short. The soils are suitable for such common crops as corn, small grain, hay, and pasture. It has good potential for timber, particularly northern hardwoods and aspen. Most areas are in pasture, woodland, or wildlife habitat. Capability unit IIw–13; woodland group 3o1.

Alluvial land, wet (0 to 2 percent slopes) (Ab).—This land type consists of alluvial material in depressions and low areas on the flood plains of streams. Slopes are nearly level. In some areas along the Wisconsin River, the soils have a high water table because of water impoundment. Some soil development took place in these areas before the impoundment, but under present conditions the areas more nearly resemble wet alluvial land.

The sediment ranges from sandy to silty. The water table is near the surface during most of the year. In most places there is grayish mottling at a depth of less than 1 foot. Because of variations in texture of the soil material, permeability and natural fertility vary widely. Available water capacity generally is high.

Included in mapping are small areas of soils that have an organic surface layer.

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

Soil	Acres	Percent	Soil	Acres	Percent
Alluvial land	1,100	0.2	Markey mucky peat	9,600	1.9
Alluvial land, wet	12,600	2.4	Marsh	8,100	1.6
Altdorf silt loam	6,900	1.3	Marshfield silt loam	16,900	3.3
Antigo silt loam, 1 to 3 percent slopes	325	.1	Meehan loamy sand	23,000	4.4
Au Gres loamy sand	6,300	1.2	Merrillan sandy loam, 1 to 3 percent slopes	6,100	1.2
Cathro mucky peat	4,250	.8	Milladore silt loam	29,250	5.7
Croswell loamy sand, 0 to 3 percent slopes	1,350	.3	Mosinee loam, 2 to 6 percent slopes	620	.1
Dancy sandy loam	1,100	.2	Newson loamy sand	31,500	6.1
Dawson mucky peat	1,800	.4	Norgo silt loam, 2 to 6 percent slopes	4,450	.9
Dawson peat	8,600	1.7	Norgo silt loam, 6 to 12 percent slopes, eroded	710	.1
Dolph silt loam	12,300	2.4	Norgo silt loam, 12 to 20 percent slopes, eroded	195	(1)
Dunnville loam, 0 to 3 percent slopes	590	.1	Nymore loamy sand, 0 to 2 percent slopes	1,450	.3
Dunnville sandy loam, 0 to 3 percent slopes	1,400	.3	Nymore loamy sand, red subsoil, 0 to 2 percent slopes	2,250	.4
Eaupleine fine sandy loam, sandy subsoil variant, 2 to 6 percent slopes	530	.1	Nymore loamy sand, red subsoil, 2 to 6 percent slopes	720	.1
Eaupleine silt loam, 2 to 6 percent slopes	16,900	3.3	Onamia loam, 1 to 3 percent slopes	930	.2
Eaupleine silt loam, 6 to 12 percent slopes	530	.1	Plainbo sand, 2 to 12 percent slopes	3,000	.6
Eaupleine silt loam, clayey subsoil variant, 2 to 6 percent slopes	1,350	.3	Plainbo sand, 12 to 30 percent slopes	120	(1)
Eaupleine silt loam, clayey subsoil variant, 6 to 12 percent slopes	195	(1)	Plainfield loamy sand, 0 to 2 percent slopes	3,850	.7
Eaupleine silt loam, silty subsoil variant, 2 to 6 percent slopes	640	.1	Plainfield loamy sand, 2 to 6 percent slopes	1,350	.3
Eleva sandy loam, 2 to 6 percent slopes	1,350	.3	Plainfield sand, 0 to 2 percent slopes	33,250	6.4
Eleva sandy loam, 6 to 12 percent slopes	160	(1)	Plainfield sand, 2 to 6 percent slopes	8,700	1.7
Elkmound sandy loam, 2 to 6 percent slopes	1,450	.3	Plainfield sand, 6 to 12 percent slopes	920	.2
Elkmound sandy loam, 6 to 12 percent slopes	560	.1	Plainfield sand, 12 to 35 percent slopes	800	.2
Elkmound sandy loam, 12 to 20 percent slopes, eroded	195	(1)	Point loamy sand, 2 to 6 percent slopes	1,300	.2
Elm Lake loamy sand	8,400	1.6	Poskin silt loam	820	.2
Fenwood silt loam, 2 to 6 percent slopes	1,100	.2	Rib silt loam	1,250	.2
Fenwood silt loam, 6 to 12 percent slopes	1,150	.2	Rietbrock silt loam, 2 to 6 percent slopes	960	.2
Fenwood silt loam, 12 to 20 percent slopes	140	(1)	Rietbrock silt loam, 6 to 12 percent slopes	420	.1
Fenwood stony silt loam, 2 to 6 percent slopes	175	(1)	Rifle mucky peat	2,600	.5
Fenwood stony silt loam, 6 to 12 percent slopes	600	.1	Rifle peat	3,950	.8
Fenwood stony silt loam, 12 to 20 percent slopes	335	.1	Santiago silt loam, 2 to 6 percent slopes	3,950	.8
Friendship loamy sand, 1 to 3 percent slopes	26,000	5.0	Santiago silt loam, 6 to 12 percent slopes	1,300	.2
Gale silt loam, 2 to 6 percent slopes	2,000	.4	Santiago silt loam, 12 to 20 percent slopes, eroded	320	.1
Gale silt loam, 6 to 12 percent slopes	480	.1	Santiago silt loam, clayey substratum, 2 to 6 percent slopes	1,300	.2
Greenwood peat	2,900	.6	Sherry silt loam	12,700	2.5
Guenther loamy sand, 2 to 6 percent slopes	600	.1	Sherry stony silt loam	570	.1
Hiles silt loam, 2 to 6 percent slopes	7,700	1.5	Veedum silt loam	18,200	3.5
Hiles silt loam, 6 to 12 percent slopes	155	(1)	Vesper silt loam	50,864	9.8
Humbird loamy sand, 2 to 6 percent slopes	660	.1	Withee silt loam, 0 to 2 percent slopes	4,600	.9
Humbird sandy loam, 2 to 6 percent slopes	2,650	.5	Withee silt loam, 2 to 6 percent slopes	37,250	7.2
Kert silt loam, 0 to 3 percent slopes	41,750	8.1	Water areas	4,650	.9
Mann silt loam	1,550	.3	Gravel pits	490	.1
Marathon silt loam, 2 to 6 percent slopes	330	.1	Made land	135	(1)
			Total	516,544	100.0

[1] Less than 0.05 percent.

Flooding is frequent and often lasts for prolonged periods. The soils are not suitable for cultivated crops. They support moderate stands of water-tolerant hardwoods. This land type is used for pasture, woodland, and wildlife habitat. Capability unit Vw–14; woodland group 4w5.

Altdorf Series

The Altdorf series consists of deep, poorly drained, nearly level, silty soils in upland waterways and depressions. These soils formed under swamp hardwoods and sedges in 15 to 30 inches of silty sediment and in the underlying clayey residuum from micaceous schist.

In a representative profile the surface layer is very dark grayish-brown silt loam 8 inches thick. The subsurface layer, about 9 inches thick, is grayish-brown silt loam that has isolated bodies of strong-brown heavy silt loam in the lower part. The subsoil is about 45 inches thick. The upper 6 inches is dark grayish-brown and brown, very firm silty clay loam that has tongues of grayish-brown silt loam extending downward from the layer above, and the lower 39 inches is dusky-red, very firm clay. The upper 14 inches of the substratum is dusky-red and dark reddish-brown silty clay loam, the next 17 inches is brownish-yellow, dark reddish-brown, and dusky-red very fine sandy loam that is 5 to 10 percent fragments of micaceous schist, and the lower part is pale-brown, pale-green, olive-yellow, and olive very fine sandy loam that is 5 to 10 percent

fragments of micaceous schist.

A seasonal high water table is at a depth of 1 foot or less in spring and part of summer. Available water capacity is medium, and permeability is slow. Natural fertility is medium. The surface layer and upper part of the subsoil are medium acid to very strongly acid, and the lower part of the subsoil is slightly acid to mildly alkaline. Bedrock is generally below a depth of 6 feet.

Altdorf soils are very severely limited for homesites that use onsite sewage disposal systems by the seasonal high water table and the slow permeability in the subsoil.

Representative profile of Altdorf silt loam in an alfalfa meadow, 30 feet northwest of twin elms in NW¼ SE¼SW¼NE¼ sec. 23, T. 23 N., R. 5 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam, gray (10YR 6/1) to light brownish gray (10YR 6/2) dry; weak, fine, subangular blocky structure; friable; many, fine, fibrous roots; neutral; abrupt, smooth boundary.

A2g—8 to 12 inches, grayish-brown (2.5Y 5/2) silt loam; many, medium, prominent mottles of yellowish brown (10YR 5/6–5/8); weak, fine, subangular blocky structure; friable; common, fine, fibrous roots; medium acid; clear, smooth boundary.

A&Bg—12 to 17 inches, grayish-brown (2.5Y 5/2) silt loam (A2); many, medium, prominent mottles of yellowish brown (10YR 5/6–5/8); moderate, fine and medium, subangular blocky structure; friable; strong-brown (7.5YR 5/6–5/8) heavy silt loam Bt remnants scattered through the horizon make up about 25 percent, by volume; common, fine, fibrous roots; few thin clay films on faces of peds and in tubular pores of Bt part; strongly acid; clear, wavy boundary.

B&Ag—17 to 23 inches, dark grayish-brown (2.5Y 4/2) and brown (7.5YR 5/2) silty clay loam (Bt); many, fine and medium, prominent mottles of strong brown (7.5YR 5/6–5/8) and reddish brown (5YR 4/4); strong, medium, prismatic structure parting to moderate, fine, angular blocky; very firm; many, thin, very dark grayish-brown (10YR 3/2) clay films on faces of peds and in tubular pores of Bt part; tongues of grayish-brown (2.5Y 5/2) silt loam (A2) penetrate horizon from above and make up about 20 percent, by volume; few, fine, fibrous roots; less than 1 percent, fine and medium, polished, rounded and subrounded quartz pebbles; strongly acid; clear, wavy boundary.

IIB2lt—23 to 28 inches, dusky-red (10R 3/3–3/4) clay; moderate, medium, prismatic structure parting to moderate, fine, angular blocky; very firm; few fine roots; continuous, thin, dark reddish-brown (5YR 3/2) clay films on faces of peds and in continuous tubular pores; common, fine, reddish-black (10R 2/1) manganese spots; less than 1 percent, fine and medium, polished, rounded and subrounded quartz pebbles; strongly acid; gradual, wavy boundary.

IIB22t—28 to 38 inches, dusky-red (10R 3/4) clay; moderate, medium, prismatic structure parting to weak, fine, angular blocky; very firm; common, thin, reddish-brown (5YR 4/4) clay films on faces of angular blocky peds and continuous clay films on faces of prisms and in tubular pores; less than 1 percent, fine and medium, polished, rounded and subrounded quartz pebbles; few, light reddish-brown (5YR 6/4), weathered rock fragments 1 to 2 millimeters in size; neutral; gradual, wavy boundary.

IIB23t—38 to 49 inches, dusky-red (10R 3/3) clay; moderate, medium and coarse, prismatic structure parting to weak, medium, angular blocky; very firm; thin continuous clay films on vertical faces of prisms; few weathered remnants of schist bedrock and less than 1 percent, rounded and subrounded, polished pebbles of quartz; mildly alkaline; gradual, wavy boundary.

IIB3t—49 to 62 inches, dusky-red (10R 3/3) clay; weak, medium and coarse, angular blocky structure; very firm; nearly continuous clay films along faces of widely spaced cleavage planes; few, fine, polished, rounded and subrounded quartz pebbles; mildly alkaline; clear, wavy boundary.

IIC1—62 to 76 inches, dusky-red (10R 3/2–3/4) and dark reddish-brown (5YR 3/4–3/3) silty clay loam; very thin, platy structure (rock fabric); firm ranging to friable; many, very fine (1 to 2 millimeters), light reddish-brown (5YR 6/4), weathered fragments of micaceous schist bedrock; neutral; clear, smooth boundary.

IIC2—76 to 93 inches, brownish-yellow (10YR 6/8), dark reddish-brown (5YR 3/2–3/3), and dusky-red (10YR 3/2–3/3) very fine sandy loam; weak, very thin, platy structure (rock fabric); firm; 5 to 10 percent fine (approximately 2 millimeters) fragments of micaceous schist bedrock; neutral; clear, smooth boundary.

IIC3—93 to 107 inches, variegated pale-brown (10YR 6/3), pale-green (5G 6/2), olive-yellow (2.5Y 6/6–6/8), and olive (5Y 5/6) very fine sandy loam; weak, very thin, platy structure (rock fabric); friable; 5 to 10 percent fragments of micaceous schist bedrock approximately 2 millimeters in size; slightly acid.

The solum ranges from 40 to 72 inches in thickness but typically is 50 to 66 inches thick. In undisturbed areas the A1 horizon ranges from black to very dark grayish brown. The IIB2t horizon ranges from heavy silty clay loam to clay.

Altdorf soils are adjacent to somewhat poorly drained Dolph soils and well-drained Eaupleine soils, clayey subsoil variant; these soils form a drainage sequence. They are near Sherry soils, which are also poorly drained. Altdorf soils are saturated for longer periods than Dolph soils and Eaupleine soils, clayey subsoil variant. They are finer textured than Sherry soils.

Altdorf silt loam (0 to 2 percent slopes) (Af).—This soil is in upland drainageways and broad upland depressions. Slopes are concave, uniform, and 100 to 500 feet long. Areas are 10 to 200 acres in size. Runoff is very slow to ponded.

The hazard of wetness is severe. Frost is also a hazard late in spring and early in fall. If this soil is drained, it is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIw–3; woodland group 2o1.

Antigo Series

The Antigo series consists of deep, well drained and moderately well drained, nearly level and gently sloping silty soils on outwash plains in broad stream valleys. These soils formed in 20 to 40 inches of silty sediment and in the underlying stratified sand that contains a small amount of fine and medium gravel. The native vegetation was white pine and northern hardwoods.

In a representative profile the surface layer is dark-brown silt loam 6 inches thick. The subsurface layer is brown silt loam 7 inches thick. The subsoil is 20 inches thick. The upper 4 inches is dark yellowish-brown silt loam that has tongues of brown silt loam extending downward from the layer above; the next 10 inches is dark yellowish-brown, firm silt loam; the next 3 inches is dark yellowish-brown heavy loam that has a few yellowish-brown mottles; and the lower 3 inches is dark-brown sandy loam that has yellowish-brown mottles. The upper 17 inches of the substratum is dark-

brown loamy sand, and the lower part is pale-brown, loose sand.

A seasonal high water table is at a depth of 5 to 7 feet. Available water capacity is medium, and permeability is moderate. Natural fertility is medium. The surface layer and subsoil are strongly acid or very strongly acid throughout. Bedrock is generally below a depth of 6 feet.

Most of the acreage of these soils is used for general farm crops, but small areas are in native pasture or woodlots. The soils are well suited to northern hardwoods, white pine, and white spruce.

Antigo soils are moderately limited for homesites that use onsite sewage disposal systems by the danger of contaminating ground water.

Representative profile of Antigo silt loam, 1 to 3 percent slopes, in a cultivated field where the slope is 2 percent and faces west, 200 feet west and 50 feet north of southeast corner of sec. 1, T. 24 N., R. 4 E.:

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

A2—6 to 13 inches, brown (10YR 5/3) silt loam; weak, medium, platy structure; friable; few roots; very strongly acid; clear, wavy boundary.

B&A—13 to 17 inches, dark yellowish-brown (10YR 4/4) silt loam; tongues, 2 inches across and 4 inches deep, of brown (10YR 5/3) silt loam extend downward from A2 horizon; weak, medium, subangular blocky structure; friable; few roots; very strongly acid; clear, wavy boundary.

B21t—17 to 27 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, medium, subangular blocky structure; firm, slightly sticky; few roots; few clay films on peds; very strongly acid; clear, wavy boundary.

B22t—27 to 30 inches, dark yellowish-brown (10YR 4/4) heavy loam; few, distinct, yellowish-brown (10YR 5/6) mottles; moderate, coarse, subangular blocky structure; firm, slightly sticky; few roots; common continuous clay films on peds; very strongly acid; clear, wavy boundary.

IIB3—30 to 33 inches, dark-brown (7.5YR 4/4) sandy loam; common, medium, prominent, yellowish-brown (10YR 5/8) mottles; weak, coarse, subangular blocky structure; friable; very strongly acid; clear, wavy boundary.

IIC1—33 to 50 inches, dark-brown (7.5YR 4/4) loamy sand; single grained; loose; strongly acid; clear, wavy boundary.

IIC2—50 to 60 inches, pale-brown (10YR 6/3) sand; single grained; loose; medium acid.

In cultivated areas the Ap horizon ranges from dark brown (10YR 3/3) to dark grayish brown (10YR 4/2) when moist and to light brownish gray (10YR 6/2) when dry. In places the underlying outwash is poorly sorted and ranges from sand or gravel to ball-like bodies of gravelly sandy clay loam. The silt cap ranges from 20 to 40 inches in thickness.

The Antigo soils in Wood County have less gravel in the C horizon than is typical for the series.

Antigo soils are on the higher and more sloping parts of outwash plains, and Poskin soils are on the lower side slopes. Antigo soils are in positions similar to those of Onamia soils, but they are finer textured in the upper part of the solum than Onamia soils. Antigo soils are better drained than Poskin soils.

Antigo silt loam, 1 to 3 percent slopes (AnA).—This soil is on convex outwash plains in broad valleys. Areas are 5 to 20 acres in size.

Included with this soil in mapping are small areas of somewhat poorly drained Poskin soils in slight depressions.

Almost all of the acreage of this soil is in cultivated crops commonly grown in the area. Small areas are in pasture or woodland. Capability unit IIs–1; woodland group 2o1.

Au Gres Series

The Au Gres series consists of deep, somewhat poorly drained, sandy soils in the basins of glacial lakes. These soils formed in deep, acid, sandy drift under scrub oak-jack pine forest.

In a representative profile a 1–inch-thick layer of raw and partly decomposed grass, moss, leaves, and other organic material is on the surface. The mineral surface layer is very dark gray and light brownish-gray loamy sand 7 inches thick. The subsoil is about 15 inches thick. The upper 3 inches is dark reddish-brown, very friable loamy sand; the next 3 inches is dark-brown, very friable loamy sand that has mottles of strong brown; and the lower 9 inches is yellowish-brown loamy sand that has mottles of strong brown and gray. The upper 18 inches of the substratum is white, loose sand that has mottles of strong brown and brownish yellow. Below a depth of 40 inches is light-gray, loose sand that has strong-brown and brownish-yellow mottles.

A seasonal high water table is near the surface in wet seasons and is at a depth of about 3 feet in dry seasons. Available water capacity is low, and permeability is rapid. Natural fertility is low. The surface layer and subsoil range from strongly acid to extremely acid throughout.

Most of the acreage of these soils is in forest or wildlife habitat. The soils are suitable for Norway pine and jack pine. Aspen grows poorly on these soils and generally dies before it reaches pulpwood size.

Au Gres soils are severely limited for building sites that have onsite sewage disposal systems by the seasonal high water table.

Representative profile of Au Gres loamy sand, where slope is 2 percent, in a thin stand of scrub oak, 1,850 feet south and 50 feet east of northwest corner of sec. 18, T. 21 N., R. 3 E.:

O1—1 to ½ inch, moss, grass, leaf litter, etc.

O2—½ inch to 0, mat of largely decomposed organic material that contains many white sand grains; extremely acid.

A21—0 to 3 inches, very dark gray (10YR 3/1) and gray (10YR 5/1) mixed grains of loamy sand; single grained; loose; many roots; extremely acid; clear, wavy boundary.

A22—3 to 7 inches, light brownish-gray (10YR 6/2) loamy sand; single grained; loose; common roots; extremely acid; abrupt, wavy boundary.

Bhir—7 to 10 inches, dark reddish-brown (5YR 3/4) loamy sand; weak, fine, subangular blocky structure; very friable; common roots; very strongly acid; clear, wavy boundary.

Bir—10 to 13 inches, dark-brown (7.5YR 4/4) loamy sand; few, fine, distinct mottles of strong brown (7.5YR 5/8); weak, fine, subangular blocky structure, very friable; few roots; very strongly acid; clear, wavy boundary.

B3—13 to 22 inches, yellowish-brown (10YR 5/4) loamy sand; common, coarse, distinct mottles of strong brown (7.5YR 5/8) and gray (10YR 5/1); weak, fine, subangular blocky structure; very friable; very strongly acid; gradual, wavy boundary.

C1—22 to 40 inches, white (10YR 8/1) sand; common, coarse, prominent mottles of strong brown (7.5YR

5/8) and brownish yellow (10YR 6/6); single grained; loose; very strongly acid; gradual, wavy boundary.

C2—40 to 60 inches, light-gray (10YR 7/2) sand; common, coarse, prominent mottles of strong brown (7.5YR 5/8) and brownish yellow (10YR 6/6); single grained; loose; very strongly acid.

The A horizon ranges from loamy sand to sand. In places a very dark gray A1 horizon about 1 inch thick is between the O2 and A21 horizons. In some places chunks of iron-cemented sand are in the Bhir or Bir horizon, but they do not constitute a continuous cemented layer.

Au Gres soils are adjacent to Croswell and Newson soils. Au Gres soils are below Croswell soils and are grayer above a depth of 40 inches than Croswell soils. Au Gres soils have a thinner and lighter A horizon than Newson soils.

Au Gres loamy sand (0 to 2 percent slopes) (Au).—This soil is on low ridges on the sand plains. Slopes are convex, somewhat hummocky, and 50 to 150 feet long. Areas are 10 to 200 acres in size. Runoff is very slow.

Almost all of the acreage of this soil is in second-growth forest. This soil has a seasonal high water table, the depth of which can be controlled by open ditches. If this soil is drained, the hazard of soil blowing is severe, but the soil is suitable for general farm crops. If undrained, this soil is suitable for small grain, hay, pasture, woodland, or wildlife habitat. If this soil is used for cultivated crops, particularly corn, frost is an additional hazard late in spring and early in fall. Capability unit IVw–5; woodland group 3w4.

Cathro Series

The Cathro series consists of very poorly drained organic soils over loamy mineral material in depressions. These soils formed in 16 to 50 inches of organic residue from decomposed sedges, grasses, reeds, and a few woody shrubs and trees. The organic material accumulated and is only partly decomposed because of the seasonal high water table. The underlying material is loam.

In a representative profile the surface layer is dark reddish-brown mucky peat about 14 inches thick. Below this is black mucky peat about 17 inches thick. The substratum is very dark gray to dark-gray loam.

A seasonal high water table is at or near the surface for most of the year. Available water capacity is very high, and permeability is moderately rapid in the organic layers and moderate in the mineral substratum. Natural fertility is low. These soils are slightly acid to strongly acid throughout. Bedrock is at a depth of more than 6 feet.

Most of the acreage of these soils is in native pasture or wildlife habitat. If the soils are drained, they are suited to general farm crops. They are poorly suited to trees.

Cathro soils are very severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table.

Representative profile of Cathro mucky peat in a cattail-sedge bog in NE¼NW¼NE¼ sec. 5, T. 25 N., R. 5 E.:

Oa1—0 to 14 inches, sapric material, dark reddish brown (5YR 2/2), black (5YR 2/1) rubbed and pressed; about 60 percent fiber, about 10 percent rubbed; weak, coarse, subangular blocky structure; non-sticky; about 80 percent herbaceous fibers and 20 percent woody fibers; many roots; strongly acid; clear, wavy boundary.

Oa2—14 to 31 inches, sapric material, black (5YR 2/1) broken face and rubbed, dark reddish brown (5YR 2/2) unrubbed; about 40 percent fiber, about 10 percent rubbed; moderate, coarse, subangular blocky structure; nonsticky; about 90 percent herbaceous fibers and 10 percent woody fibers; medium acid; abrupt boundary.

IIC1g—31 to 40 inches, very dark gray (N 3/0) loam; massive; friable; slightly acid; clear, wavy boundary.

IIC2g—40 to 60 inches, dark-gray (N 4/0) loam; many, medium, prominent mottles of olive brown (2.5Y 4/4) and greenish gray (5GY 5/1); massive; firm; slightly acid.

In places a thin layer of fibrous peat 3 to 6 inches thick is on the surface. If the peat is unrubbed, the content of woody fibers ranges from about 5 to 30 percent. Depth to the loamy mineral C horizon ranges from 16 to 50 inches. The C horizon ranges from fine sandy loam to sandy clay loam.

Cathro soils are adjacent to the very poorly drained Rifle and Markey soils. They formed in shallower organic deposits than Rifle soils. They have a finer textured underlying mineral soil than Markey soils.

Cathro mucky peat (0 to 2 percent slopes) (Ca).—This soil is in depressions and in broad valleys of slow-moving streams. Areas are 10 to 200 acres in size. Vegetation is mainly sedges, cattails, and poor-quality aspen. Runoff is ponded.

Included with this soil in mapping are small areas of soils that have a less decomposed surface layer. Also included are small areas of Dancy and Rifle soils.

If this soil is cultivated, the hazard of soil blowing is severe. Frost is a hazard to row crops on this soil. If this soil is drained, it is suitable for limited cropping. Drainage is generally difficult because of a lack of outlets. Some areas are used for unimproved pasture, but most areas are in wildlife habitat. Capability unit IVw–9; not placed in a woodland group.

Croswell Series

The Croswell series consists of deep, moderately well drained, sandy soils on low ridges. These soils formed under pine forest in deep, acid, sandy drift.

In a representative profile the surface layer is very dark brown, loamy sand 5 inches thick. The subsurface layer is light brownish-gray loamy sand 4 inches thick. The subsoil is 14 inches thick. The upper 3 inches is dark reddish-brown, friable loamy sand; and the lower 11 inches is dark-brown, friable loamy sand. The substratum is dark yellowish-brown to brown, loose sand that has a few dark yellowish-brown mottles below a depth of 36 inches.

A seasonal high water table is at a depth of 3 to 5 feet during part of the year. Available water capacity is low, and permeability is rapid. Natural fertility is low. The surface layer and subsoil are strongly acid in the upper part and medium acid in the lower part.

Most of the acreage of these soils is in woodland or wildlife habitat. The soils are suited to Norway pine, jack pine, and aspen.

Croswell soils are moderately limited for building sites by the seasonal high water table.

Representative profile of Croswell loamy sand, 0 to 3 percent slopes, where slope is 1 percent, in a thin stand

of black oak, 300 feet north and 200 feet west of the southeast corner of sec. 13, T. 22 N., R. 2 E.:

A1—0 to 5 inches, very dark brown (10YR 2/2) loamy sand; weak, fine, granular structure; friable; common roots; very strongly acid; clear, wavy boundary.

A2—5 to 9 inches, light brownish-gray (10YR 6/2) loamy sand; weak, fine, granular structure; loose; common roots; strongly acid; clear, wavy boundary.

Bhir—9 to 12 inches, dark reddish-brown (5YR 3/3) loamy sand; moderate, medium, subangular blocky structure; friable; common roots; weakly cemented nodules of very firm, dark reddish-brown (5YR 3/2) loamy sand, about 1 inch in diameter; strongly acid; clear, wavy boundary.

Bir—12 to 23 inches, dark-brown (7.5YR 3/4) loamy sand; weak, medium, subangular blocky structure; friable; few roots; medium acid; clear, wavy boundary.

C1—23 to 36 inches, dark yellowish-brown (10YR 4/4) sand; single grained; loose; medium acid; clear, wavy boundary.

C2—36 to 42 inches, brown (10YR 5/3) sand; few, medium, distinct, dark yellowish-brown (10YR 4/6) mottles; single grained; loose; medium acid; clear, wavy boundary.

C3—42 to 60 inches, brown (10YR 5/3) sand; single grained; loose; medium acid.

The A horizon ranges from very dark brown to very dark gray and dark yellowish brown. It generally is loamy sand, but it ranges from loamy sand to sandy loam. Depth to the Bhir horizon ranges from 6 to 10 inches. Cementation in the Bhir horizon ranges from none to many weak nodules, but it is not a continuous cemented layer. The amount of mottling in the C horizon generally is small, and grayish mottles do not occur above a depth of 40 inches.

Croswell soils are adjacent to Au Gres and Newson soils. They are saturated for shorter periods than Au Gres soils and are not so gray. They have a thinner, lighter-colored A horizon than Newson soils, and they are not so gray in the subsoil.

Croswell loamy sand, 0 to 3 percent slopes (CrA).—This soil is on low ridges on the sand plains. Slopes are convex, somewhat irregular, and 50 to 150 feet long. Areas are 10 to 50 acres in size. The color of the surface layer in uncultivated areas is uniformly very dark brown. Runoff is slow.

This soil has a fluctuating water table and lacks moisture late in summer and in other dry seasons. The hazard of soil blowing is severe. Open ditch drainage is effective in controlling the depth of the water table. If soil blowing is controlled, this soil is suitable for general farm crops. Capability unit IVs–3; woodland group 3s1.

Dancy Series

The Dancy series consists of deep, poorly drained, nearly level soils in upland drainageways and depressions and on marsh borders. These soils formed in a layer of sandy loam and loamy sand drift and the underlying loamy residuum from granitic rocks that have a high content of mica. The sandy loam and loamy sand drift ranges from 20 inches to less than 40 inches in thickness. The native vegetation was sedges and hardwoods.

In a representative profile the surface layer is very dark brown sandy loam about 9 inches thick. The subsurface layer is loamy sand about 14 inches thick. The upper part is dark grayish-brown and is mottled with strong brown, and the lower part is variegated light brownish gray, yellowish brown, brownish yellow, and strong brown. The subsoil is about 18 inches thick. The upper part is variegated light brownish-gray, yellowish-brown, and strong-brown, firm sandy clay loam; the middle part is grayish-brown, firm clay loam that has strong-brown mottles; and the lower part is olive-gray, firm clay loam that has yellowish-brown mottles. The substratum is black and dark olive-gray sandy loam residuum from micaceous granitic rock.

A seasonal high water table is near the surface during part of the year. Available water capacity is medium, and permeability is moderately rapid in the surface and subsurface layers and moderately slow in the subsoil. Natural fertility is low. The surface layer and subsoil are slightly acid to medium acid in the upper part and slightly acid to neutral in the lower part. Depth to bedrock is generally more than 6 feet.

Most of the acreage of these soils is used for native pasture or woodland, but some small areas are used for oats and hay. The soils generally support poor stands of aspen, white spruce, or jack pine.

Dancy soils are very severely limited for use as building sites that have onsite sewage-disposal systems by the seasonal high water table and moderately slow permeability in the subsoil.

Representative profile of Dancy sandy loam in an idle field, 200 feet north and 200 feet east of the intersection of County Highways P and O, NW¼ sec. 25, T. 23 N., R. 6 E.:

Ap—0 to 9 inches, very dark brown (10YR 2/2) sandy loam, dark gray (10YR 4/1) dry; moderate, fine, subangular blocky structure; friable; many fine fibrous roots; slightly acid; clear, smooth boundary.

A2—9 to 13 inches, dark grayish-brown (10YR 4/2) loamy sand, light brownish gray (10YR 6/2) dry; common, fine, prominent mottles of strong brown (7.5YR 5/6–5/8); weak, medium, platy structure; very friable; common fine fibrous roots; slightly acid; clear, wavy boundary.

A&B—13 to 23 inches, variegated light brownish-gray (10YR 6/2), yellowish-brown (10YR 5/4), light yellowish-brown (10YR 6/4), and brownish-yellow (10YR 6/6–6/8) loamy sand (A2); weak, medium, subangular blocky structure; friable; isolated remnants of strong-brown (7.5YR 5/6 and 5/8) sandy loam (B2t) occupy about 40 percent, by volume; few fibrous roots; few thin clay films on faces of peds and in some pores of the B2t part; slightly acid; clear, wavy boundary.

IIB&A—23 to 27 inches, variegated light brownish-gray (2.5Y 6/2), yellowish-brown (10YR 5/6–5/8), and strong-brown (7.5YR 5/6–5/8) sandy clay loam (B2t); weak, medium, subangular blocky structure; firm; tongues of light brownish-gray (10YR 6/2) sandy loam and loamy sand (A2) 10 to 15 millimeters wide penetrate this horizon from above and occupy about 20 percent, by volume; common thin clay films on faces of peds and in pores of the Bt part; slightly acid; clear, wavy boundary.

IIB2tg—27 to 32 inches, grayish-brown (2.5Y 5/2) clay loam; many, fine and medium, prominent mottles of strong brown (7.5YR 5/6–5/8); weak, medium, subangular blocky structure; firm; common, thin, patchy, dark-brown (10YR 3/3) clay films in tubular pores and on faces of some peds; clean fine sand coats along primary vertical structural planes; slightly acid; clear, wavy boundary.

IIB3g—32 to 41 inches, olive-gray (5Y 5/2) clay loam; common, medium, distinct and prominent mottles of light yellowish brown (2.5Y 6/4) and yellowish brown (10YR 5/6–5/8); weak, medium, subangular blocky structure; firm; few clay flows in tubular pores; few (1 to 2 percent), fine, angular

fragments of igneous rock; neutral; clear, wavy boundary.

IIC—41 to 60 inches, black (5Y 2/2) and dark olive-gray (5Y 3/2) sandy loam residuum from weathered and disintegrated highly micaceous granitic bedrock; massive; friable; few, fine, angular fragments of igneous rock; neutral.

The sandy loam and loamy sand A and B horizons range from 20 inches to less than 40 inches in total thickness. The solum ranges from 28 to 50 inches in thickness and extends into the underlying loamy residuum that weathered from acid igneous rock. The Ap or A1 horizon ranges from black (10YR 2/1) to very dark grayish brown (10YR 3/2). The A2 horizon ranges from dark-gray (10YR 4/1) to light brownish-gray (10YR 6/2) sandy loam or loamy sand. The IIB2tg horizon is loam or clay loam and ranges from grayish brown to olive gray. The IIC horizon ranges from sandy loam to clay loam and from black (5Y 2/2) to olive gray (5Y 5/2). Content of igneous rock fragments in the IIC horizon ranges from 10 to 30 percent by volume.

Dancy soils are similar to the moderately well drained Guenther soils and to the somewhat poorly drained Point soils. They are saturated for longer periods than those soils.

Dancy sandy loam (0 to 2 percent slopes) (Da).—This soil is in concave depressions and drainageways or on marsh borders. Areas are long, narrow, and 5 to 40 acres in size. The surface layer is uniformly dark. Runoff is slow to ponded.

Included with this soil in mapping are small areas of soils that have a surface layer of loamy sand or mucky sandy loam. Also included are some small areas of soils that have slopes of 3 to 4 percent.

This soil is saturated in spring and part of summer. If adequately drained and fertilized, this soil is moderately suited to small grain, hay, and pasture. Frost is a hazard to row crops late in spring or early in fall. Capability unit IVw–3; woodland group 3w4.

Dawson Series

The Dawson series consists of deep, very poorly drained, organic soils in broad depressions on glacial lake plains. These soils formed in 16 to 50 inches of organic residue from partly decomposed moss sedges, grasses, and other aquatic plants. The organic material accumulated and is only partly decomposed because of the seasonal high water table. The substratum is sandy.

In a representative profile in a sphagnum moss bog, the surface layer is dark reddish-brown raw sphagnum moss about 3 inches thick. The next 33 inches is black muck. The upper 12 inches of the substratum is very dark gray loamy sand. Below this, reaching a depth of 60 inches, is pale-brown medium sand.

A seasonal high water table is at or near the surface for much of the year. Available water capacity is high and permeability is moderately rapid in the organic material and rapid in the substratum. Natural fertility is low. Dawson soils are very strongly acid throughout the organic part of the profile.

Almost all of the acreage of these soils is sphagnum moss bog. Either the bog is open, or it supports poor stands of stunted black spruce. A few areas are in cranberries. These soils are too acid and too poorly drained to support a stand of timber. Sphagnum moss is harvested from some areas.

Dawson soils are very severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table.

Representative profile of Dawson peat in a sphagnum moss bog, in NW¼NW¼SE¼NW¼ sec. 6, T. 21 N., R. 2 E.:

Oil—0 to 3 inches, fibric material, dark reddish brown (5YR 2/2) broken face, dark reddish brown (5YR 3/2) rubbed and pressed; about 80 percent fiber, about 50 percent rubbed; massive; nonsticky; dominantly sphagnum moss fiber; extremely acid; abrupt, smooth boundary.

Oa1—3 to 9 inches, sapric material, black (5YR 2/1) broken face, dark reddish brown (5YR 2/2) rubbed and pressed; about 30 percent fiber, less than 10 percent rubbed; moderate, medium, granular structure; nonsticky; dominantly herbaceous fibers; very strongly acid; clear, smooth boundary.

Oa2—9 to 24 inches, sapric material, black (5YR 2/1) broken face, dark reddish brown (5YR 2/2) rubbed and pressed; about 20 percent fiber, less than 10 percent rubbed; moderate, fine, angular blocky structure; nonsticky; dominantly herbaceous fibers; very strongly acid; clear, smooth boundary.

Oa3—24 to 36 inches, sapric material, black (5YR 2/1) broken face, dark reddish brown (5YR 2/2) rubbed and pressed; about 35 percent fibers, less than 10 percent rubbed; moderate, thick, platy structure; nonsticky; dominantly herbaceous fibers; very strongly acid; abrupt, smooth boundary.

IIC1—36 to 48 inches, very dark gray (10YR 3/1) loamy sand; single grained; nonsticky; strongly acid; clear, smooth boundary.

IIC2—48 to 60 inches, pale-brown (10YR 6/3) medium sand; single grained; nonsticky; slightly acid.

The depth to the sandy C horizon ranges from 16 to 50 inches. The Oil layer is generally sphagnum moss and ranges from 1 to 8 inches in thickness. The material is dominantly sapric, but layers of fibric material less than 5 inches thick or layers of hemic material less than 10 inches thick are present in places.

Dawson soils are adjacent to Greenwood soils. They have a thinner organic deposit than Greenwood soils.

Dawson mucky peat (0 to 2 percent slopes) (Dc).—This soil is in depressions on glacial lake plains. Areas are 50 to 200 acres in size. The natural vegetation is mainly sphagnum moss. Runoff is ponded.

This soil has a profile similar to the one described as representative of the series, but the surface layer, to a depth of about 12 inches, is dominantly raw sphagnum moss fibers.

Included with this soil in mapping are small areas of soils that have a surface layer of peat. Also included are areas of soils in which the organic material is more than 50 inches deep.

If this soil is cultivated, the hazard of soil blowing is severe. The soil is suited to cranberries and to sphagnum moss. It is poorly suited to general farm crops because of high acidity, very poor drainage, and moderate frost hazard. If properly drained, limed, and fertilized, it is suitable for grasses and legumes for forage and, in places, for such specialty crops as carrots. Capability unit IVw–9; woodland group 6w6.

Dawson peat (0 to 2 percent slopes) (Db).—This soil is in broad depressions on glacial lake plains. Areas are irregularly shaped and 50 to 300 acres in size. Vegetation is mainly sphagnum moss and stunted black spruce. Runoff is ponded.

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

Included with this soil in mapping are small areas of soils that have organic material more than 50 inches deep. Also included are some small areas of soils that have a surface layer of mucky peat.

If this soil is cultivated, the hazard of soil blowing is severe. This soil is poorly suited to the common cultivated crops because of high acidity, very poor drainage, and moderate frost hazard. Before this soil can be cultivated, it is necessary to remove the surface layer of raw sphagnum moss fibers. If properly drained, limed, and fertilized, this soil is suitable for grasses and legumes for forage or, in places, for such specialty crops as carrots. This soil is suitable for cranberries and for sphagnum moss. Capability unit IVw–9; woodland group 6w6.

Dolph Series

The Dolph series consists of deep, somewhat poorly drained, nearly level, silty soils on broad upland plains. These soils formed under northern hardwood forest in 15 to 30 inches of silty sediment and in the underlying clayey residuum from micaceous schist.

In a representative profile in a cultivated area, the surface layer is dark grayish-brown silt loam 8 inches thick. The subsurface layer is about 7 inches thick. The upper part is grayish-brown silt loam that has strong-brown mottles, and the lower part is grayish-brown and light brownish-gray silt loam that has mottles of strong brown and that contains isolated bodies of reddish-brown and yellowish-red heavy silt loam. The upper 4 inches of the subsoil is reddish-brown and weak-red clay that has tongues of reddish-gray, brown, and light brownish-gray silt loam and silty clay loam extending downward from the layer above; and the lower 17 inches is dark reddish-brown clay. The substratum is variegated olive-gray and reddish-brown very fine sandy loam about 21 inches thick. Below this, reaching to a depth of about 71 inches, is dark olive-gray, olive-yellow, and strong-brown, moderately soft mica schist bedrock that can be dug with a spade.

A seasonal high water table is at a depth of 1 to 3 feet for part of the year. Available water capacity is medium, and permeability is slow. Natural fertility is medium. The surface layer and subsoil are medium acid to very strongly acid, and the substratum is slightly acid to mildly alkaline above a depth of 40 inches. The depth to bedrock ranges from 4 to 8 feet.

These soils are suitable for general farm crops. They are well suited to white pine, balsam fir, white spruce, and other timber species.

Dolph soils are severely limited for homesites that have onsite sewage-disposal systems by the seasonal high water table and slow permeability.

Representative profile of Dolph silt loam 725 feet east and 525 feet north of the intersection of two town roads in NW¼SE¼SW¼NE¼ sec. 23, T. 23 N., R. 5 E.:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak, medium, subangular blocky structure; friable; many fine fibrous roots; neutral; abrupt, smooth boundary.

A2—8 to 10 inches, grayish-brown (10YR 5/2) silt loam; many, fine, prominent mottles of strong brown (7.5YR 5/6–5/8); weak, thin, platy structure; friable; many fine fibrous roots; strongly acid; clear, wavy boundary.

A&B—10 to 15 inches, grayish-brown (10YR 5/2) and light brownish-gray (10YR 6/2) silt loam (A2); common, fine, prominent mottles of strong brown (7.5YR 5/6–5/8); weak, medium, prismatic structure parting to very weak, fine, subangular blocky; friable; isolated remnants of reddish-brown (5YR 4/4) and yellowish-red (5YR 4/6) heavy silt loam (Bt) make up about 20 percent, by volume; strongly acid; clear, wavy boundary.

IIB&A—15 to 19 inches, reddish-brown (5YR 4/4) and weak-red (2.5YR 4/2) clay (Bt); many, fine, distinct and prominent mottles of strong brown (7.5YR 5/6–5/8); moderate, medium, prismatic structure parting to weak, fine, angular blocky; firm, many, thin, dark-brown (10YR 3/3) clay films on faces of peds and in tubular pores of Bt part; tongues of reddish-gray (5YR 5/2), brown (7.5YR 5/2), and light brownish-gray (10YR 6/2) silt loam and silty clay loam (A2) penetrate this horizon from above and make up approximately 20 percent, by volume; few, fine, fibrous roots; strongly acid; clear, wavy boundary.

IIB21t—19 to 26 inches, dark reddish-brown (2.5YR 3/4) clay; few, medium, distinct mottles of yellowish red (5YR 5/6); moderate, medium, prismatic structure parting to moderate, fine and very fine, angular blocky; very firm; continuous thin clay films on faces of peds and in tubular pores; few (2 to 3 percent, by volume) fine, weathered rock fragments throughout horizon; very strongly acid; gradual, wavy boundary.

IIB22t—26 to 36 inches, dark reddish-brown (2.5YR 3/4) clay; weak, medium, prismatic structure parting to weak, medium and fine, angular blocky; very firm; common thin clay films on faces of peds and continuous pores; few (2 to 3 percent, by volume,) fine, weathered rock fragments throughout horizon; very strongly acid; clear, wavy boundary.

IIC—36 to 57 inches, variegated olive-gray (5Y 4/2 and 5/2) and reddish-brown (5YR and 2.5YR 4/4) very fine sandy loam; massive to weak, thick, platy structure; friable; few moderately thick (2 to 4 inches) tongues of clay loam (B3) extend 10 to 12 inches into this horizon from horizon above; slightly acid; clear, wavy boundary.

IIR—57 to 71 inches, dark olive-gray (5Y 3/2), olive-yellow (5Y 6/6), and strong-brown (7.5YR 5/6) mica schist bedrock; moderately soft (can be chopped out with spade); thin clay coatings of light olive brown (2.5Y 5/4) on some schist fragments near upper boundary; slightly acid.

The solum ranges from 24 to 40 inches in thickness but typically is 30 to 40 inches thick. In undisturbed areas an A1 horizon 3 to 5 inches thick is present instead of the Ap horizon. The IIBt horizon is heavy silty clay loam, silty clay, or clay that is firm or very firm. It is about 1 to 5 percent polished, rounded and subrounded quartz pebbles. The IIC horizon generally is sandy loam, fine sandy loam, or very fine sandy loam but ranges to silty clay loam, sandy clay loam, or clay loam in the upper part.

Dolph soils are adjacent to well-drained Eaupleine soils, clayey subsoil variant, and poorly drained Altdorf soils; these soils form a drainage sequence. Dolph soils are near Milladore soils. They are saturated for shorter periods than Altdorf soils and for longer periods than Eaupleine soils, clayey subsoil variant. They have a solum the lower part of which formed in residuum from micaceous schist, whereas Milladore soils formed in micaceous gneiss.

Dolph silt loam (0 to 2 percent slopes) [Do].—This soil is on uplands. Slopes are long and uniform and are generally between 1 and 2 percent. Areas are irregularly shaped and 10 to 200 acres in size. The cultivated surface layer is almost uniformly dark grayish brown.

Included with this soil in mapping are small areas of Altdorf soils. Also included are some areas of soils that have a surface layer of loam and some areas of soils that have a sandy loam layer, less than 12 inches thick, in the subsoil.

This soil is slow to dry in spring, but it is suitable for general farm crops. Capability unit IIw–3; woodland group 3o1.

Dunnville Series

The Dunnville series consists of deep, well-drained, loamy soils on stream terraces or on high bottom lands. These soils formed under mixed grass and hardwood forest in loamy and sandy outwash material.

In a representative profile in a cultivated area, the surface layer is 12 inches thick. It is very dark brown loam over dark-brown loam. The subsoil is 12 inches thick. The upper 3 inches is dark reddish-brown, friable loam; the middle 5 inches is reddish-brown, friable loam; and the lower 4 inches is reddish-brown, friable sandy loam. The substratum is dark-brown to strong-brown, loose medium and fine sand.

A seasonal high water table is generally at a depth of more than 5 feet. Available water capacity is medium, and permeability is moderate. Natural fertility is medium. The surface layer and subsoil are strongly acid to very strongly acid. Bedrock is at a depth of more than 6 feet.

Most of the acreage of these soils is used for general farm crops, but some areas are in native pasture and woodland. They are moderately limited for homesites that use onsite sewage-disposal systems by the danger of contaminating ground water.

Representative profile of Dunnville loam, 0 to 3 percent slopes, in a red clover-timothy meadow that has a 1 percent slope, 600 feet north and 2,200 feet west of the southeast corner of sec. 21, T. 21 N., R. 5 E.:

Ap—0 to 8 inches, very dark brown (7.5YR 2/2) loam; weak, medium, subangular blocky structure parting to moderate, medium, granular; friable; common roots; strongly acid; abrupt, smooth boundary.

A3—8 to 12 inches, dark-brown (7.5YR 3/2) loam; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; friable; common roots; strongly acid; clear, wavy boundary.

B1—12 to 15 inches, dark reddish-brown (5YR 3/3) loam; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky; friable; common roots; strongly acid; clear, wavy boundary.

B2—15 to 20 inches, reddish-brown (5YR 4/3) loam; weak, coarse, prismatic structure parting to moderate, medium, subangular blocky; friable; common roots; strongly acid; clear, wavy boundary.

B3—20 to 24 inches, reddish-brown (5YR 4/3) sandy loam; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; friable; very dark brown (7.5YR 2/2) organic coatings on vertical faces of peds; common roots; strongly acid; clear, wavy boundary.

IIC1—24 to 30 inches, dark-brown (7.5YR 4/4) medium and fine sand; single grained; loose; few roots; very strongly acid; clear, smooth boundary.

IIC2—30 to 60 inches, strong-brown (7.5YR 5/6) medium sand; single grained; loose; strongly acid.

The loamy upper part of the profile ranges from 20 to 40 inches in thickness. The A horizon ranges from very dark brown to dark reddish-brown loam to sandy loam. The B horizon generally ranges from loam to sandy loam. Clay content in the B horizon is about the same as in the A horizon.

Dunnville soils are near Plainfield and Meehan soils. They are finer textured and redder than Plainfield soils. They are finer textured than Meehan soils.

Dunnville loam, 0 to 3 percent slopes (DwA).—This soil is on stream terraces and high bottom lands. Slopes are nearly level to very gently undulating. Areas are 5 to 40 acres in size. The surface layer is almost uniformly very dark brown to dark reddish brown.

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 3 to 5 percent.

Available water capacity is medium. The soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIs–1; woodland group 3o1.

Dunnville sandy loam, 0 to 3 percent slopes (DvA).—This very gently undulating soil is on stream terraces and high bottom lands along the Wisconsin River. Areas are 5 to 80 acres in size. The surface layer is almost uniformly dark reddish brown. Runoff is slow.

This soil has a profile similar to the one described as representative of the series, but the surface layer and subsoil contain more sand.

Included with this soil in mapping are some small areas of soils that have slopes of 3 to 5 percent.

The hazard of soil blowing is severe. Available water capacity is medium. If shelterbelts, wind stripcropping, and cover crops are used, this soil is suitable for row crops. If soil blowing is not controlled, the soil is suited to small grain and hay. If irrigation is used and soil blowing is controlled, the soil is well suited to such specialty crops as potatoes and other vegetables. Capability unit IIIs–4; woodland group 3o1.

Eaupleine Series

The Eaupleine series consists of deep, moderately well drained to well drained, gently sloping and sloping, silty soils on low ridges on the upland plain. These soils formed under northern hardwood forest in 15 to 30 inches of loessal sediment and in the underlying residuum from micaceous gneiss.

In a representative profile the surface layer is dark-brown silt loam about 7 inches thick. The subsurface layer is about 7 inches thick. The upper part is brown silt loam, and the lower part is brown silt loam that contains isolated bodies of dark yellowish-brown material. The subsoil is about 24 inches thick. The upper 10 inches is dark-brown, friable silt loam that has tongues of brown silt loam extending downward from the layer above; the lower 14 inches is dark-brown, firm micaceous loam. The substratum is dark-brown, strong-brown, and dark greenish-gray micaceous loam that has many fragments of greenish gneiss below a depth of 50 inches.

A seasonal high water table is generally at a depth of more than 5 feet. Available water capacity is high, and permeability is moderately slow. Natural fertility is medium. The surface layer and subsoil are slightly acid to strongly acid in the upper part and strongly acid to very strongly acid in the lower part. The depth to bedrock ranges from 4 to 6 feet.

Most of the acreage of these soils is used for general farm crops, but some areas are in native pasture or hardwood forest. The soils are well suited to hard maple, red oak, elm, aspen, and other timber species.

Eaupleine soils are moderately limited for homesites that use onsite sewage-disposal systems by moderately slow permeability in the substratum.

Representative profile of Eaupleine silt loam, 2 to 6 percent slopes, in an alfalfa-timothy meadow, 2,800

feet west and 100 feet north of the southeast corner of sec. 2, T. 25 N., R. 4 E.:

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam, light brownish gray (10YR 6/2) dry; moderate, medium, granular structure; friable; many roots; neutral; abrupt, smooth boundary.
A2—7 to 11 inches, brown (10YR 5/3) silt loam; moderate, thin, platy structure; friable; many roots; slightly acid; clear, wavy boundary.
A&B—11 to 14 inches, brown (10YR 5/3) silt loam (A2); moderate, thin, platy structure; friable; isolated remnants of dark yellowish-brown (10YR 4/4) silt loam (B2t) make up about 40 percent, by volume; many roots; grayish sand grains on ped faces; slightly acid; clear, wavy boundary.
B&A—14 to 24 inches, dark-brown (7.5YR 4/4) silt loam (B2t); moderate, medium, subangular blocky structure; friable; few tongues of brown (10YR 5/3) silt loam (A2) penetrate this horizon from above and make up about 20 percent, by volume; thin patchy clay films on faces of peds of Bt part; few roots; slightly acid; clear, wavy boundary.
IIB2t—24 to 31 inches, dark-brown (7.5YR 4/4) micaceous loam; moderate, medium, subangular blocky structure; friable to firm; common clay films on faces of peds and in pores; medium acid; clear, wavy boundary.
IIB3t—31 to 38 inches, dark-brown (7.5YR 4/4) micaceous loam; moderate, medium and coarse, subangular blocky structure; friable to firm; few clay films on faces of peds, many small (less than 10 millimeters in diameter) particles of greenish gneiss; strongly acid; clear, wavy boundary.
IIC1—38 to 50 inches, dark-brown (7.5YR 4/4) and dark greenish-gray (5GY 4/1) loam; massive; firm; common mica fragments; strongly acid; clear, wavy boundary.
IIC2—50 to 60 inches, strong-brown (7.5YR 5/6) and dark greenish-gray (5GY 4/1) loam; common mica fragments; massive; firm; many fragments of soft greenish gneiss; strongly acid.

The solum ranges from 36 to 66 inches in thickness but typically is 40 to 60 inches thick. In undisturbed areas, an A1 horizon 3 to 5 inches thick is present instead of an Ap horizon. The Ap or A1 horizon ranges from very dark brown to brown. The B2t horizon is typically silt loam but ranges to very fine sandy loam in places. The IIB2t and IIB3t horizons range from heavy sandy loam to heavy loam. The IIC horizon is dominantly 7.5YR or 5YR in hue, 4 or 5 in value, and 4 to 7 in chroma, but greenish gray colors are common. The IIC horizon consists of disintegrated and partly weathered micaceous gneissic bedrock.

Eaupleine soils are adjacent to Eaupleine soils, sandy subsoil variant; Eaupleine soils, silty subsoil variant; and Eaupleine soils, clayey subsoil variant. They have a more silty B horizon than Eaupleine soils, sandy subsoil variant, and Eaupleine soils, clayey subsoil variant. They have a thinner silt cap than Eaupleine soils, silty subsoil variant.

Eaupleine silt loam, 2 to 6 percent slopes (EaB).—This soil is on upland ridges and knolls. Slopes are convex, uniform, and 100 to 300 feet long. Areas are irregularly shaped and 2 to 100 acres in size. If cultivated, the surface layer is nearly uniformly dark brown. Runoff is medium.

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

Included with this soil in mapping are some areas in Milladore Township of soils that have a surface layer of loam. Also included are some areas of soils that are mottled in the lower part of the subsoil.

The hazard of water erosion is moderate. This soil is well suited to corn, small grain, hay, and other crops commonly grown in the county. It is also suited to pasture and woodland. Capability unit IIe–1; woodland group 2o1.

Eaupleine silt loam, 6 to 12 percent slopes (EaC).—This soil is on the sides of ridges or valleys. Slopes are convex, uniform, and 50 to 200 feet long. Areas are irregularly shaped and 3 to 15 acres in size. The cultivated surface layer ranges from dark brown to brown. Runoff is medium.

This soil has a profile similar to the one described as representative of the series, but the surface layer is thinner and lighter in color.

Included with this soil in mapping are some areas in Milladore Township of soils that have a surface layer of loam.

The hazard of water erosion is severe, but it can be controlled by relatively simple practices. This soil is suited to small grain, hay, and other crops commonly grown in the county. If adequate erosion-control practices are used, corn can be grown in the rotation. The soil is also well suited to pasture and woodland. Capability unit IIIe–1; woodland group 2o1.

Eaupleine Series, Clayey Subsoil Variant

The Eaupleine series, clayey subsoil variant, consists of deep, moderately well drained to well drained, gently sloping and sloping, silty soils on low hills on the upland plain. These soils formed under northern hardwood forest in 10 to 20 inches of loessal sediment and in the underlying clayey residuum from granitic and schistose rocks.

In a representative profile the surface layer is dark-brown silt loam 6 inches thick. The subsurface layer is about 7 inches thick. The upper part is brown silt loam, and the lower part is tongues of brown silt loam that extend downward into reddish-brown heavy loam. The upper 6 inches of the subsoil is reddish-brown, firm silty clay loam, and the lower 12 inches is dark reddish-brown, very firm clay. The substratum is dark-red, very firm clay that contains some angular fragments of reddish granitic rock.

A seasonal high water table is at a depth of more than 5 feet. Available water capacity is medium, and permeability is slow. Natural fertility is medium. The surface layer and subsoil are slightly acid to strongly acid in the upper part and strongly acid to very strongly acid in the lower part. Bedrock is generally at a depth of 4 to 6 feet.

Most of the acreage of these soils is used for general farm crops, but some areas are in native pasture or woodland. The soils are well suited to hardwood trees.

These soils are severely limited for homesites that use onsite sewage-disposal systems by the slow permeability of the subsoil and substratum.

Representative profile of Eaupleine silt loam, clayey subsoil variant, 6 to 12 percent slopes, in a bluegrass pasture that has slopes of 7 percent, 1,800 feet north and 100 feet east of the southwest corner of sec. 25, T. 24 N., R. 3 E.:

Ap—0 to 6 inches, dark-brown (10YR 3/3) silt loam, pale brown (10YR 6/3) dry; moderate, fine, granular structure; friable; common roots; medium acid; abrupt, smooth boundary.
A2—6 to 10 inches, brown (10YR 5/3) silt loam; weak, thin, platy structure; friable; common roots; strongly acid; clear, wavy boundary.
A&B—10 to 13 inches, tongues of brown (10YR 5/3) silt loam that has a gritty feel and extends downward into reddish-brown (2.5YR 4/4) heavy loam (B2t);

tongues have moderate, thin, platy structure, and B2t part has moderate, medium, subangular blocky structure; friable; common roots; very strongly acid; clear, wavy boundary.

IIB21t—13 to 19 inches, reddish-brown (2.5YR 4/4) silty clay loam; moderate, medium, angular blocky structure; firm; many clay films on faces of peds; few roots; many angular fragments of reddish granitic rock; very strongly acid; clear, wavy boundary.

IIB22t—19 to 31 inches, dark reddish-brown (2.5YR 3/4) clay; strong, medium, angular blocky structure; very firm, sticky; thin patchy clay films on faces of peds; few roots; many angular fragments of reddish granitic rock; very strongly acid; clear, wavy boundary.

IIC—31 to 60 inches, dark-red (2.5YR 3/6) clay; massive; very firm, sticky; many angular fragments of reddish granitic rock, increasing in number and size with increasing depth and grading into shattered rock; very strongly acid.

The silt mantle ranges from 10 to 20 inches in thickness. The IIB21t horizon ranges from silty clay loam to clay.

Eaupleine soils, clayey subsoil variant, are near and have more clay in the B horizon than Eaupleine soils. Eaupleine soils, clayey subsoil variant, are better drained than the lower lying Altdorf or Dolph soils.

Eaupleine silt loam, clayey subsoil variant, 2 to 6 percent slopes (EdB).—This soil is on the tops of low hills. Slopes are convex, uniform, and 50 to 300 feet long. Areas are irregularly shaped and 3 to 20 acres in size. The cultivated surface layer ranges from dark brown to brown. Runoff is medium.

This soil has a profile similar to the one described as representative of the series, but the silty upper part is somewhat thicker and the depth to reddish residuum ranges from 15 to 20 inches.

The hazard of water erosion is moderate. This soil is well suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIe–6; woodland group 2o1.

Eaupleine silt loam, clayey subsoil variant, 6 to 12 percent slopes (EdC).—This soil is on the sides of low hills or ridges. Slopes are convex, uniform, and 50 to 200 feet long. Areas are long, narrow, and 3 to 10 acres in size. The cultivated surface layer ranges from dark brown to reddish brown. 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 a thinner reddish-brown surface layer.

The hazard of water erosion is severe. This soil is suited to grain and hay. If adequate erosion-control measures are used, corn can be grown in the rotation. Capability unit IIIe–6; woodland group 2o1.

Eaupleine Series, Sandy Subsoil Variant

The Eaupleine series, sandy subsoil variant, consists of well-drained, gently sloping soils on broad ridges on the upland plain. These soils formed in 15 to 25 inches of sandy loam sediment and in the underlying residuum from micaceous gneiss.

In a representative profile the surface layer is dark-brown and dark yellowish-brown fine sandy loam about 14 inches thick. The subsoil is 34 inches thick. The upper 12 inches is dark yellowish-brown sandy loam and brown loam, and the lower 22 inches is brown and yellowish-brown loam. The substratum is dark yellowish-brown and olive-brown loam.

A seasonal high water table is generally at a depth of more than 5 feet. Available water capacity is medium, and permeability is moderately slow. Natural fertility is medium. The surface layer and subsoil are slightly acid to strongly acid in the upper part and very strongly acid in the lower part. Bedrock is generally at a depth of 4 to 6 feet.

Most of the acreage of these soils is cultivated, but some areas are in native pasture or woodland. The soils are well suited to hardwoods.

These soils are moderately limited for homesites that use onsite sewage-disposal systems by moderately slow permeability in the substratum.

Representative profile of Eaupleine fine sandy loam, sandy subsoil variant, 2 to 6 percent slopes, in a meadow, 900 feet south and 100 feet west of the northeast corner of sec. 2, T. 25 N., R. 5 E.:

Ap—0 to 7 inches, dark-brown (10YR 3/3) fine sandy loam, light brownish-gray (10YR 6/2) dry; weak, very fine, subangular blocky structure; friable; many fine fibrous roots; slightly acid; abrupt, smooth boundary.

A3—7 to 14 inches, dark yellowish-brown (10YR 4/4) fine sandy loam; weak, medium, subangular blocky structure; friable; common fine fibrous roots; slightly acid; clear, wavy boundary.

B11—14 to 19 inches, dark yellowish-brown (10YR 4/4) sandy loam; moderate, medium, subangular blocky structure; friable; few roots; slightly acid; clear, wavy boundary.

IIB12—19 to 26 inches, brown (10YR 4/3) loam; moderate, medium, subangular blocky structure; friable; few, thin, patchy clay films; few roots; strongly acid; clear, wavy boundary.

IIB21t—26 to 36 inches, variegated dark yellowish-brown (10YR 3/4 and 4/4) and yellowish-brown (10YR 5/6) loam; moderate, medium, subangular blocky structure; friable; common yellowish-brown (10YR 5/4) clay films; strongly acid; gradual, wavy boundary.

IIB22t—36 to 44 inches, variegated brown (7.5YR 4/4), yellowish-brown (10YR 5/6), and dark yellowish-brown (10YR 3/4) heavy loam; moderate, medium, subangular blocky structure; firm; common yellowish-brown (10YR 5/6) clay films; about 5 percent angular fragments of a gneissic rock 2 to 10 centimeters in diameter and 1 to 4 centimeters thick; very strongly acid; clear, wavy boundary.

IIB3—44 to 48 inches, dark yellowish-brown (10YR 4/4) and olive-brown (2.5Y 4/4) loam; moderate, fine, subangular blocky structure; friable; few, thin, patchy clay films; about 5 percent angular fragments of gneissic rock 2 to 10 centimeters in diameter and 1 to 4 centimeters thick; very strongly acid; gradual, wavy boundary.

IIC—48 to 60 inches, dark yellowish-brown (10YR 3/4) and olive-brown (2.5Y 4/4) loam; massive; friable; very strongly acid.

The solum generally ranges from 36 to 50 inches in thickness, but it is as thick as 60 inches in places. The Ap and A3 horizons are dominantly fine sandy loam, but they range to loam in places. The color of the A3 horizon ranges from 10YR 5/3 to 7.5YR 4/4. The IIB2t, IIB3, and IIC horizons commonly are 5 to 10 percent, by volume, angular fragments of gneissic rock as large as 10 centimeters in diameter.

Eaupleine soils, sandy subsoil variant, are adjacent to Eaupleine and Sherry soils. They are more sandy than Eaupleine soils. They are more sandy and better drained than the lower lying Sherry soils.

Eaupleine fine sandy loam, sandy subsoil variant, 2 to 6 percent slopes (EbB).—This soil is on broad ridgetops. Slopes are convex, uniform, and 100 to 300 feet

long. The cultivated surface layer is almost uniformly dark brown. Runoff is slow.

The hazard of water erosion is moderate. This soil is suited to such general farm crops as corn, small grain, and hay. It is also suited to pasture and woodland. Capability unit IIe–7; woodland group 2o1.

Eaupleine Series, Silty Subsoil Variant

The Eaupleine series, silty subsoil variant, consists of deep, well-drained, gently sloping, silty soils on broad ridgetops. These soils formed under northern hardwood forest in loessal sediment 30 to 50 inches thick and in the underlying loamy residuum from gneissic rock.

In a representative profile the surface layer is dark-brown silt loam 7 inches thick. The subsurface layer is about 8 inches of brown silt loam that has isolated remnants of the dark yellowish-brown silt loam subsoil in the lower part. The subsoil is about 25 inches thick. The upper 4 inches is dark yellowish-brown, friable silt loam that has tongues of brown silt loam extending down into it from the layer above, the next 12 inches is brown, friable heavy silt loam that has fine mottles of strong brown; and the lower 9 inches is brown, friable silt loam. The substratum is yellowish-brown silt loam and dark yellowish-brown loam.

A seasonal high water table is at a depth of more than 5 feet. Available water capacity is high, and permeability is moderately slow. Natural fertility is medium. The surface layer and subsoil are slightly acid to strongly acid in the upper part and strongly acid to very strongly acid in the lower part. Bedrock generally is at a depth of 4 to 6 feet.

Most of the acreage of these soils is used for such general farm crops as corn, oats, and hay. Some areas are in native pasture or woodlots. The soils are well suited to hard maple, red oak, and elm trees.

These soils are slightly limited for homesites that use onsite sewage-disposal systems.

Representative profile of Eaupleine silt loam, silty subsoil variant, 2 to 6 percent slopes, in a cultivated field, 1,000 feet east and 30 feet north of the southwest corner of sec. 5, T. 25 N., R. 5 E.:

Ap—0 to 7 inches, dark-brown (10YR 3/3) silt loam; moderate, medium, granular structure; friable; many roots; slightly acid; abrupt, smooth boundary.

A2—7 to 11 inches, brown (10YR 5/3) silt loam; moderate, medium, granular structure; friable; many roots; some mixing with Ap horizon; medium acid; clear, wavy boundary.

A&B—11 to 15 inches, brown (10YR 5/3) silt loam (A2); moderate, thin, platy structure; friable; isolated remnants of dark yellowish-brown (10YR 4/4) silt loam (B2t) make up about 25 percent, by volume; common roots; clean coatings of fine sand on peds; very strongly acid; clear, wavy boundary.

B&A—15 to 19 inches, dark yellowish-brown (10YR 4/4) silt loam (B2t); moderate, fine, subangular blocky structure; friable; tongues of brown (10YR 5/3) silt loam (A2) penetrate this horizon from above and make up about 20 percent, by volume; common roots; strongly acid; clear, wavy boundary.

B21t—19 to 31 inches, brown (7.5YR 4/4) heavy silt loam; fine, distinct mottles of strong brown (7.5YR 5/6 and 5/8); moderate and strong, medium, subangular blocky structure; friable; many roots; few patchy clay films; clean silica coatings on peds; very strongly acid; clear, wavy boundary.

B22t—31 to 40 inches, brown (7.5YR 4/4) silt loam; weak and moderate, medium and coarse, subangular blocky structure; friable; clean silica coatings on peds; very strongly acid; clear, wavy boundary.

C1—40 to 49 inches, yellowish-brown (10YR 5/4) silt loam; massive; friable; very strongly acid.

IIC2—49 to 60 inches, dark yellowish-brown (10YR 4/4) loam; massive; friable; many small rock fragments; very strongly acid.

The solum ranges from 36 to 66 inches in thickness. In cultivated areas the Ap horizon ranges from very dark grayish brown (10YR 3/2) to dark brown (10YR 3/3). The A2 horizon ranges from brown to grayish brown. The underlying residuum ranges from yellowish-brown to dark-red gritty loam that contains varying amounts of rock fragments. It is generally micaceous.

Eaupleine soils, silty subsoil variant, are adjacent to Eaupleine and Fenwood soils. They have a thicker silt cap than Fenwood soils that are underlain by granitic rocks. They also have a thicker silt cap than Eaupleine soils.

Eaupleine silt loam, silty subsoil variant, 2 to 6 percent slopes (EcB).—This soil is on broad ridgetops. Slopes are long and uniform and are generally 2 to 3 percent. Areas are 10 to 40 acres in size. The surface layer is uniformly dark brown. Runoff is medium.

Included with this soil is mapping are some areas of soils that have a small amount of grayish mottling in the lower part of the subsoil. Also included are a few small areas of soils that have thin (1 to 6 inches thick) layers of fine sandy loam in the lower part of the subsoil or in the substratum.

The hazard of water erosion is moderate. This soil is suited to all general farm crops commonly grown in the county. It is well suited to green peas for canning. Capability unit IIe–1; woodland group 2o1.

Eleva Series

The Eleva series consists of moderately deep, well-drained, gently sloping and sloping, loamy soils on low ridges on the sand plain and on the unglaciated upland plain. These soils formed in a mixture of sandstone residuum and loessal sediment that is underlain by sandstone bedrock at a depth of 24 to 40 inches.

In a representative profile the surface layer is dark grayish-brown sandy loam 7 inches thick. The subsurface layer is about 10 inches thick. The upper part is yellowish-brown sandy loam, and the lower part is brown sandy loam. The subsoil is dark yellowish-brown firm sandy loam 10 inches thick. The substratum is yellow sand about 11 inches thick. Below this is weakly cemented, very pale brown sandstone.

A seasonal high water table is generally at a depth of more than 5 feet. Available water capacity is low, and permeability is moderately rapid. Natural fertility is low. The surface layer and subsoil range from medium acid to very strongly acid. The depth to sandstone is extremely variable; it ranges from 2 feet to more than 4 feet.

Most of the acreage of these soils is in woodland or is idle, but some areas are used for general farm crops. The soils are suitable for white pine, Norway pine, and jack pine for sawlogs, pulpwood, or Christmas trees.

These soils are moderately limited for homesites that use onsite sewage-disposal systems by the danger of contaminating ground water.

Representative profile of Eleva sandy loam, 2 to 6 percent slopes, in an idle field, 1,500 feet east and 1,200

feet south of the northwest corner of sec. 8, T. 22 N., R. 5 E.:

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2 moist, 10YR 6/3 dry) sandy loam; weak, fine, subangular blocky structure; friable; common fine fibrous roots; medium acid; abrupt, smooth boundary.

A2—7 to 12 inches, yellowish-brown (10YR 5/4) sandy loam; weak, medium, subangular blocky structure; friable; few fine roots; strongly acid; clear, wavy boundary.

A&B—12 to 17 inches, brown (10YR 5/3) sandy loam (A2); weak, medium, subangular blocky structure; friable; isolated remnants of dark yellowish-brown sandy loam (Bt) make up about 20 percent, by volume; few fine roots; strongly acid; clear, wavy boundary.

B&A—17 to 27 inches, dark yellowish-brown (10YR 4/4) sandy loam; moderate, medium, subangular blocky structure; firm; tongues of brown (10YR 5/3) sandy loam (A2) penetrate this horizon from above and make up about 20 percent, of the horizon; thin patchy clay films on peds; very strongly acid; clear, wavy boundary.

C—27 to 38 inches, yellow (10YR 8/6) sand; single grained; loose; medium acid; clear, wavy boundary.

R—38 to 60 inches, very pale brown (10YR 8/4) soft sandstone; massive; weakly cemented; medium acid.

The solum ranges from 20 to 40 inches in thickness, which generally corresponds to the depth to sandstone. In undisturbed areas, the Al horizon commonly is very dark grayish-brown, and it ranges from 3 to 6 inches in thickness. The Bt horizon ranges from light sandy loam to loam and from dark yellowish brown to brownish yellow. The underlying sandstone ranges from very pale brown to yellowish brown. It ranges from very weakly cemented to strongly cemented.

The annual temperature of Eleva soils, as mapped in Wood County, is a few degrees cooler than the range defined for the series, and they have tonguing in the subsoil. These differences do not alter the behavior of the soils.

Eleva soils are adjacent to Gale, Norgo, and Elkmound soils. They are more sandy throughout than Gale soils. They are deeper to sandstone and are underlain by softer sandstone than Norgo and Elkmound soils.

Eleva sandy loam, 2 to 6 percent slopes (EeB).—This soil is on the tops and sides of low ridges. Slopes are convex, uniform, and 100 to 300 feet long. Areas are 5 to 40 acres in size. The color of the cultivated surface layer is almost uniformly dark brown. Runoff is moderate.

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

Available water capacity is low. The hazard of water erosion is severe, and the hazard of soil blowing is moderate. Water erosion and soil blowing can be controlled by use of conservation practices. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIs–4; woodland group 3o1.

Eleva sandy loam, 6 to 12 percent slopes (EeC).—This soil is on the sides of low ridges. Slopes are convex, uniform, and 100 to 200 feet long. Areas are 3 to 10 acres in size. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but the surface layer is slightly thinner and the sandstone generally is at a depth of 20 to 30 inches.

Included with this soil in mapping are some areas of soils that have a dark yellowish-brown surface layer. Also included are small areas of soils that have slopes of 12 to 18 percent.

Available water capacity is low. The hazard of water erosion is severe, and the hazard of soil blowing is moderate. Water erosion and soil blowing can be controlled by use of a combination of erosion-control practices. This soil is suited to small grain, hay, and other crops commonly grown in the county. If erosion control practices are used, row crops can be grown in the rotation. Capability unit IIIs–4; woodland group 3o1.

Elkmound Series

The Elkmound series consists of shallow, well-drained, loamy soils on low hills and ridges on the upland plains. These soils formed under mixed hardwood-coniferous forest in 12 to 20 inches of sandy loam over hard platy sandstone.

In a representative profile the surface layer is dark-brown, friable sandy loam 3 inches thick. The subsoil is dark-brown, friable, blocky sandy loam 8 inches thick. The substratum is about 1 inch of loose, brown loamy sand over flat plates or slabs of yellowish-red and strong-brown, hard sandstone. Brown loamy sand fills the narrow spaces between the plates. Below a depth of about 18 inches, the sandstone is in large plates of varying thickness.

The water table is below a depth of 5 feet. Available water capacity is very low, and permeability is moderately rapid. Natural fertility is low. The surface layer and subsoil are strongly acid or very strongly acid throughout. Bedrock is at a depth of 1 to 2 feet.

These soils are well suited to Norway pine and jack pine for sawlogs or pulpwood. They are moderately suited to white pine.

Elkmound soils are severely limited for building sites that have onsite sewage-disposal systems by the shallow depth to bedrock and the danger of contaminating ground water.

Representative profile of Elkmound sandy loam, 6 to 12 percent slopes, in an aspen-red oak woodlot, 1,100 feet south and 500 feet east of the northwest corner of sec. 29, T. 23 N., R. 6 E.:

A1—0 to 3 inches, dark-brown (10YR 3/3) sandy loam, brown (10YR 5/3) dry; weak, fine, granular structure; friable; common roots; very strongly acid; clear, wavy boundary.

B2—3 to 11 inches, dark-brown (10YR 4/3) sandy loam; weak, coarse, subangular blocky structure; friable; few roots; very strongly acid; clear, wavy boundary.

C—11 to 12 inches, brown (7.5YR 5/4) loamy sand; single grained; loose; few roots; few spots of reddish-brown (5YR 5/4) loamy sand; very strongly acid; abrupt, smooth boundary.

IIR—12 to 18 inches, yellowish-red (5YR 5/6 and 4/8) and strong-brown (7.5YR 5/6) hard, platy sandstone; brown loamy sand from horizon above is between the plates; plates are 25 to 75 millimeters thick and 50 to 250 millimeters across. Below a depth of 18 inches the sandstone is very large slabs of varying thickness.

The A horizon ranges from dark brown (10YR 3/3) to dark yellowish brown (10YR 4/4). Depth to sandstone ranges from 12 to 20 inches. The B horizon lies directly on the sandstone in places. In some places the sandstone is partly weathered to flat plates in a sandy matrix.

The annual temperature of Elkmound soils as mapped in Wood County is a few degrees cooler than the range defined for the series. This difference does not alter their usefulness and behavior.

Elkmound soils are adjacent to Norgo, Eleva, and Gale soils. They are more sandy than Norgo and Gale soils. They are shallower than Eleva and Gale soils.

Elkmound sandy loam, 2 to 6 percent slopes (EkB).—This soil is on low rises and on ridgetops on the upland plain. Slopes are convex, uniform, and 100 to 200 feet long. Areas are 5 to 50 acres in size. The cultivated surface layer is nearly uniformly dark brown. Runoff is slow.

This soil has a profile similar to the one described as representative of the series, but the depth to sandstone is about 18 to 20 inches and the surface layer and subsoil are thicker.

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

The hazard of water erosion is severe, and the hazard of soil blowing is moderate. Erosion-control measures are necessary to maintain productivity. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIe–3; woodland group 3d1.

Elkmound sandy loam, 6 to 12 percent slopes (EkC).—This soil is on the sides of upland ridges. Slopes are uniform, convex, and 75 to 200 feet long. Areas are 5 to 20 acres in size. The cultivated surface layer is dark brown to brown. Runoff is medium.

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

Included with this soil in mapping are some moderately eroded areas of soils that have lost 2 to 5 inches of the surface layer through water erosion. Also included are small areas of soils that have a surface layer of loam.

The hazard of water erosion is very severe, and the hazard of soil blowing is moderate. This soil is suited to small grain, hay, and other crops commonly grown in the county. Capability unit IVe–3; woodland group 3d1.

Elkmound sandy loam, 12 to 20 percent slopes, eroded (EkD2).—This soil is on the sides of upland ridges. Slopes are convex, uniform, and 50 to 150 feet long. Areas are 5 to 15 acres in size. The cultivated surface layer is dark brown to dark yellowish brown. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but the surface layer is dark brown to yellowish brown.

Included with this soil in mapping are some areas of slightly eroded soils that have a dark-brown surface layer.

The hazard of water erosion is very severe. This soil is suited to hay and pasture. Capability unit VIe–3; woodland group 3d2.

Elm Lake Series

The Elm Lake series consists of deep, poorly drained, sandy soils in broad, nearly level depressions. These soils formed under sedges and swamp-hardwood forest in 20 to 40 inches of sandy sediment over residuum weathered from interbedded sandstone and shale. They occupy a transitional area between the silty soils to the north and the lacustrine sands of Glacial Lake Wisconsin to the south.

In a representative profile the surface layer is very dark brown loamy sand about 1 inch thick. The substratum is 35 inches thick. The upper 5 inches is dark grayish-brown and brown, loose fine sand; the next 17 inches is light brownish-gray fine, medium, and coarse sand that has yellowish-brown and strong-brown mottles; and the lower 13 inches is olive-gray silty clay loam that has yellowish-brown and strong-brown mottles in the upper part and yellowish-brown and light olive-brown mottles in the lower part. Below a depth of 36 inches is very pale brown, fragmental sandstone that grades to massive sandstone at a depth of about 50 inches.

A seasonal high water table is at or near the surface in spring and part of summer. Available water capacity is low, and permeability is rapid in the upper sandy layers and slow in the substratum. Natural fertility is low. These soils are medium acid to very strongly acid throughout the profile. Sandstone bedrock is generally at a depth of 2 to 4 feet.

Most of the acreage of these soils is in second-growth woodland, but small areas are used for native pasture or general farm crops. The soils are suited to red maple and poplars.

These soils are very severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table.

Representative profile of Elm Lake loamy sand in a pine plantation, 40 feet south and 30 feet west of the right-angle corner of Wisconsin State Highway 54, in NE¼NE¼NE¼NE¼ sec. 34, T. 22 N., R. 2 E.:

A1—0 to 1 inch, very dark brown (10YR 2/2) loamy sand, dark grayish brown (10YR 4/2) dry; weak, fine, granular structure; very friable; many fine fibrous roots; medium acid; abrupt, smooth boundary.

C1—1 to 3 inches, dark grayish-brown (10YR 4/2) fine sand, light brownish gray (10YR 6/2) dry; single grained; loose; many fine fibrous roots; medium acid; clear, wavy boundary.

C2—3 to 6 inches, brown (10YR 5/3) fine sand, light brownish gray (10YR 6/2) dry; single grained; loose; many fine fibrous roots; medium acid; clear, wavy boundary.

C3—6 to 23 inches, light brownish-gray (10YR 6/2) fine, medium, and coarse sand; common, medium, distinct and prominent mottles of yellowish brown (10YR 5/4–5/6) and strong brown (7.5YR 5/6); single grained; loose; few fine roots; strongly acid; abrupt, smooth boundary.

IIC4—23 to 26 inches, light brownish-gray (2.5Y 6/2) and olive-gray (5Y 5/2) silty clay loam; many, fine and medium, prominent mottles of yellowish brown (10YR 5/6–5/8) and strong brown (7.5YR 5/6–5/8); massive; firm, hard, sticky; very strongly acid; clear, wavy boundary.

IIC5—26 to 30 inches, olive-gray (2.5Y 5/2) light silty clay; many, fine and medium, prominent mottles of yellowish brown (10YR 5/6–5/8) and strong brown (7.5YR 5/6–5/8); massive; firm, very hard, sticky; strongly acid; clear, wavy boundary.

IIC6—30 to 36 inches, olive-gray (5Y 5/2) silty clay loam; many, fine and medium, distinct and prominent mottles of light olive brown (2.5Y 5/4) and yellowish brown (10YR 5/6–5/8); massive; firm, hard, sticky; 10 to 12 percent, by volume, fine sandstone fragments; medium acid; clear, smooth boundary.

IIIR—36 to 60 inches, very pale brown (10YR 7/3) fragmented, fine-grained sandstone, grading to massive sandstone at a depth of 50 inches.

Depth to interbedded sandstone and shale residuum ranges from 30 to 50 inches. The sandstone layers range from very hard to weakly cemented. The number, thickness, and arrangement of the sandstone and shale layers are extremely variable.

Elm Lake soils are in depressions adjacent to the somewhat poorly drained Merrillan soils and the moderately well drained Humbird soils; these soils form a drainage sequence. Elm Lake soils have more clay in the C horizon and have a higher seasonal water table than Merrillan and Humbird soils.

Elm Lake loamy sand (0 to 2 percent slopes) (Em).—This soil is in broad, nearly level depressions and drainageways. Areas are 10 to 60 acres in size. Runoff is very slow or ponded.

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

The hazard of soil blowing is severe. Wetness is a very severe limitation. Frosts late in spring and early in fall are a serious hazard to growing corn. If this soil is drained, it is suitable for small grain and hay. Capability unit IVw–5; woodland group 4w4.

Fenwood Series

The Fenwood series consists of moderately deep, well-drained, gently sloping to moderately steep, silty soils on uplands. These soils formed under forest vegetation in a thin layer of silty sediment and in the underlying loamy residuum from fine-grained granitic and greenstone rocks.

In a representative profile the surface layer is very dark grayish-brown silt loam about 6 inches thick (fig. 5). The subsurface layer is about 12 inches thick. The upper 6 inches is brown silt loam, and the lower 6 inches is brown loam that contains isolated bodies of dark yellowish-brown loam. The subsoil is about 20 inches thick. The upper 4 inches is dark yellowish-brown, friable loam that has tongues of brown loam extending downward from the layer above; the next 6 inches is yellowish-brown, friable loam; and the lower 10 inches is brown, friable loam that has numerous angular fragments of granitic rock. The substratum is about 60 percent angular rock and brown loam between the fragments. Below a depth of about 45 inches, rock content increases and makes further digging difficult.

A seasonal high water table is at a depth of more than 5 feet. Available water capacity is medium, and permeability is moderate. Natural fertility is medium. The surface layer and subsoil are slightly acid to strongly acid in the upper part and strongly acid to very strongly acid in the lower part. Bedrock is at a depth of 3 to 5 feet.

About one-half of the acreage of these soils is used for woodland, and the rest is used for general farm crops or native pasture. The soils are well suited to northern hardwoods or aspen.

Fenwood soils are moderately or severely limited for homesites that use onsite sewage-disposal systems by the moderate depth to bedrock or by slope.

Representative profile of Fenwood silt loam, 2 to 6 percent slopes, in an idle field, 800 feet east and 50 feet south of the northwest corner of sec. 36, T. 24 N., R. 2 E.:

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

A2—6 to 12 inches, brown (10YR 5/3) silt loam; weak, coarse, subangular blocky structure parting to moderate, thin, platy; friable; common roots; slight mixing of A1 into A2; medium acid; clear, smooth boundary.

A&B—12 to 18 inches, brown (10YR 5/3) loam (A2); weak, thick, platy structure parting to moderate, medium, subangular blocky; friable; dark yellowish-brown (10YR 4/4) loam Bt remnants scattered through horizon make up about 20 percent, by volume; few thin clay films on faces of peds in Bt part; few roots; medium acid; clear, wavy boundary.

B&A—18 to 22 inches, dark yellowish-brown (10YR 4/4) loam; moderate, medium, subangular blocky structure; friable; narrow tongues of brown (10YR 5/3) loam (A2) penetrate horizon from above and make up about 20 percent, by volume; few roots; very pale brown (10YR 7/3) sand coatings on some ped faces; few clay films on peds; medium acid; clear, wavy boundary.

Figure 5.—**Representative profile of a Fenwood silt loam.**

B22t—22 to 28 inches, yellowish-brown (10YR 5/4) loam; few faint mottles of yellowish brown (10YR 5/8); moderate, medium, subangular blocky structure; friable; many clay films on peds; medium acid; clear, wavy boundary.

IIB3—28 to 38 inches, brown (7.5YR 4/4) loam; moderate, medium, subangular blocky structure; friable; very pale brown (10YR 7/4) sand coatings on peds; many angular fragments of yellowish-red (5YR 5/8), reddish-yellow (7.5YR 6/6), and light yellowish-brown (10YR 6/4) crystalline rock; few clay films on peds; strongly acid; gradual, wavy boundary.

C—38 to 45 inches, 60 percent fractured crystalline rock and brown (7.5YR 4/4) loam between fragments. At a depth of 45 inches, the concentration of rock fragments makes further penetration difficult.

The solum generally ranges from 36 to 48 inches in thickness, but it is as thick as 60 inches in places. The dense concentration of rock fragments is at a depth of 30 to 50 inches. The silt layer ranges from 7 to 15 inches in thickness.

Fenwood soils are adjacent to lower lying, somewhat poorly drained Rietbrock soils; these soils form a drainage sequence. They are near Eaupleine soils, silty subsoil variant. Fenwood soils are less silty than Eaupleine soils, silty subsoil variant, and they are underlain by gneissic rock, whereas Eaupleine soils, silty subsoil variant, are underlain by granitic rock. Fenwood soils are less silty and more shallow to gneissic rock than Milladore soils.

Fenwood silt loam, 2 to 6 percent slopes (FeB).—This soil is on low hills. Slopes are convex, uniform, and 200 to 300 feet long. Areas are 5 to 30 acres in size. Runoff is medium.

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

Included with this soil in mapping are small areas of soils that have a brown surface layer. Also included are areas of soils that have a small amount of grayish mottling in the lower part of the subsoil.

The hazard of water erosion is moderate. Simple practices will control erosion on this soil. This soil is well suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIe–2; woodland group 2o1.

Fenwood silt loam, 6 to 12 percent slopes (FeC).—This soil is on uplands. Slopes are convex, uniform, and 150 to 300 feet long. Areas are 5 to 25 acres in size.

This soil has a profile similar to the one described as representatative of the series, but the upper part of the profile is slightly thinner and depth to the concentration of rock fragments is about 35 inches.

Included with this soil in mapping are a few areas of soils that have a lighter colored surface layer.

The hazard of water erosion is severe. Under intensive management this soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIe–2; woodland group 2o1.

Fenwood silt loam, 12 to 20 percent slopes (FeD).—This soil is on uplands. Slopes are convex, uniform, and 100 to 150 feet long. Areas are 5 to 10 acres in size. The surface layer is uniformly dark grayish brown.

This soil has a profile similar to the one described as representative of the series, but the surface layer and subsoil are thinner and the depth to the concentration of rock fragments is about 30 inches.

Most of the acreage of this soil is in pasture or woodland. The hazard of erosion is very severe. This soil is not well suited to row crops. Under intensive management it is suited to small grain and hay. Capability unit IVe–1; woodland group 2r2.

Fenwood stony silt loam, 2 to 6 percent slopes (FfB).—This soil is on uplands. Slopes are convex, uniform, and 100 to 200 feet long. Areas are 5 to 10 acres in size.

This soil has a profile similar to the one described as representative of the series, but it contains enough stones to make use of cultivating machinery impractical. The stones are 1 foot or more in diameter and 2 to 15 feet apart.

Most of the acreage of this soil has been cleared of trees and is in native pasture. Pasture improvement generally is impractical because of the stones. Capability unit VIs–6; woodland group 2o1.

Fenwood stony silt loam, 6 to 12 percent slopes (FfC).—This soil is on uplands. Slopes are convex, uniform, and 150 to 300 feet long. Areas are 5 to 50 acres in size.

This soil has a profile similar to the one described as representative of the series, but it has slightly thinner horizons and contains enough stones to make use of cultivating machinery impractical. The stones are 1 foot or more in diameter and 2 to 15 feet apart.

Most of the acreage of this soil is forested, but some areas have been cleared of trees and are in native pasture. Pasture improvement generally is impractical because of the stones. Capability unit VIs–6; woodland group 2o1.

Fenwood stony silt loam, 12 to 20 percent slopes (FfD).—This soil is on uplands. Slopes are convex, uniform, and 100 to 400 feet long. Areas are 10 to 100 acres in size.

This soil has a profile similar to the one described as representative of the series, but the upper horizons are somewhat thinner and there are enough stones to make use of cultivating machinery impractical. The stones are 1 foot or more in diameter and 2 to 15 feet apart.

Included with this soil in mapping are small areas where slopes are more than 20 percent.

Almost all of the acreage of this soil is forested, but some small areas are in native pasture. Pasture improvement generally is impractical because of the stones. Capability unit VIs–6; woodland group 2r2.

Friendship Series

The Friendship series consists of deep, moderately well drained, nearly level, sandy soils on outwash plains. These soils formed under jack pine-black oak forest in deep outwash sediment that is mostly quartz sand.

In a representative profile the surface layer is very dark grayish-brown loamy sand 8 inches thick. The subsoil is about 32 inches thick. The upper 8 inches is loose, brown medium sand; the middle 14 inches is loose, yellowish-brown medium sand; and the lower 10 inches is loose, light yellowish-brown medium sand mottled with brownish yellow and strong brown. The substratum is loose, pale-brown medium sand.

A seasonal high water table is at a depth of 3 to 5 feet during part of the year. Available water capacity is low, and permeability is rapid. Natural fertility is low. These soils are generally medium acid to slightly

acid in the upper part and slightly acid to neutral in the lower part. Bedrock is at a depth of more than 6 feet.

Most of the acreage of these soils is in woodland, but some areas are used for general farm crops or for native pasture. The soils are well suited to Norway pine and jack pine.

Friendship soils are moderately limited for building sites that have onsite sewage-disposal systems by the seasonal high water table.

Representative profile of Friendship loamy sand, 1 to 3 percent slopes, in a 20-year-old jack pine plantation, 100 feet west of County Highway U in SE¼SE¼ SE¼NE¼ sec. 36, T. 21 N., R. 6 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loamy sand, gray (10YR 6/1) dry; very weak, medium, subangular blocky structure; very friable; many fine fibrous roots; strongly acid; abrupt, smooth boundary.

B21—8 to 16 inches, brown (10YR 5/3) medium sand; single grained; loose; common fine fibrous roots; slightly acid; clear, smooth boundary.

B22—16 to 30 inches, yellowish-brown (10YR 5/4) medium sand; single grained; loose; few fine fibrous roots; slightly acid; gradual, wavy boundary.

B3—30 to 40 inches, light yellowish-brown (10YR 6/4) medium sand; common, medium, distinct and prominent mottles of brownish yellow (10YR 6/6-6/8) and strong brown (7.5YR 5/6–5/8); single grained; loose; slightly acid; gradual, wavy boundary.

C—40 to 60 inches, pale-brown (10YR 6/3) medium sand; common, fine and medium, distinct and prominent mottles of brownish yellow (10YR 6/6–6/8); single grained; loose; neutral.

The solum ranges from 20 to 40 inches in thickness. The solum and the C horizon, to a depth of 60 inches, typically are dominated by medium sand and some coarse sand. In places the A1 or Ap horizon is more than 10 inches thick and is less than 3.5 in value. It contains less than 1 percent organic matter.

The moderately well drained Friendship soils are adjacent to the excessively drained Plainfield soils and the somewhat poorly drained Meehan soils; these soils form a drainage sequence. Friendship soils are saturated for longer periods than Plainfield soils and for shorter periods than Meehan soils. They have fewer grayish-brown, brownish-gray, or gray mottles than Meehan soils.

Friendship loamy sand, 1 to 3 percent slopes (FrA).—This soil is on outwash plains. Areas are 10 to 200 acres in size. The cultivated surface layer is almost uniformly very dark grayish brown. Runoff is very slow.

Included with this soil in mapping are small areas of Plainfield loamy sand and Meehan loamy sand.

The hazard of soil blowing is very severe, but if water is available this soil is suitable for such irrigated specialty crops as corn, potatoes, and vegetables. Capability unit IVs–3; woodland group 3s1.

Gale Series

The Gale series consists of moderately deep, well-drained, silty soils on uplands. These soils formed under mixed hardwood and pine forest in 15 to 34 inches of silty sediment and in residuum from weathered sandstone.

In a representative profile the surface layer is dark grayish-brown silt loam 8 inches thick. The subsurface layer is grayish-brown silt loam 3 inches thick. The subsoil is 18 inches thick. The upper 3 inches is dark yellowish-brown, friable silt loam that has tongues of grayish-brown silt loam extending downward into it from the layer above; the middle 10 inches is dark yellowish-brown, friable heavy silt loam; and the lower 5 inches is dark yellowish-brown, friable loam. The substratum is about 7 inches of yellowish-brown sand. Below this is yellowish-brown, platy sandstone.

The water table is generally below a depth of 5 feet. Available water capacity is medium, and permeability is moderate. Natural fertility is medium. The surface layer and subsoil are generally medium acid to strongly acid in the upper part and strongly acid to very strongly acid in the lower part. Bedrock is at a depth of 2 to 4 feet or more.

Most of the acreage of these soils is used for general farm crops, but some areas are in native pasture or woodland. The soils are well suited to hardwoods.

Gale soils are severely limited for building sites that have onsite sewage-disposal systems by the shallow depth to bedrock.

Representative profile of Gale silt loam, 2 to 6 percent slopes, in a red clover meadow, 2,600 feet east and 100 feet north of the southwest corner of sec. 21, T. 23 N., R. 4 E.:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam; weak, fine, subangular blocky structure parting to moderate, medium, granular; friable; common roots; medium acid; abrupt, smooth boundary.

A2—8 to 11 inches, grayish-brown (10YR 5/2) silt loam; moderate, thin, platy structure; friable; common roots; strongly acid; gradual, wavy boundary.

B&A—11 to 14 inches, dark yellowish-brown (10YR 4/4) silt loam (Bt); moderate, fine, subangular blocky structure; friable; tongues of grayish-brown (10YR 5/2) silt loam (A2) penetrate this horizon from above and make up about 20 percent, by volume; common roots; strongly acid; clear, wavy boundary.

B2t—14 to 24 inches, dark yellowish-brown (10YR 4/4) heavy silt loam; moderate, subangular blocky structure; friable; grayish-brown (10YR 5/2) clean silt grains on faces of peds; thin patchy clay films; common roots; strongly acid; gradual, wavy boundary.

B3—24 to 29 inches, dark yellowish-brown (10YR 4/4) loam; moderate, medium, subangular blocky structure; friable; common roots; very strongly acid; clear, smooth boundary.

IIC—29 to 36 inches, yellowish-brown (10YR 5/4) medium sand; single grained; loose; very strongly acid; abrupt, smooth boundary.

IIR—36 to 60 inches, yellowish-brown (10YR 5/4), platy sandstone.

The A horizon ranges from 10YR 3/3 to 10YR 4/2 when moist. Fragments of sandstone are in the profile or on the surface in some places. Depth to sandstone ranges from 25 to 40 inches. Rounded pebbles of quartzite and chert generally are in the lower part of the solum and in the residuum.

The annual temperature of these soils, as mapped in Wood County, is a few degrees cooler than the range defined for the series and some tonguing is evident. These differences do not alter the usefulness or behavior of the soils.

Gale soils are near Eleva, Elkmound, Hiles, and Vesper soils. They have a subsoil the lower part of which formed in sandstone, whereas that of Hiles and Vesper soils formed in shale and sandstone. They are better drained than Vesper soils. Gale soils are less sandy throughout than Eleva soils. They are deeper over bedrock and less sandy than Elkmound soils.

Gale silt loam, 2 to 6 percent slopes (GaB).—This

soil is on the tops and sides of low ridges. Slopes are convex, uniform, and 200 to 300 feet long. Areas are 10 to 30 acres in size. The surface layer is uniformly dark grayish brown. Runoff is medium.

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

Included with this soil in mapping are areas of soils that are underlain at a depth of 40 inches or more by loamy residuum from granitic rock.

The hazard of water erosion is moderate. This soil is well suited to such general farm crops as corn, small grain, and hay. Capability unit IIe–2; woodland group 2o1.

Gale silt loam, 6 to 12 percent slopes (GaC).—This soil is on the sides of low ridges. Slopes are convex, uniform, and 100 to 200 feet long. Areas are 3 to 10 acres in size.

This soil has a profile similar to the one described as representative of the series, but the depth to sandstone residuum is 4 to 6 inches less, and in some areas 3 to 5 inches of the surface layer has been lost through erosion.

Included with this soil in mapping are a few small areas of soils that are underlain by loamy residuum from granitic rock at a depth of 40 inches or more. Also included are some areas of soils that have a dark-brown surface layer and some small areas of soils that have slopes of as much as 15 percent.

The hazard of water erosion is severe. This soil is suited to corn, grain, and hay. Capability unit IIIe–2; woodland group 2o1.

Greenwood Series

The Greenwood series consists of deep, very poorly drained organic soils in broad depressions on the glacial lake plain. These soils formed in more than 50 inches of organic residue from partly decomposed moss, sedges, grasses, and other aquatic plants. The organic material accumulated and is only partly decomposed because it is saturated by water most of the year.

In a representative profile in a sphagnum moss bog, the surface layer is black and dark-brown raw sphagnum moss about 3 inches thick. The next layer is black, plastic muck 3 inches thick. The next 11 inches is dark yellowish-brown mucky peat; the next 7 inches is very dark brown, plastic muck; and the lower 36 inches is dark-brown, mottled mucky peat.

A seasonal high water table is at or near the surface during much of the year. Available water capacity is very high, and permeability is moderately rapid. Natural fertility is low. The upper part of the soil is very strongly acid, and the lower part is very strongly acid to medium acid. Bedrock is generally below a depth of 6 feet.

Because of high acidity and very poor drainage, these soils are of little commercial use. A few small areas are in cranberries. Sphagnum moss is harvested from some areas. The rest is sphagnum bog that has scattered stunted black spruce and tamarack.

Greenwood soils are very severely limited for building sites that have onsite sewage-disposal systems by the high water table.

Representative profile of Greenwood peat in a sphagnum moss bog, about 60 feet east of the road and 60 feet south of a culvert in the road ditch on the east side of the road, in NW¼NW¼SW¼NW¼ sec. 19, T. 21 N., R. 2 E.:

Oil—0 to 3 inches, fibric material, black (10YR 2/1) and dark brown (10YR 3/3) broken face, dark brown (7.5YR 3/2) rubbed, brown (10YR 5/3) pressed; 100 percent fiber, about 90 percent rubbed; matted; friable; dominantly sphagnum moss fibers, rest is herbaceous fibers; extremely acid; clear, smooth boundary.

Oa1—3 to 6 inches, sapric material, black (10YR 2/1) broken face, black (N 2/0) rubbed, black (10YR 2/1) pressed; about 60 percent fiber, 9 percent rubbed; matted; plastic; herbaceous fibers; very strongly acid; clear, smooth boundary.

Oe1—6 to 17 inches, hemic material, dark yellowish brown (10YR 3/4) broken face, dark brown (10YR 3/3) rubbed, very dark grayish brown (10YR 3/2) pressed; about 80 percent fiber, about 35 percent rubbed; matted; nonsticky; herbaceous fibers; very strongly acid; clear, smooth boundary.

Oa2—17 to 24 inches, sapric material, very dark brown (10YR 2/2) broken face and rubbed, black (10YR 2/1) pressed; about 20 percent subangular blocky structure; plastic; herbaceous fibers; very strongly acid; abrupt, smooth boundary.

Oe2—24 to 60 inches, hemic material, dark brown (10YR 3/3) broken face, very dark grayish brown (10YR 3/2) rubbed and pressed; about 35 percent fibers, about 15 percent rubbed; matted; friable; herbaceous fibers; medium acid.

The O layer is more than 50 inches thick. The Oil layer, which is as much as 6 inches thick, commonly is fibric material derived from sphagnum moss. The rest of the profile is principally hemic material derived from herbaceous fibers. In some places layers of fibric or sapric material are in the subsurface or bottom tiers, but their combined thickness does not exceed 10 inches. In some places less than 10 percent woody fibers is present.

Greenwood soils are adjacent to Dawson soils. Greenwood soils formed in thicker organic deposits than Dawson, Rifle, or Markey soils. They are more acid than Markey or Rifle soils.

Greenwood peat (0 to 2 percent slopes) (Gr).—This soil is in depressions on the glacial lake plain. Areas are 100 to 1,000 acres in size. The vegetation is mainly sphagnum moss, wild cranberries, leatherleaf, and spirea, along with scattered black spruce and tamarack. Runoff is ponded.

Included with this soil in mapping are small areas of soils that have organic material less than 50 inches deep over sand.

If this soil is cultivated, the hazard of soil blowing is very severe. Because of high acidity, very poor drainage, and the moderate hazard of frost, this soil is poorly suited to cultivated crops commonly grown in the county. If properly drained, limed, and fertilized, this soil is suited to forage crops or such specialty crops as carrots. The soil is suited to cranberries and sphagnum moss. Capability unit VIIw–10; woodland group 6w6.

Guenther Series

The Guenther series consists of deep, moderately well drained or well drained, sandy soils on uplands. These soils formed under pine-oak forest in 20 inches to less than 40 inches of sandy sediment and in the underlying loamy residuum from acid granitic rocks.

In a representative profile the surface layer is very dark grayish-brown loamy sand about 6 inches thick. The subsurface layer is brown loamy sand about 3

inches thick. The subsoil is 28 inches thick. The upper 9 inches is dark-brown, very friable loamy sand; the next 7 inches is brown, very friable loamy sand; the next 5 inches is grayish-brown, very friable light sandy loam that has mottles of dark brown and that contains yellowish-brown remnants of sandy loam; and the lower 7 inches is dark-brown firm heavy loam that is mottled with brown and that contains a few angular fragments of granitic rock. The substratum is dark-brown, firm loam that contains a few angular fragments of granitic rock.

The water table is below a depth of 5 feet. Available water capacity is medium, and permeability is moderate. Natural fertility is low. The surface layer and subsoil are slightly acid to medium acid in the upper part and medium acid to strongly acid in the lower part. Bedrock is at a depth of 4 to 8 feet.

Most of the acreage of these soils is used for such general farm crops as corn, grain, and hay, but some areas are in native pasture or woodland.

Guenther soils are moderately limited for homesites that use onsite sewage-disposal systems by moderate permeability in the lower part of the subsoil and in the substratum.

Representative profile of Guenther loamy sand, 2 to 6 percent slopes, in a cultivated field, 100 feet north of town road in SW¼SE¼SE¼SW¼ sec. 15, T. 25 N., R. 5 E.:

Ap—0 to 6 inches, very dark grayish-brown (10YR 3/2) loamy sand, light brownish gray (10YR 6/2) dry; weak, fine and very fine, subangular blocky structure; friable; many fine roots; slightly acid; abrupt, smooth boundary.

A2—6 to 9 inches, brown (7.5YR 4/2) loamy sand; weak, fine, subangular blocky structure; very friable; many fine roots; medium acid; clear, wavy boundary.

B2ir—9 to 18 inches, dark-brown (7.5YR 4/4) loamy sand; weak, fine and very fine, subangular blocky structure; very friable; common fine roots; medium acid; clear, wavy boundary.

B3ir—18 to 25 inches, brown (7.5YR 5/4) loamy sand; weak, fine and very fine, subangular blocky structure; very friable; few fine roots; medium acid; clear, wavy boundary.

IIA&B—25 to 30 inches, grayish-brown (10YR 5/2) light sandy loam (A2); few, medium, distinct mottles of dark brown (7.5YR 4/4); weak, thin, platy structure; very friable; upward extensions and isolated remnants of yellowish-brown (10YR 5/4) sandy loam (Bt) make up about 25 percent, by volume; upward extensions of Bt horizon have moderate, medium, subangular blocky structure; friable; few fine fibrous roots; few thin clay films on faces of subangular blocky peds; few (less than 5 percent) fine and medium (5 to 50 millimeters) angular fragments of igneous rock; medium acid; clear, wavy boundary.

IIB2t—30 to 37 inches, dark-brown (7.5YR 4/4) heavy loam; common, medium, faint mottles of brown (7.5YR 5/4); moderate, medium, subangular blocky structure; firm; few fine roots; few to common thin clay films and clean silt and fine sand coatings on faces of peds; few (less than 5 percent) fine and medium (5 to 50 millimeters) angular fragments of igneous rock; medium acid; clear, wavy boundary.

IIC—37 to 60 inches, dark-brown (7.5YR 4/4) loam; many, fine, light-gray (10YR 7/2) specks of weathered feldspathic minerals; massive; firm; few (less than 5 percent) fine and medium (5 to 50 millimeters) angular fragments of igneous rock; medium acid.

The sandy sediment ranges from 20 inches to less than 40 inches in thickness. The solum ranges from 24 to 42 inches in thickness and extends into the loamy residuum. The content of rock fragments in the lower part of the solum ranges from 1 to 10 percent, and in the substratum it ranges from 10 to 30 percent. It generally increases with increasing depth. The amount of high-chroma mottles in the lower part of the subsoil ranges from none to common.

Guenther soils are on low upland ridges adjacent to lower lying somewhat poorly drained Point soils and poorly drained Dancy soils; these soils form a drainage sequence. Guenther soils are saturated for shorter periods than Point or Dancy soils.

Guenther loamy sand, 2 to 6 percent slopes (GuB).—This soil is on low ridges. Slopes are uniform, convex, and 100 to 300 feet long. Areas are 5 to 20 acres in size. The surface layer is very dark grayish brown. Runoff is slow.

Included with this soil in mapping are small areas of soils that have a sandy loam surface layer. Some small areas on ridgetops are brownish where soil blowing has removed some of the surface layer.

The hazard of water erosion is slight, and the hazard of soil blowing is severe. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. If adequately limed and fertilized, alfalfa grows well on this soil. Capability unit IIIe–4; woodland group 1s1.

Hiles Series

The Hiles series consists of moderately deep, moderately well drained to well drained, silty soils on low hills and ridges. These soils formed under mixed hardwood forest in 15 to 30 inches of silty sediment and in the underlying residuum from interstratified sandstone and clayey shale.

In a representative profile the surface layer is very dark grayish-brown silt loam about 3 inches thick. The upper 9 inches of the subsoil is brown silt loam over 7 inches of grayish-brown silt loam. The next 5 inches is yellowish-brown, firm silt loam that has tongues of grayish-brown silt loam extending downward into it from the layer above; and the lower 5 inches is pale-brown and brown, firm loam that has mottles of yellowish brown. The substratum is pale-brown and light yellowish-brown, soft, platy sandstone interstratified with thin layers of yellowish-brown and olive silty clay loam and silty clay residuum from shale.

A seasonal high water table is at a depth of 3 feet to more than 6 feet. Available water capacity is medium, and permeability is slow. Natural fertility is medium. The soil is medium acid to strongly acid in the silty upper part and strongly acid to extremely acid in the residuum from sandstone and shale.

Most of the acreage of these soils is used for general farm crops or pasture. Some areas are in hardwood forest, mainly oak and aspen.

Hiles soils are severely limited for building sites that have onsite sewage-disposal systems by the slowly permeable shale and sandstone subtratum.

Representative profile of Hiles silt loam, 2 to 6 percent slopes, in a pastured woodlot, 75 feet south and 1,900 feet east of the intersection of Wisconsin Highway 13 and County Highway N in NE¼NW¼NE¼NW¼ sec. 29, T. 23 N., R. 3 E.:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; mod-

erate, fine, subangular blocky structure; friable; many fine fibrous roots; medium acid; clear, wavy boundary.

B2ir—3 to 12 inches, brown (10YR 4/3) silt loam; weak, fine, subangular blocky structure; friable; many fine fibrous roots; strongly acid; clear, wavy boundary.

A2—12 to 19 inches, grayish-brown (10YR 5/2) silt loam; weak, medium, platy structure parting to weak, fine and very fine, subangular blocky; friable; few fine roots; strongly acid; clear, wavy boundary.

B&A—19 to 24 inches, yellowish-brown (10YR 5/4) heavy silt loam; common, fine, distinct mottles of yellowish brown (10YR 5/6); moderate, fine, subangular blocky structure; firm; few fine fibrous roots; few thin clay films on faces of peds; tongues of grayish-brown (10YR 5/2) silt loam penetrate this horizon from the A2 horizon above and make up approximately 20 percent, by volume; strongly acid; clear, wavy boundary.

IIB2t—24 to 29 inches, pale-brown (10YR 6/3) and brown (10YR 5/3) heavy loam; common, fine, faint and distinct mottles of yellowish brown (10YR 5/4–5/6); moderate, medium, subangular blocky structure; firm; few thin clay films on faces of peds; bleached silt and very fine sand grains coat faces of peds along primary vertical cleavage planes; many fine fragments of sandstone; strongly acid; clear, wavy boundary.

IIC—29 to 60 inches, pale-brown (10YR 6/3) and light yellowish-brown (10YR 6/4), soft, platy sandstone and thin layers of yellowish-brown (10YR 5/6–5/8) and olive (5Y 5/3, 5/4, 5/6) silty clay loam and silty clay residuum from shale; strongly acid.

The thickness and arrangement of the sandy, loamy, and clayey layers derived from sandstone and shale residuum are extremely variable. High-chroma mottles are few to common, fine to medium, and faint to distinct in the B2t or IIB2t horizon in most places.

Hiles soils are adjacent to somewhat poorly drained Kert soils, poorly drained Vesper soils, and very poorly drained Veedum soils; these soils form a drainage sequence. Hiles soils are in positions similar to those of Gale soils. They are saturated for shorter periods than Kert, Vesper, and Veedum soils. They have more shale residuum in the B and C horizons than Gale soils.

Hiles silt loam, 2 to 6 percent slopes (HsB).—This soil is on low ridgetops. Slopes are convex, uniform, and 200 to 400 feet long. Areas are 5 to 40 acres in size. In cultivated fields the surface layer is uniformly very dark grayish brown. Runoff is medium.

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

The hazard of water erosion is moderate. It can be controlled by simple conservation practices. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIe–6; woodland group 2o1.

Hiles silt loam, 6 to 12 percent slopes (HsC).—This soil is on the sides of low ridges. Slopes are convex, uniform, and 100 to 200 feet long. Areas are 5 to 15 acres in size. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but it has thinner upper horizons and is slightly shallower over the sandstone substratum.

Included with this soil in mapping are small areas of soils that have a yellowish-brown surface layer.

The hazard of water erosion is severe. If conservation practices and good management are used, this soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIe–6; woodland group 2o1.

Humbird Series

The Humbird series consists of deep, moderately well drained to well drained, sandy to loamy soils on uplands. These soils formed under mixed hardwood forest in 15 to 40 inches of sandy and loamy sediment and in the underlying residuum from stratified sandstone and shale.

In a representative profile the surface layer is very dark grayish-brown sandy loam about 8 inches thick. The upper part of the subsoil is 8 inches of dark-brown sandy loam, and the lower part is 8 inches of pale-brown fine sand. The next 6 inches is dark-brown, friable loamy fine sand, and the lower 6 inches is very firm, olive-gray silty clay mottled with strong brown. The substratum is very pale brown medium sand.

A seasonal high water table is at a depth of 3 to 5 feet. Available water capacity is medium, and permeability is moderately rapid in the upper part and slow in the residuum from sandstone and shale. Natural fertility is low.

About half of the acreage of these soils has been cleared and is used for general farm crops or pasture. Most of the remaining acreage is in second-growth hardwood and aspen forest.

Humbird soils are severely limited for building sites that have onsite sewage-disposal systems by the slow permeability in the lower part of the subsoil.

Representative profile of Humbird sandy loam, 2 to 6 percent slopes, in a grass-clover meadow, 75 feet west of Wisconsin State Highway 13 in NE¼SE¼SE¼SE¼ sec. 18, T. 23 N., R. 3 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) sandy loam, light brownish gray (10YR 6/2) dry; moderate, fine, subangular blocky structure; friable; many fine fibrous roots; medium acid; abrupt, smooth boundary.

B21ir—8 to 12 inches, dark-brown (7.5YR 4/4) sandy loam; weak, fine and very fine, subangular blocky structure; very friable; common fine fibrous roots; medium acid; clear, wavy boundary.

B22ir—12 to 16 inches, dark-brown (10YR 4/3) sandy loam; weak, fine and very fine, subangular blocky structure; very friable; few fine fibrous roots; slightly acid; clear, wavy boundary.

IIA2—16 to 24 inches, pale-brown (10YR 6/3) fine sand; single grained; loose; few fine fibrous roots; very slightly acid; clear, wavy boundary.

IIB2t—24 to 30 inches, dark-brown (10YR 4/3) loamy fine sand; weak, fine and medium, subangular blocky structure; friable; few thin clay films on faces of peds and bridging sand grains; strongly acid; abrupt, smooth boundary.

IIIB3t—30 to 36 inches, olive-gray (5Y 5/2) silty clay; common, medium, prominent mottles of strong brown (7.5YR 5/6–5/8); weak, medium, angular and subangular blocky structure; very firm; few thin clay films on some ped faces; extremely acid; abrupt, smooth boundary.

IIIC—36 to 60 inches, very pale brown (10YR 7/3) medium sand; single grained; loose; few thin (½-inch) widely spaced laminae of brown (10YR 5/3) loamy sand; slightly acid.

The thickness and arrangement of the sandy, loamy, and clayey layers that formed in sandstone and shale residuum are extremely variable. High-chroma mottles are few to common, fine to medium, and faint to prominent in the IIB2t and IIB3t horizons in many places. Bedrock is at a depth of 2 to 6 feet.

Humbird soils are adjacent to the lower lying, somewhat poorly drained Merrillan soils and the poorly drained Elm Lake soils; these soils form a drainage sequence. Humbird

soils are saturated for shorter periods than Elm Lake or Merrillan soils.

Humbird loamy sand, 2 to 6 percent slopes (HuB).—This soil is on low ridges on the unglaciated upland plains. Slopes are convex, uniform, and 100 to 300 feet long. Areas are 3 to 10 acres in size. In cultivated areas the surface layer is uniformly dark grayish brown. Runoff is slow.

This soil has a profile similar to the one described as representative of the series, but it has more sand in the upper horizons, has many sandstone fragments throughout the profile, and generally has less shale in the substratum.

Included with this soil in mapping are some areas of soils that have slopes of 6 to 12 percent.

The hazard of water erosion is slight, and the hazard of soil blowing is severe. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIe–4; woodland group 3d1.

Humbird sandy loam, 2 to 6 percent slopes (HwB).—This soil is on low ridges on the unglaciated upland plains. Slopes are convex, uniform, and 200 to 400 feet long. Areas are 5 to 40 acres in size. In cultivated fields the surface layer is uniformly very dark grayish brown. Runoff is slow.

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 7 to 10 percent.

The hazards of soil blowing and water erosion are severe. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIe–4; woodland group 3d1.

Kert Series

The Kert series consists of moderately deep, somewhat poorly drained, silty soils on uplands. These soils formed under mixed hardwood and coniferous forest in 15 to 30 inches of silty sediment and in the underlying residuum from stratified sandstone and shale.

In a representative profile the surface layer is very dark grayish-brown silt loam about 5 inches thick (fig. 6). The subsurface layer is brown silt loam 9 inches thick. The subsoil is 19 inches thick. The upper 8 inches is pale-brown loamy fine sand that is mottled with yellowish brown and that contains scattered bodies of brown heavy loamy sand; and the lower 11 inches is reddish-brown very firm clay that is mottled with strong brown and brown and that has tongues of brown silt loam and fine sandy loam extending downward into it from the layer above. The upper 7 inches of the substratum is olive-yellow and pale-green, firm silty clay over 12 inches of dark reddish-brown very firm clay. Below this is olive and pale-green, firm clay that has thin layers of hard, platy sandstone.

A seasonal high water table is at a depth of 1 to 3 feet. Available water capacity is medium, and permeability is slow. Natural fertility is low. These soils are slightly acid to strongly acid in the upper part and strongly acid to extremely acid in the sandstone and shale residuum. Depth to hard bedrock ranges from 2 to 6 feet.

Most of the acreage of these soils has been cleared and is used for corn, small grain, hay, and pasture. Some areas are in second-growth woodland or native pasture. The soils are suited to hardwoods as well as to white pine, white spruce, and hemlock.

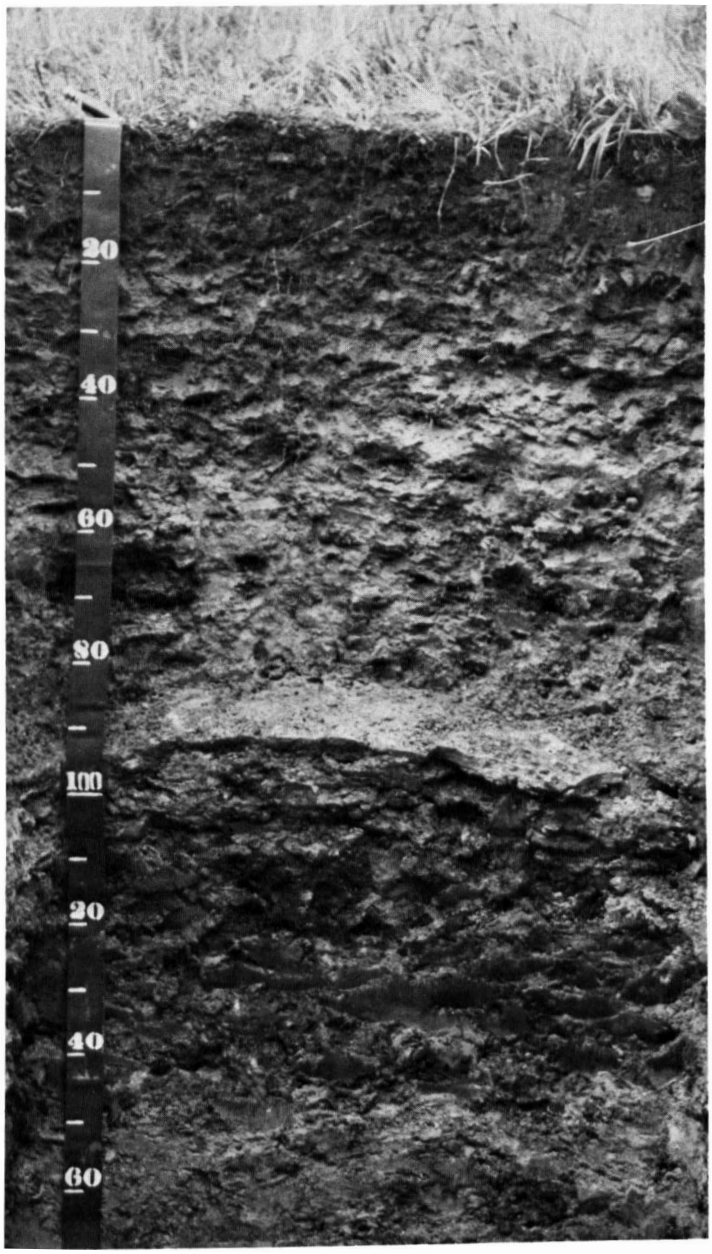

Figure 6.—**Representative profile of Kert silt loam, 0 to 3 percent slopes.**

Kert soils are severely limited for homesites that use onsite sewage-disposal systems by the seasonal high water table and the slow permeability of the substratum.

Representative profile of Kert silt loam, 0 to 3 percent slopes, in a grass-clover meadow, 350 feet north of a town road in NW¼SE¼SW¼SE¼ sec. 19, T. 24 N., R. 3 E.:

Ap—0 to 5 inches, very dark grayish-brown (10YR 3/2) silt loam, light brownish gray (10YR 6/2) dry;

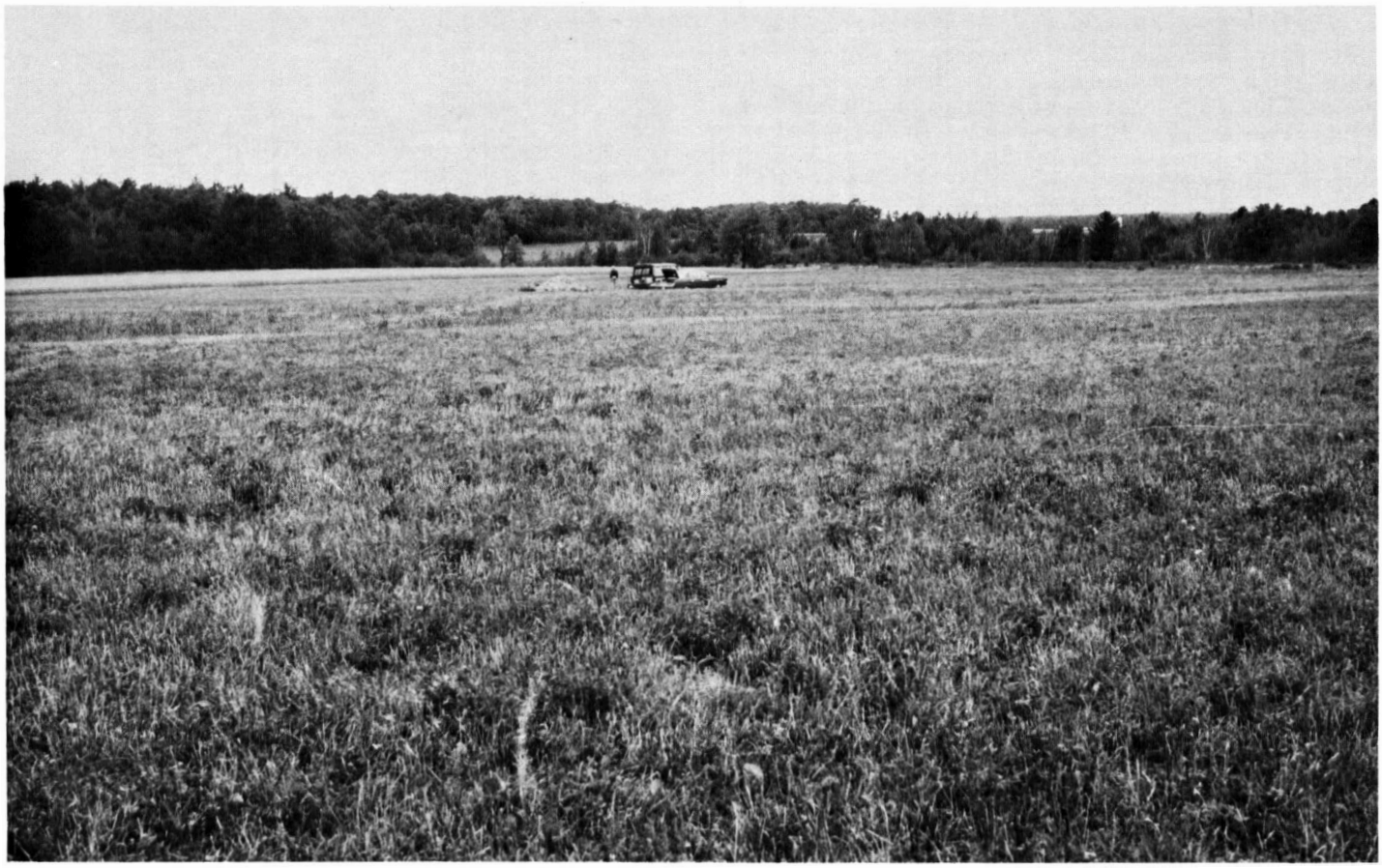

Figure 7.—**Typical landscape in an area of Kert silt loam, 0 to 3 percent slopes.**

weak, fine, subangular blocky structure; friable; many fine fibrous roots; neutral; abrupt, smooth boundary.

A2—5 to 14 inches, brown (10YR 5/3) silt loam; many, fine, prominent mottles of yellowish brown (10YR 5/6–5/8); weak, thin, platy structure; friable; common fine fibrous roots; slightly acid; clear, wavy boundary.

IIA&B—14 to 22 inches, pale-brown (10YR 6/3) loamy fine sand (A2); many, fine, prominent mottles of yellowish brown (10YR 5/6–5/8); very weak, fine, subangular blocky structure; very friable; brown (10YR 5/3) heavy loamy fine sand remnants of Bt horizon scattered through the horizon and make up about 30 percent, by volume; few thin clay films on faces of peds and in some pores or bridging sand grains in Bt part; slightly acid; abrupt, wavy boundary.

IIIB&A—22 to 33 inches, reddish-brown (2.5YR 4/4) clay (Bt); many, fine, prominent mottles of strong brown (7.5YR 5/6) and brown (7.5YR 5/2); strong, thick, platy structure parting to moderate, fine, angular blocky; very firm; continuous, thick, very dark gray (10YR 3/1) and dark-gray (10YR 4/1) clay films along horizontal cleavage planes and thin clay films on faces of angular blocky peds; tongues of brown (10YR 5/3) silt loam and fine sandy loam (A2) penetrate the horizon from above and make up approximately 35 percent, by volume; many, fine, prominent mottles of strong brown (7.5YR 5/6–5/8); weak, fine, subangular blocky structure; firm; strongly acid; clear, wavy boundary.

IIIC1—33 to 40 inches, olive-yellow (2.5Y 6/6) and pale-green (5G 7/2) silty clay; weak, fine, angular blocky structure; firm; few thin clay films on vertical faces of peds; thin (approximately ½ inch) layers of pale-brown (10YR 6/3) and light yellowish-brown (10YR 6/4), hard, platy sandstone at intervals of approximately 2 inches; very strongly acid; abrupt, smooth boundary.

IIIC2—40 to 52 inches, dark reddish-brown (2.5YR 3/4) clay; weak, fine, angular blocky structure; very firm; few thin clay films on vertical faces of peds; few, thin, pinkish-gray (7.5YR 7/2) silt coats on faces of peds; very strongly acid; abrupt, smooth boundary.

IIIC3—52 to 68 inches, olive (5Y 5/4) and pale-green (5G 7/2) clay; weak, fine, angular blocky structure; firm; few thin clay films on vertical faces of peds; thin (approximately ½ inch) layers of pale-brown (10YR 6/3), hard, platy sandstone at intervals of approximately 4 inches; strongly acid.

The thickness, number, and arrangement of the sandy, loamy, and clayey horizons in the sandstone and shale residuum are extremely variable. In some places the sandstone and shale residuum is thin and granitic rock or residuum from granitic rock is at a depth of 40 inches or more.

Kert soils are adjacent to the higher lying, well drained to moderately well drained Hiles soils; the lower lying, poorly drained Vesper soils; and the very poorly drained Veedum soils. These soils form a drainage sequence. Kert soils are saturated for longer periods than Hiles soils and for shorter periods than Vesper or Veedum soils. They are finer textured in the upper part of the solum than Merrillan soils.

Kert silt loam, 0 to 3 percent slopes (KeA).—This soil is on the upland plain. Slopes are convex, uniform, and

200 to 400 feet long (fig. 7). Areas are 5 to 60 acres in size. The surface layer in cultivated areas is uniformly dark grayish brown. Runoff is slow.

Included with this soil in mapping are small areas of soils that have slopes of more than 3 percent or that have a loam surface layer. Also included are some small areas of soils in which the shale layers are lacking and the subsoil formed in silt and in sandy residuum over hard sandstone at a depth of about 40 inches. In some areas glacial till and pebbles are in the solum just above the sandstone and shale residuum.

This soil is seasonally saturated and is difficult to cultivate. The hazard of water erosion is slight. Under good management this soil is suitable for intensive production of corn, small grain, hay and other crops commonly grown in the county. Tiling is ineffective on this soil because of the slowly permeable substratum, but surface drainage is beneficial. Capability unit IIw–3; woodland group 2o1.

Mann Series

The Mann series consists of deep, very poorly drained, nearly level, silty soils in depressions and drainageways on the glacial till plain. These soils formed under water-tolerant hardwood forest and an understory of sedges and reeds in 20 to 36 inches of silty drift and in the underlying acid heavy sandy loam glacial till.

In a representative profile the surface layer is black silt loam 8 inches thick over very dark gray silty clay loam 5 inches thick. The subsoil is about 21 inches thick. The upper part is dark-gray, firm silty clay loam mottled with yellowish brown and greenish gray; the middle part is gray, firm silty clay loam mottled with strong brown; and the lower part is gray and brown, firm heavy loam mottled with olive. The substratum is brown heavy sandy loam glacial till.

A seasonal high water table is near the surface during spring and part of the summer. Available water capacity is high, and permeability is moderately slow. Natural fertility is low. The surface layer and subsoil range from slightly acid in the upper part to mildly alkaline in the lower part. Depth to bedrock is more than 6 feet.

Most of the acreage of these soils is used for native pasture or woodland, but some areas are in oats and hay. These soils are moderately suited to lowland hardwoods, white spruce, balsam fir, and white pine.

Mann soils are very severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table.

Representative profile of Mann silt loam in a bromegrass meadow, on the University of Wisconsin Marshfield Branch Experiment Station, 1,400 feet west and 500 feet south of the northeast corner of sec. 22, T. 25 N., R. 3 E.:

Ap—0 to 8 inches, black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; weak, fine, subangular blocky structure; friable; many fine fibrous roots; neutral; abrupt, smooth boundary.

A12—8 to 13 inches, very dark gray (5Y 3/1) silty clay loam; few, fine, prominent mottles of yellowish brown (10YR 5/8) and dark greenish gray (5BG 4/1); moderate, fine and medium, angular blocky structure; firm; common fine fibrous roots; mildly alkaline; clear, wavy boundary.

B21g—13 to 20 inches, dark-gray (5Y 4/1) silty clay loam; common, fine, prominent mottles of yellowish brown (10YR 5/8) and faint mottles of dark greenish gray (5BG 4/1); moderate, fine and medium, angular blocky structure; firm, hard, slightly plastic; few fine fibrous roots; mildly alkaline; clear, wavy boundary.

B22g—20 to 28 inches, gray (5Y 5/1) silty clay loam; many, medium, prominent mottles of strong brown (7.5YR 5/6–5/8); weak, medium, subangular blocky structure; firm, hard, slightly plastic; few fine fibrous roots; moderately alkaline; clear, wavy boundary.

IIB3g—28 to 34 inches, gray (5Y 5/1) and brown (7.5YR 4/2) heavy loam; common, medium, prominent mottles of olive (5Y 5/6); weak, medium, subangular blocky structure; firm, slightly hard, slightly plastic; 5 to 10 percent fine gravel; moderately alkaline; clear, wavy boundary.

IIC—34 to 60 inches, brown (7.5YR 5/4) heavy sandy loam; few, fine, distinct mottles of strong brown (7.5YR 5/6); massive; friable, slightly hard, slightly plastic; 5 to 10 percent fine gravel; moderately alkaline.

The solum ranges from 24 to 50 inches in thickness and extends into the underlying loamy glacial till. The upper silty layers range from 20 to 36 inches in thickness. The Ap horizon is black silt loam, silty clay loam, or mucky silt loam. The A12 horizon is very dark gray silt loam or silty clay loam. The A horizon ranges from 10 to 16 inches in thickness. The B2g horizon is dark-gray, gray, dark grayish-brown, or olive-gray silty clay loam, but in some places it is heavy loam, clay loam, or sandy clay loam in the lower part. It commonly has distinct or prominent mottles and ranges from slightly acid to mildly alkaline. The IIB3g horizon is gray, dark-gray, grayish-brown, or olive-gray heavy loam, sandy clay loam, clay loam, or heavy sandy loam. It ranges from slightly acid to moderately alkaline. The IICg horizon is brown, dark-brown, or dark yellowish-brown loam, heavy sandy loam, or sandy clay loam. It is neutral to mildly alkaline.

Mann soils are adjacent to the poorly drained Marshfield soils and the higher lying, somewhat poorly drained Withee soils; these soils form a drainage sequence. Mann soils are saturated for longer periods and have a darker A horizon than Marshfield or Withee soils.

Mann silt loam (0 to 2 percent slopes) (Ma).—This soil is in depressions and drainageways or along small streams on the glacial till plain. Slopes are concave, uniform, and 100 to 300 feet long. Areas are 20 to 80 acres in size. The surface layer is uniformly black. Runoff is very slow to ponded. Some areas have many large stones on the surface.

This soil has a seasonal high water table and is subject to flooding. The hazard of frost generally is slight late in spring and early in fall. Tile drains do not function well in this soil. If adequately drained and protected from flooding, this soil is suited to small grain and hay, but row crops are subject to frost damage. Capability unit IVw–3; woodland group 5w5.

Marathon Series

The Marathon series consists of moderately deep, well-drained, silty soils on uplands. These soils formed under northern mixed forest in 15 to 30 inches of silty sediment and in the underlying loamy residuum from disintegrated and weathered coarse-grained granite.

In a representative profile the surface layer is very dark grayish-brown silt loam 8 inches thick. The subsurface layer is 10 inches thick. The upper 6 inches is dark grayish-brown silt loam, and the lower 4 inches is brown silt loam that has isolated bodies of firm,

brown silt loam subsoil material. The subsoil is 20 inches thick. The upper 2 inches is firm, brown silt loam; the middle 8 inches is firm, dark yellowish-brown and yellowish-brown loam; and the lower 10 inches is friable, brown loam. The middle and lower layers contain many small angular pieces of yellowish-red rock. The substratum is strong-brown, angular rock fragments and sandy loam between the fragments.

The water table is generally below a depth of 5 feet. Available water capacity is medium, and permeability is moderate in the silty upper part and moderately rapid in the lower gravelly material. Natural fertility is medium. This soil is slightly acid to strongly acid in the lower part. The depth to hard bedrock is generally more than 5 feet.

About half of the acreage of these soils has been cleared and is used for general farm crops. The rest is in woodland or native pasture. Because individual areas of these soils are relatively small, they are generally used for the same purpose as the surrounding soils.

Marathon soils are moderately limited for building sites that use onsite sewage-disposal systems by the moderately rapid permeability in the substratum and the danger of contaminating ground water.

Representative profile of Marathon silt loam, 2 to 6 percent slopes, in a cultivated field, 100 feet east and 50 feet south of the northwest corner of sec. 6, T. 25 N., R. 4 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam, gray (10YR 6/1) when dry; moderate, fine, subangular blocky structure; friable; many roots; slightly acid; abrupt, smooth boundary.

A2—8 to 14 inches, dark grayish-brown (10YR 4/2) silt loam; moderate, very thin, platy structure; friable; many roots; slightly acid; clear, wavy boundary.

A&B—14 to 18 inches, brown (10YR 5/3) silt loam (A2); moderate, medium, subangular blocky structure parting to moderate, thin, platy; friable; A2 part makes up about 80 percent, by volume, and completely surrounds brown (10YR 4/3) silt loam remnants of underlying B21t horizon; moderate, coarse structure parting to fine, subangular blocky; firm; few roots; few thin clay films on faces of peds in B21t remnants; medium acid; clear, wavy boundary.

B21t—18 to 20 inches, brown (10YR 4/3) silt loam; moderate, coarse, subangular blocky structure parting to moderate, fine, subangular blocky; firm (weakly cemented); light-gray (10YR 7/2) coatings on peds; few thin clay films on peds; few roots; few angular pieces of yellowish-red rock 5 to 10 millimeters in diameter; strongly acid; clear, wavy boundary.

B22t—20 to 28 inches, dark yellowish-brown and yellowish-brown (10YR 4/4 and 5/4) loam; moderate, coarse, subangular blocky structure parting to moderate, fine, subangular blocky; firm; few thin clay films on peds; few roots; many fine mica flakes; many angular pieces of yellowish-red rock 5 to 10 millimeters in diameter; very strongly acid; gradual, wavy boundary.

IIB3—28 to 38 inches, brown (7.5YR 5/4) loam; weak, medium, subangular blocky structure; friable; many fine mica flakes; many angular pieces of yellowish-red rock 5 to 10 millimeters in diameter; very strongly acid; gradual, wavy boundary.

IIC—38 to 60 inches, strong-brown (7.5YR 5/6) gravel; disintegrated igneous rock; angular pieces of gneiss 3 to 30 millimeters in diameter that have sandy loam in interstices; about 80 percent gravel; very strongly acid.

The solum ranges from 36 to 50 inches in thickness. The degree of weathering of the underlying rock is extremely variable, and in places large, relatively unweathered stones are in the substratum.

Marathon soils are on the side slopes of broad ridges above Milladore soils. They are in positions similar to those of Mosinee soils. They are saturated for shorter periods than Milladore soils. They have a more silty A horizon, stronger structure, and a C horizon of more coarsely divided granitic bedrock than Mosinee soils.

Marathon silt loam, 2 to 6 percent slopes (MbB).—This soil is on the sides of broad ridges. Slopes are 100 to 300 feet long. Areas are 5 to 20 acres in size. The surface layer is almost uniformly grayish brown.

Included with this soil in mapping are small areas of soils that have slopes of as much as 12 percent.

This soil is well suited to all crops commonly grown in the county. Capability unit IIe–2; woodland group 2o1.

Markey Series

The Markey series consists of deep, very poorly drained organic soils in depressions. These soils formed in 16 to 50 inches of organic residue over sand. The residue is partly decomposed remains of sedges, grasses, reeds, and a few woody shrubs and trees. The organic material is only partly decomposed because of the high water table.

In a representative profile in a moss-sedge bog, the surface layer is raw sphagnum moss about 2 inches thick. Below that is about 45 inches of black mucky peat that formed in herbaceous plant material. Brown sand is below a depth of 47 inches.

A seasonal high water table is at or near the surface for much of the year. Available water capacity is very high, and permeability is moderately rapid in the organic material and rapid in the sand. Natural fertility is low. These soils are medium acid to slightly acid throughout. Bedrock is at a depth of more than 6 feet.

Most of the acreage of these soils is in woodland and wildlife habitat. The natural plant cover is marsh grass, sedges, reeds, and cattails, but some areas have forest cover of alder, aspen, balsam fir, black spruce, and tamarack. Some areas are used for cranberries, and small areas are used for pasture.

Markey soils are very severely limited for building sites that use onsite sewage-disposal systems by the high water table.

Representative profile of Markey mucky peat in a sphagnum moss-sedge bog, 600 feet south of the corner of County Highway D in SE¼NE¼SE¼NE¼ sec. 33, T. 22 N., R. 4 E.:

Oil—0 to 2 inches, fibric material, very dark brown (10YR 2/2) broken face, dark brown (10YR 3/3) rubbed and pressed; about 95 percent fiber, 70 percent rubbed; matted; nearly 100 percent sphagnum moss fibers; very strongly acid; clear, smooth boundary.

Oa1—2 to 10 inches, sapric material, black (10YR 2/1) broken face, very dark brown (10YR 2/2) rubbed and pressed; about 35 percent fiber, about 8 percent rubbed; matted; mainly herbaceous fibers; strongly acid; clear, smooth boundary.

Oa2—10 to 21 inches, sapric material, black (10YR 2/1) broken face, very dark brown (10YR 2/2) rubbed and pressed; about 20 percent fiber, about 5 percent rubbed; moderate, coarse, subangular blocky structure; sticky; mainly herbaceous fibers; medium acid; clear, smooth boundary.

Oa3—21 to 38 inches, sapric material, black (10YR 2/1)

broken face, very dark brown (10YR 2/2) rubbed and pressed; about 20 percent fiber, about 5 percent rubbed; weak, thick, platy structure parting to moderate, fine, subangular blocky; sticky; mainly herbaceous fibers; medium acid; clear, smooth boundary.

Oa4—38 to 47 inches, sapric material, black (10YR 2/1) broken face, dark reddish brown (5YR 2/2) rubbed and pressed; about 30 percent fiber, about 5 percent rubbed; moderate, coarse, subangular blocky structure; sticky; mainly herbaceous fibers; medium acid; abrupt, smooth boundary.

IIC—47 to 60 inches, brown (10YR 4/3) medium sand; single grained; slightly acid.

The depth to the sandy IIC horizon ranges from 16 to 50 inches. In some places the soil is as much as 10 percent woody fragments, but the organic material is mainly residue from herbaceous plants. About one-half of the acreage of these soils has a thin (1 to 3 inches) layer of sphagnum moss on the surface. Those areas of soils that do not have moss on the surface have black mucky peat on the surface. Some areas of soils have as much as 10 inches of hemic material or 5 inches of fibric material in the subsurface tier.

Markey soils are adjacent to Rifle and Cathro soils. They formed in thinner organic deposits than Rifle soils. They are underlain by sand, whereas Cathro soils have a loamy C horizon.

Markey mucky peat (0 to 2 percent slopes) (Mc).—This soil is in depressions and stream valleys. Areas are 20 to 1,000 acres in size. The plant cover is mainly sedges, reeds, cattails, and sphagnum moss and an overstory of aspen, balsam fir, alder, tamarack, and black spruce. Runoff is ponded.

Included with this soil in mapping are small areas of Rifle soils.

Wetness is a very severe limitation on this soil. The hazard of soil blowing is severe if the soil is cultivated. The hazard of frost is moderate. If drained and fertilized, this soil is suited to corn and forage. It is well suited to cranberries and is used extensively for them (fig. 8). Capability unit IVw–9; not placed in a woodland group.

Marsh

Marsh (0 to 2 percent slopes) (Md) includes stream and reservoir borders, sloughs, alluvial land, and bogs that are covered by water most of the year. Beneath the water is waterlogged mineral material or organic matter that is largely undecomposed. The native vegetation is sedges, cattails, and other semi-aquatic plants.

Almost all of the acreage of these soils is in wildlife habitat. Some places can be made more attractive to wildlife and more productive as wildlife habitat. Capability unit VIIIw–15; woodland group 6w5.

Marshfield Series

The Marshfield series consists of deep, poorly drained, silty soils in upland drainageways and de-

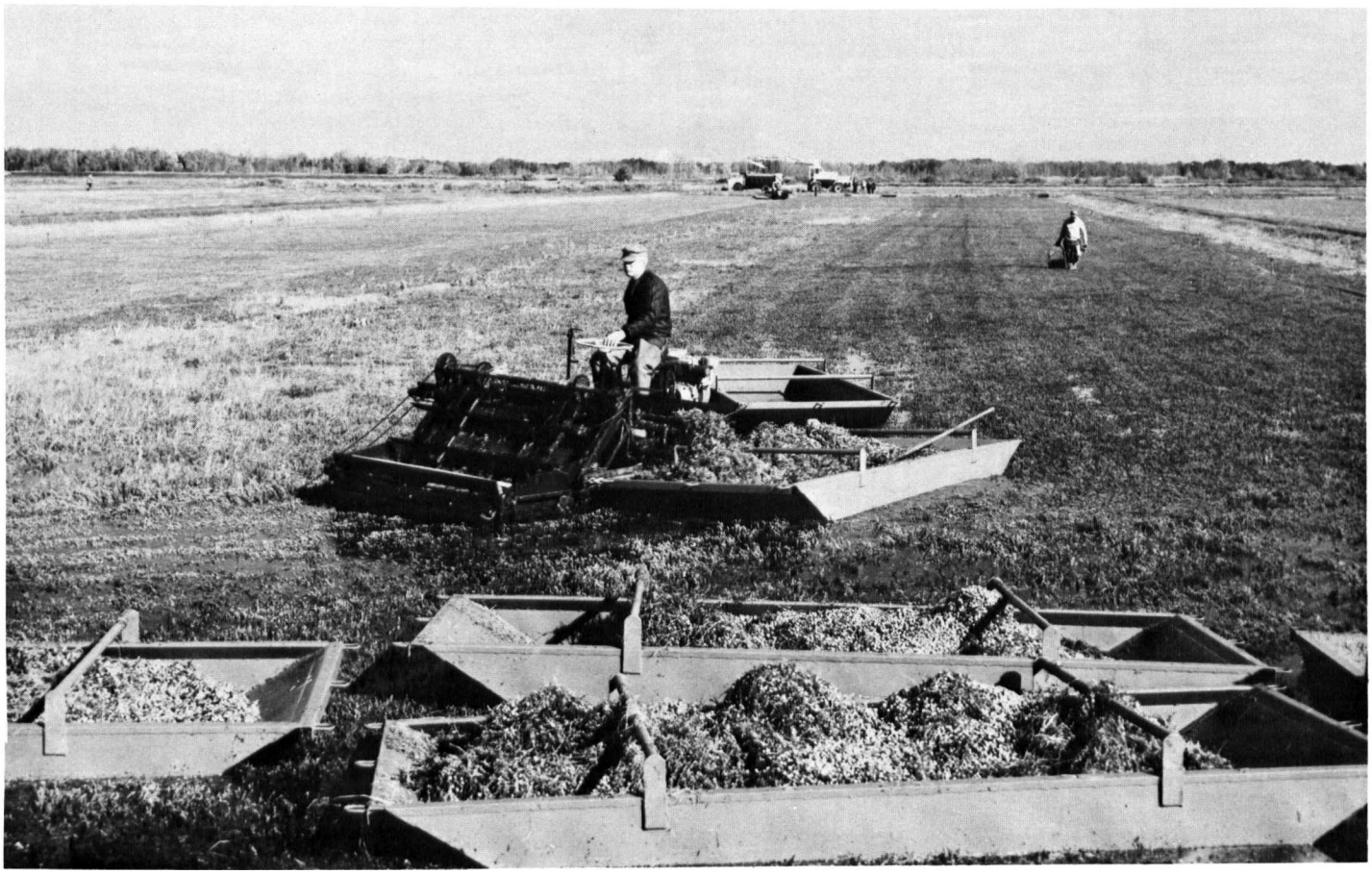

Figure 8.—**Harvesting cranberries in an area of Markey mucky peat.**

pressions on the glacial till plain. These soils formed under water-tolerant hardwood and white pine forest in 15 to 30 inches of silty sediment and in the underlying loamy glacial till.

In a representative profile the surface layer is very dark gray silt loam about 5 inches thick. The subsurface layer is about 11 inches of grayish-brown silt loam mottled with strong brown. The subsoil is about 28 inches thick. The upper 8 inches is grayish-brown, firm silt loam mottled with strong brown; the next 10 inches is grayish-brown, firm loam mottled with yellowish brown and strong brown; and the lower 10 inches is olive-gray, very firm loam mottled with strong brown. The substratum is olive-gray and olive silty clay loam mottled with strong brown in the upper 14 inches and mottled with yellowish brown below a depth of 58 inches.

A seasonal high water table is at a depth of less than 1 foot during spring and part of summer. Available water capacity is high, and permeability is moderately slow. Natural fertility is medium. The surface layer and subsoil range from very strongly acid to strongly acid in the upper part and from very strongly acid to slightly acid in the lower part. Bedrock generally is at a depth of more than 6 feet.

Most of the acreage of these soils has been cleared and is used for such general farm crops as corn, grain, and hay. Some areas are in woodlots or native pasture. The soils are suited to black ash, elm, soft maple, aspen, and white pine.

Marshfield soils are severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table and moderately slow permeability.

Representative profile of Marshfield silt loam in a pastured woodlot, 200 feet east and 250 feet south of the northwest corner of the woodlot in NW¼NW¼SW¼NE¼ sec. 22, T. 25 N., R. 3 E.:

A1—0 to 5 inches, very dark gray (10YR 3/1) silt loam, gray (10YR 6/1) dry; few, fine, prominent mottles of yellowish brown (10YR 5/6); moderate, fine, subangular blocky structure; friable; many fine fibrous roots; strongly acid; clear, wavy boundary.

A21g—5 to 9 inches, grayish-brown (2.5Y 5/2) silt loam; common, medium, prominent mottles of strong brown (7.5YR 5/6); weak, thin, platy structure; friable; many fine fibrous roots; very strongly acid; abrupt, wavy boundary.

A22g—9 to 16 inches, grayish-brown (2.5Y 5/2) silt loam; many, fine and medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, platy structure; friable; common fine roots; very strongly acid; clear, wavy boundary.

B1g—16 to 24 inches, grayish-brown (2.5Y 5/2) silt loam; common, medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, thick, platy structure parting to weak, medium, subangular blocky; firm; very strongly acid; clear, wavy boundary.

IIB2tg—24 to 34 inches, grayish-brown (2.5Y 5/2) loam; common, medium and large, prominent, yellowish-brown (10YR 5/6) and strong-brown (7.5YR 5/6) mottles; weak, medium and coarse, subangular blocky structure; firm; thin sand coats are along some vertical structural planes near the upper boundary; few, thin, dark-brown (10YR 3/3) clay films on faces of some peds and in root cavities and insect or worm holes; very strongly acid; clear, smooth boundary.

IIB3tg—34 to 44 inches, olive-gray (5Y 5/2) loam; many, fine and medium, prominent, strong-brown (7.5YR 5/6) mottles; weak, medium, prismatic structure parting to weak, fine and medium, subangular blocky; very firm; few, thin, dark-gray (10YR 4/1), very dark gray (10YR 3/1), and very dark grayish-brown (10YR 3/2) clay films on some prominent vertical structural planes and in some root and worm channels; strongly acid; clear, smooth boundary.

IIC1—44 to 58 inches, olive-gray (5Y 5/2) and olive (5Y 5/3) silty clay loam; many, large and medium, prominent, strong-brown (7.5YR 5/6) mottles that make up approximately 40 percent of the horizon; weak, coarse, subangular blocky structure; firm; few thin clay films along vertical structural planes; medium acid; gradual, smooth boundary.

IIC2—58 to 66 inches, olive-gray (5Y 5/2) and olive (5Y 5/3) silty clay loam; many, large, prominent, yellowish-brown (10YR 5/6) mottles in approximately 40 percent of the horizon; massive; firm; slightly acid.

The solum ranges from 24 to about 50 inches in thickness. The underlying glacial till ranges from loam to silty clay loam in texture.

Marshfield soils are in drainageways and depressions adjacent to the higher lying, somewhat poorly drained Withee soils and the lower lying, very poorly drained Mann soils. They are in positions similar to those of Mann soils, but they have a thinner dark A horizon and a more clayey B horizon than Mann soils.

Marshfield silt loam (0 to 2 percent slopes) (Mf).—This soil is in upland drainageways on the glacial till plain. Slopes are generally concave, uniform, and less than 1 percent. Areas are irregularly shaped and 10 to 100 acres in size. The surface layer is uniformly very dark gray.

Included with this soil in mapping are small areas of soils that have slopes of more than 2 percent. Also included are small areas of Mann soils.

The hazard of wetness is severe. If drained, this soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIw–3; woodland group 3w5.

Meehan Series

The Meehan series consists of deep, somewhat poorly drained, sandy soils on outwash plains. These soils formed in deep sandy sediment under mixed coniferous and hardwood forest.

In a representative profile the surface layer is loamy sand about 7 inches thick. It is very dark gray in the upper part and dark brown in the lower part. The upper 21 inches of the substratum is brown sand mottled with yellowish brown, the next 14 inches is brownish-yellow, very friable sand mottled with light gray and yellowish brown, the next 4 inches is dark grayish-brown sand mottled with yellowish brown; and below this, and extending to a depth of 60 inches, is light brownish-gray sand.

A seasonal high water table is at a depth of 1 to 3 feet. Available water capacity is low, and permeability is rapid. Natural fertility is low. These soils are medium acid to strongly acid in the upper part and medium acid to slightly acid in the lower part. Bedrock is at a depth of more than 6 feet.

Most of the acreage of these soils is in second-growth hardwood forest or in plantations of Norway pine or jack pine. Some areas are used for general farm crops. The soils are suited to Norway pine, jack pine, white spruce, and balsam fir.

Meehan soils are severely limited for building sites

that have onsite sewage-disposal systems by the high water table and the danger of contaminating ground water.

Representative profile of Meehan loamy sand in an aspen-white birch woodlot, 75 feet south of a town road in NW¼NW¼NE¼NE¼ sec. 13, T. 21 N., R. 6 E.:

A11—0 to 5 inches, very dark gray (10YR 3/1) loamy sand, light brownish gray (10YR 6/2) dry; weak, fine, granular structure; friable; many light-gray (10YR 7/1) sand grains, many roots; strongly acid; clear, wavy boundary.

A12—5 to 7 inches, dark-brown (7.5YR 3/2) loamy sand; moderate, medium, subangular blocky structure; firm; many roots; strongly acid; abrupt, wavy boundary.

C1—7 to 14 inches, brown (10YR 5/3) sand; few, fine, prominent mottles of yellowish-brown (10YR 5/6); weak, medium, subangular blocky structure; friable; common roots; medium acid; clear, wavy boundary.

C2—14 to 28 inches, brown (10YR 5/3) sand; common, medium, prominent mottles of yellowish brown (10YR 5/6 and 5/8); weak, coarse, subangular blocky structure; very friable; few roots; medium acid; clear, wavy boundary.

C3—28 to 42 inches, brownish-yellow (10YR 6/6) sand; common, medium, prominent mottles of light gray (10YR 7/2) and many, coarse, distinct mottles of yellowish brown (10YR 5/8); weak, coarse, subangular blocky structure; very friable; medium acid; clear, wavy boundary.

C4—42 to 46 inches, dark grayish-brown (10YR 4/2) sand; common, medium, prominent mottles of yellowish brown (10YR 5/6 and 5/8); single grained; very friable; slightly acid; clear, wavy boundary.

C5—46 to 60 inches, light brownish-gray (10YR 6/2) sand; single grained; very friable; slightly acid.

In cultivated areas the Ap horizon ranges from very dark brown to dark brown. The C horizon ranges from grayish brown to yellowish brown or dark yellowish brown.

Meehan soils are adjacent to the excessively drained Plainfield soils, the moderately well drained Friendship soils, and the poorly drained Newson soils; these soils form a drainage sequence. Meehan soils are saturated for shorter periods than Newson soils and for longer periods than Plainfield and Friendship soils. They are coarser textured and are saturated for longer periods than adjacent Dunnville soils.

Meehan loamy sand (0 to 2 percent slopes) (Mh).—This soil is in depressions on the outwash plain or on low rises surrounded by poorly drained sandy soils. Areas are 10 to 200 acres in size. Runoff is slow.

Included with this soil in mapping are small areas of soils that have a surface layer of sandy loam. Also included are areas of Newson and Friendship soils.

The hazard of soil blowing is severe on cultivated fields. The high water table restricts crop production on this soil. Controlling the water table helps to prevent excessive drainage. Capability unit IVw–5; woodland group 3w4.

Merrillan Series

The Merrillan series consists of moderately deep, somewhat poorly drained, loamy soils on upland plains. These soils formed under mixed hardwood-coniferous forest in 15 to 40 inches of loamy sediment and in the underlying residuum from stratified sandstone and shale.

In a representative profile the surface layer is black sandy loam 5 inches thick; it is black but grades to grayish brown in the lower part. The subsoil is about 24 inches thick. The upper 13 inches is dark-brown sandy loam that grades to brown and yellowish-brown sandy loam; the next 5 inches is pale-brown, friable silty clay loam mottled with light brownish gray and brownish yellow; the next 4 inches is pale-brown, friable sandy clay loam mottled with brownish yellow; and the lower 2 inches is light olive-gray, firm clay loam mottled with yellowish brown and brownish yellow. The substratum is about 7 inches of alternating layers, each about ½ inch thick, of sandstone and light olive-gray clayey shale residuum. Hard sandstone is below a depth of 36 inches.

A seasonal high water table is at a depth of 1 to 3 feet. Available water capacity is low, and permeability is moderately slow. Natural fertility is low. The upper part of these soils ranges from medium acid to very strongly acid, and the lower part, which formed in residuum from sandstone and shale, ranges from strongly acid to extremely acid. Depth to hard bedrock ranges from 2 to 5 feet.

Most of the acreage of this soil is in second-growth hardwood forest or in pastured woodlots. Some areas have been cleared and are used for such general farm crops as corn, grain, and hay. These soils are suited to red oak, red maple, and white pine.

Merrillan soils are severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table and the moderately slow permeability in the subsoil and substratum.

Representative profile of Merrillan sandy loam, 1 to 3 percent slopes, in a cutover woodlot, 30 feet south of town road in NE¼NE¼NW¼NW¼ sec. 13, T. 22 N., 2E.:

O2—½ inch to 0, organic mat including partly decomposed leaves and grass.

A1—0 to 4 inches, black (10YR 2/1) sandy loam; weak, very fine, subangular blocky structure; friable; many roots; many white sand grains; very strongly acid; abrupt, wavy boundary.

A2—4 to 5 inches, grayish-brown (10YR 5/2) sandy loam; weak, fine, subangular blocky structure; very friable; many roots; rounded bodies of A1 material in upper part; strongly acid; abrupt, wavy boundary.

B2ir—5 to 12 inches, dark-brown (7.5YR 4/4) sandy loam grading to dark yellowish brown (10YR 4/4) in lower part; moderate, medium, subangular blocky structure; friable; few roots; strongly acid; gradual, wavy boundary.

A'2—12 to 18 inches, brown (10YR 5/3) and yellowish-brown (10YR 5/4) sandy loam; weak, fine, subangular blocky structure; very friable; few roots; strongly acid; abrupt, smooth boundary.

IIB 21t—18 to 23 inches, pale-brown (10YR 6/3) silty clay loam; many, medium, faint mottles of light brownish gray (10YR 6/2) and many, coarse, prominent mottles of brownish yellow (10YR 6/6); moderate, medium, subangular blocky structure; friable; many thin clay films on faces of peds; very strongly acid; abrupt, wavy boundary.

IIB'22t—23 to 27 inches, pale-brown (10YR 6/3) sandy clay loam; many, medium, prominent mottles of brownish yellow (10YR 6/6); moderate, medium, subangular blocky structure; friable; common thin clay films on faces of peds; few sandstone fragments; very strongly acid; abrupt, smooth boundary.

IIB 3t—27 to 29 inches, light olive-gray (5Y 6/2) heavy clay loam; common, medium, prominent mottles of yellowish brown (10YR 5/6) and brownish yellow

(10YR 6/6); strong, medium, subangular blocky structure; firm; few thin clay films on faces of peds; very strongly acid; abrupt, smooth boundary.

IIC—29 to 36 inches, stratified layers of hard sandstone about ½ inch thick and of light olive-gray (5Y 6/2) clayey shale residuum; shale is weak, thin, platy and is firm; strongly acid; abrupt, smooth boundary.

IIIR—36 to 60 inches, hard sandstone; cannot be penetrated with shovel.

The solum typically ranges from 24 to 40 inches in thickness. The color of the Ap horizon ranges from 10YR 2/2 to 10YR 3/2. The thickness and arrangement of the sandy, loamy, and clayey horizons that formed in sandstone and shale residuum are extremely variable. The color of the shale residuum ranges from light olive gray (5Y 6/2) to dark reddish brown (5YR in hue).

Merrillan soils form a drainage sequence with the well drained to moderately well drained Humbird soils and the poorly drained Elm Lake soils. Merrillan soils are in positions similar to those of Kert soils and in many places are near Kert soils. They are coarser textured in the upper part of the solum than Kert soils. Merrillan soils are saturated for longer periods than Humbird soils and for shorter periods than Elm Lake soils. Merrillan and Plainbo soils are underlain by bedrock at a depth of less than 40 inches, but Merrillan soils are finer textured than Plainbo soils.

Merrillan sandy loam, 1 to 3 percent slopes (MpA).—This soil is on the lower side slopes of ridges. Slopes are convex, uniform, and 100 to 300 feet long. The dominant slope is about 2 percent. Areas are 5 to 40 acres in size. Runoff is slow.

Included with this soil in mapping are small areas of soils that have slopes of 3 to 5 percent.

The hazard of soil blowing is moderate. The hazard of water erosion is slight on sloping areas. Wetness is a severe limitation during part of the growing season. Practices to control soil blowing and to maintain organic-matter content are beneficial. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIw–6; woodland group 3o1.

Milladore Series

The Milladore series consists of deep, somewhat poorly drained, silty soils on uplands. These soils formed under mixed hardwood-white pine forest in 15 to 30 inches of silty sediment and in the underlying loamy residuum from micaceous gneiss.

In a representative profile the surface layer is dark-brown silt loam 6 inches thick. The subsurface layer is brown silt loam 3 inches thick. The subsoil is 24 inches thick. The upper 6 inches is mottled, yellowish-brown, friable silt loam that has tongues of light brownish-gray material extending downward into it from the layer above; the next 14 inches is mottled, brown and strong-brown, firm silt loam; and the lower 4 inches is dark-brown, mottled, friable loam. The substratum, which extends to a depth of 60 inches, is dark-brown and dark yellowish-brown loam.

A seasonal high water table is at a depth of 1 to 3 feet. Available water capacity is high, and permeability is moderate in the subsoil and moderately slow in the substratum. Natural fertility is medium. Hard bedrock is at a depth of more than 5 feet.

Most of the acreage of these soils is used for such general farm crops as corn, small grain, and hay, but some areas are in woodlots or native pasture. The soils are suited to northern hardwoods.

Milladore soils are severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table and the moderately slow permeability of the substratum.

Representative profile of Milladore silt loam in a bluegrass-timothy pasture, 50 feet north of a town road in SW¼SE¼SE¼SW¼ sec. 17, T. 25 N., R. 5 E.:

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

A2—6 to 9 inches, brown (10YR 5/3) silt loam; common, medium, prominent mottles of yellowish brown (10YR 5/8); weak, medium, platy structure; friable; common roots; medium acid; clear, wavy boundary.

B&A—9 to 15 inches, yellowish-brown (10YR 5/4) silt loam; common, medium, prominent mottles of yellowish red (5YR 4/8); moderate, medium, subangular blocky structure; tongues of light brownish-gray (10YR 6/2) silt loam (about 20 millimeters across at top of horizon) extend downward into this horizon; weak, thick, platy structure in tongues; friable; common roots; medium acid; clear, wavy boundary.

B21t—15 to 23 inches, brown (10YR 5/3) silt loam; many, medium, prominent mottles of yellowish brown (10YR 5/6), strong brown (7.5YR 5/8), and brown (7.5YR 5/2); moderate, fine, subangular blocky structure; firm; few thin clay films on ped faces; few roots; strongly acid; clear, wavy boundary.

IIB22t—23 to 29 inches, strong-brown (7.5YR 5/6) heavy silt loam; common, coarse, prominent mottles of brown (7.5YR 5/2); moderate, medium, subangular blocky structure; firm; many clay films on ped faces; few roots; strongly acid; clear, wavy boundary.

IIB3—29 to 33 inches, dark-brown (7.5YR 4/4) loam; few, medium, distinct mottles of brown (7.5YR 5/2) and strong brown (7.5YR 5/6); moderate, medium, subangular blocky structure; friable; few clay films on ped faces; strongly acid; clear, wavy boundary.

IIC1—33 to 52 inches, dark-brown (7.5YR 4/4) loam; massive; friable; many fragments of gneissic rock 10 to 25 millimeters in diameter and 5 to 10 millimeters thick; slightly acid; clear, wavy boundary.

IIC2—52 to 60 inches, dark yellowish-brown (10YR 4/4) loam and streaks of dark-brown (7.5YR 4/4) and grayish-brown (10YR 5/2) clay loam; massive; firm; many fragments of gneissic rock 10 to 25 millimeters in diameter and 5 to 10 millimeters thick; slightly acid.

The solum ranges from 30 to 60 inches in thickness. The IIBt horizon is heavy sandy loam, light sandy clay loam, loam, or heavy loam. In some places sufficient rock fragments are present to term the horizon gravelly. The IIC horizon ranges from heavy sandy loam to sandy clay loam and in places has enough rock fragments to be termed gravelly.

Milladore soils are near Sherry, Rietbrock, Marathon, and Dolph soils. They are saturated for shorter periods than the lower lying, poorly drained Sherry soils. They have a thicker silty layer than Rietbrock soils, which formed over granite. They are saturated for longer periods than Marathon soils. Milladore soils have a B horizon that formed in gneiss, whereas that of Dolph soils formed in schist.

Milladore silt loam (0 to 2 percent slopes) (Mr.)—This soil is on the tops and sides of broad low ridges on the upland plain. Slopes are convex, uniform, and 100 to 400 feet long. Areas are 5 to 100 acres in size. Runoff is slow.

Included with this soil in mapping are some areas of soils that have a surface layer of loam or sandy loam but that have a subsoil similar to that of Milladore soils. Also included are some areas of soils that are silty to a depth of 30 to 50 inches; in these soils the entire surface layer and subsoil formed in silt.

Wetness is a moderate limitation during part of the growing season. Capability unit IIw–4; woodland group 3o1.

Mosinee Series

The Mosinee series consists of deep, well-drained, loamy soils on uplands. These soils formed under mixed hardwood-pine-hemlock forest in 15 to 30 inches of loamy sediment and in the underlying fine gravelly residuum from weathered and disintegrated granitic bedrock.

In a representative profile the surface layer is very dark grayish-brown loam about 8 inches thick. The upper 9 inches of the subsoil is yellowish-brown, friable loam that has fine angular gravel in the lower part; and the lower 15 inches is dark yellowish-brown, friable gravelly loam. The substratum is dark yellowish-brown very gravelly sandy loam.

The water table is generally below a depth of 5 feet. Available water capacity is medium, and permeability is moderate in the subsoil and moderately rapid in the substratum. Natural fertility is medium. These soils are medium acid to strongly acid throughout. The depth to bedrock ranges from 4 to 8 feet.

Much of the acreage of these soils has been cleared and is used for general farm crops or for pasture. The soils are suited to northern hardwoods, white pine, and Norway pine.

Mosinee soils are moderately limited for building sites that have onsite sewage-disposal systems by the relatively shallow depth to bedrock and the danger of contaminating ground water.

Representative profile of Mosinee loam, 2 to 6 percent slopes, in an idle field, about 400 feet north of County Highway H in NW¼SE¼SE¼SW¼ sec. 9, T. 25 N., R. 5 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate, fine, subangular blocky structure; friable; many fine roots; medium acid; abrupt, smooth boundary.

B1—8 to 11 inches, dark yellowish-brown (10YR 4/4) light loam, yellowish brown (10YR 5/4) rubbed; weak, fine, subangular blocky structure; friable; common fine roots; medium acid; clear, wavy boundary.

B21—11 to 17 inches, yellowish-brown (10YR 5/4) light loam; moderate, medium, subangular blocky structure; friable; common fine roots; about 10 percent, by volume, coarse sand and very fine angular gravel (1 to 5 millimeters in diameter); medium acid; clear, wavy boundary.

IIB22—17 to 24 inches, dark yellowish-brown (10YR 4/4) gravelly loam; weak, medium, subangular blocky structure; friable; common fine roots; about 10 percent, by volume, coarse sand and very fine angular gravel (1 to 5 millimeters in diameter); medium acid; clear, wavy boundary.

IIB3—24 to 32 inches, dark yellowish-brown (10YR 4/4) gravelly loam; weak, medium, subangular blocky structure; friable; few fine roots; about 35 percent, by volume, very fine (2.5 millimeters in diameter) angular gravel; medium acid; clear, wavy boundary.

IIC—32 to 60 inches, dark yellowish-brown (10YR 4/4) very gravelly sandy loam derived from disintegrating granitic bedrock; loose; single grained; few fine roots; about 75 percent, by volume, very fine (2.5 millimeters in diameter) angular gravel; medium acid.

The solum typically is 30 to 60 inches thick, but it ranges from 20 to 60 inches in thickness. The texture of the A1 or Ap horizon ranges from sandy loam to silt loam but is generally loam. The texture of the IIC horizon is very gravelly sandy loam or very gravelly loam.

Mosinee soils are near Marathon, Milladore, and Dancy soils. Mosinee soils are in positions similar to those of the Marathon and Milladore soils but are less silty throughout than those soils. Mosinee soils are above Dancy soils and have a finer textured solum than those soils.

Mosinee loam, 2 to 6 percent slopes (MsB).—This soil is on benchlike parts of uplands. Areas are irregularly shaped and 10 to 30 acres in size. Slopes range from 50 to 200 feet in length.

Included with this soil in mapping are some areas where slopes are less than 2 percent.

In some places, stones 1 foot in diameter or larger and 5 to 30 feet apart are on the surface and in the profile.

The hazard of water erosion is moderate. Capability unit IIe–2; woodland group 3d1.

Newson Series

The Newson series consists of deep, poorly drained, sandy soils in depressions on outwash plains. These soils formed in deep sandy sediment under swamp hardwood-sedge vegetation.

In a representative profile the surface layer is black loamy sand about 6 inches thick. The subsoil is about 16 inches thick. It is very dark grayish-brown and grayish-brown loamy sand in the upper part and light brownish-gray sand in the lower part. Below the subsoil, and extending to a depth of 60 inches, is very pale brown sand.

A seasonal high water table is at or near the surface in spring and in part of summer. Available water capacity is low, and permeability is rapid. Natural fertility is low. These soils are strongly acid to extremely acid throughout the profile. Bedrock is at a depth of more than 6 feet.

Most of the acreage of these soils is in low-quality woodland. Some areas were cleared and cropped, but most of these have reverted to woodland or wildlife habitat. A few areas are used for general farm crops. A few small areas are used for cranberries, for which they are well suited.

Newson soils are very severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table.

Representative profile of Newson loamy sand in a sparse stand of aspen, 100 feet south of a town road in NE¼NE¼NE¼NE¼ sec. 16, T. 21 N., R. 2 E.:

O1—2 to 1½ inches, moss and undecomposed litter of aspen leaves and twigs.

O2—1½ inches to 0, dark reddish-brown (5YR 3/3) mat of fine roots and decomposed leaves and twigs; extremely acid.

A11—0 to 3 inches, black (10YR 2/1) loamy sand; weak, fine and medium, subangular blocky structure; very friable; many fine fibrous roots; few bleached sand grains; very strongly acid; clear, wavy boundary.

A12—3 to 6 inches, black (10YR 2/1) loamy sand; weak, fine and very fine, subangular blocky structure; very friable; many fine fibrous roots; very strongly acid; clear, wavy boundary.

B21g—6 to 11 inches, very dark grayish-brown (10YR 3/2) loamy sand; moderate, medium, subangular blocky structure; friable; common fine fibrous roots; very strongly acid; clear, wavy boundary.

B22g—11 to 14 inches, dark grayish-brown (2.5Y 4/2) loamy sand; few, fine, distinct mottles of yellowish brown (10YR 5/4); very weak, medium, subangular blocky structure; friable; few fine fibrous roots; very strongly acid; clear, wavy boundary.

B3—14 to 22 inches, light brownish-gray (10YR 6/2) sand; few, medium, distinct mottles of yellowish brown (10YR 5/4); single grained; loose; few fine roots; very strongly acid; clear, wavy boundary.

C—22 to 60 inches, very pale brown (10YR 7/3) sand; single grained; loose; very strongly acid.

The O layer ranges from 0 to 4 inches in thickness. In cultivated areas the color of the Ap horizon is 10YR 2/1, 10YR 2/2, or 10YR 3/1. The C horizon generally has hue of 10YR or 2.5Y, value of 4 to 8, and chroma of 1 to 3.

Newson soils are adjacent to the moderately well drained Friendship soils and the somewhat poorly drained Meehan soils; these soils form a drainage sequence. Newson soils are saturated for longer periods than Friendship or Meehan soils. They have a thicker dark A horizon than Croswell soils. They have a thinner dark O layer than Dawson and Markey soils.

Newson loamy sand (0 to 2 percent slopes) (Ne).—This soil is on nearly level plains or in depressions and drainageways on sandy plains. Areas are 5 to 500 acres in size. Runoff is very slow.

Included with this soil in mapping are small areas of Meehan, Markey, and Dawson soils.

Water often ponds on this soil in spring. If drained, this soil is subject to a severe hazard of soil blowing and has moderately low potential for corn, small grain, and hay. If this soil is drained, and if sufficient water is available, it is suitable for such irrigated specialty crops as cranberries, potatoes, and vegetables. This soil has fair potential for pasture or hay. Because of its low position, this soil is subject to frost late in spring or early in fall. Capability unit IVw–5; woodland group 4w4.

Norgo Series

The Norgo series consists of shallow, well-drained, silty soils on low hills and ridges. These soils formed in 10 to 20 inches of silty sediment over hard, platy sandstone.

In a representative profile the surface layer is very dark grayish-brown silt loam about 6 inches thick. The subsoil is dark yellowish-brown silt loam, about 11 inches thick, that grades to brown in the lower part. The substratum is thin, flat slabs of hard sandstone bedrock.

A seasonal high water table is below a depth of 5 feet. Available water capacity is low, and permeability is moderate. Natural fertility is low. These soils are medium acid to very strongly acid throughout. The depth to bedrock is 20 inches or less.

Most of the acreage of these soils is in woodland or native pasture. Some areas that make up only small parts of a field have been cleared and are used for general farm crops. The soils are suited to red oak and aspen.

Norgo soils are severely limited as building sites that have onsite sewage-disposal systems by the shallow depth to bedrock.

Representative profile of Norgo silt loam, 2 to 6 percent slopes, in a cultivated field, 100 feet south of a town road in NE¼NW¼NE¼SE¼ sec. 14, T. 24 N., R. 5 E.:

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

B21t—6 to 11 inches, dark yellowish-brown (10YR 4/4) silt loam; moderate, medium, subangular blocky structure; friable; common roots; strongly acid; clear, wavy boundary.

B22t—11 to 17 inches, brown (10YR 5/3) silt loam; moderate, medium, subangular blocky structure; friable; few clay films on peds; few roots; strongly acid; abrupt, smooth boundary.

IIR—17 inches, dark yellowish-brown and yellowish-brown (10YR 4/8 and 5/8) fine-grained sandstone rock in flat slabs 15 to 50 millimeters thick and 100 to 1,000 millimeters in diameter; dark-brown (7.5YR 4/4) loam between slabs in upper part of layer.

The solum commonly ranges from 15 to 20 inches in thickness, but it is as thin as 10 inches in places. The sandstone is generally hard and platy, but in some places it is sufficiently fractured that it can be dug with a spade.

Norgo soils are adjacent to Elkmound and Eleva soils. They are finer textured and shallower over bedrock than Eleva soils. They are finer textured than Elkmound soils.

Norgo silt loam, 2 to 6 percent slopes (NoB).—This soil is on low rises and on ridgetops on the upland plain. Slopes are convex, uniform, and 100 to 200 feet long. Areas are 5 to 50 acres in size. The cultivated surface layer is almost uniformly very dark grayish brown. Runoff is medium.

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 less than 2 percent. Also included are some areas of soils that have a surface layer of loam.

The hazard of water erosion is severe. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIe–3; woodland group 3d1.

Norgo silt loam, 6 to 12 percent slopes, eroded (NoC2).—This soil is on the sides of upland ridges. Slopes are uniform, convex, and 75 to 200 feet long. Areas are 3 to 15 acres in size. The cultivated surface layer is dark grayish brown or dark brown. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but the surface layer is dark brown because part of the subsoil has been mixed into the surface layer.

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

The hazard of water erosion is very severe. This soil is suited to such common crops as small grain and hay. It is suited to row crops if adequate erosion-control measures are used. Capability unit IVe–3; woodland group 3d1.

Norgo silt loam, 12 to 20 percent slopes, eroded (NoD2).—This soil is on sides of ridges on the upland plain. Slopes are uniform, convex, and 50 to 150 feet long. Areas are 3 to 10 acres in size. The cultivated surface layer is generally dark yellowish brown but in

some areas is dark grayish brown. Runoff is very rapid.

This soil has a profile similar to the one described as representative of the series, but the surface layer is dark brown to dark yellowish brown and the subsoil is somewhat thinner. From 3 to 5 inches of the original surface layer has been removed by water erosion over much of the acreage.

Included with this soil in mapping are some areas of soils that have a dark grayish-brown surface layer. Also included are small areas that have slopes of more than 20 percent.

The hazard of water erosion is very severe. This soil is not suited to row crops. It is suited to hay if adequate erosion-control measures are used. Capability unit VIe–3; woodland group 3d2.

Nymore Series

The Nymore series consists of deep, excessively drained, sandy soils on outwash plains. These soils formed in deep sandy outwash under a sparse coniferous forest that has prairie-type grasses in the openings.

In a representative profile the surface layer is very dark brown loamy sand 9 inches thick. The upper 5 inches of the subsoil is reddish-brown loamy sand, and the lower 26 inches is reddish-brown and dark-brown medium sand. The substratum is dark yellowish-brown medium sand that grades to yellowish-brown medium sand with depth.

The water table is generally below a depth of 5 feet. Available water capacity is low, and permeability is rapid. Natural fertility is medium. These soils are medium acid to strongly acid in the upper part and medium acid to slightly acid in the lower part. Bedrock is at a depth of more than 6 feet.

Most of the acreage of these soils was once cleared, cultivated, and used for general farm crops. Much of the cleared land is now idle or in plantations of Christmas trees.

Nymore soils are moderately limited for building sites that have onsite sewage-disposal systems by the danger of contaminating ground water.

Representative profile of Nymore loamy sand, red subsoil, 0 to 2 percent slopes, 100 feet east of town road in NW¼ NW¼SW¼SW¼ sec. 25, T. 22 N., R. 6 E.:

Ap—0 to 9 inches, very dark brown (10YR 2/2), loamy sand, dark grayish brown (10YR 4/2) dry; weak, granular structure; very friable; many roots; medium acid; abrupt, smooth boundary.

B21—9 to 14 inches, reddish-brown (5YR 4/4) loamy sand; weak, fine, subangular blocky structure; very friable; common roots; medium acid; clear, smooth boundary.

B22—14 to 19 inches, reddish-brown (5YR 4/4) medium sand; very weak, fine, subangular blocky structure; very friable; few roots; medium acid; clear, smooth boundary.

B23—19 to 24 inches, reddish-brown (5YR 4/4) medium sand; single grained; loose; few roots; medium acid; clear, smooth boundary.

B3—24 to 40 inches, dark-brown (7.5YR 4/4) medium sand, grading with increasing depth to dark yellowish-brown (10YR 4/4); single grained; loose; medium acid; clear, smooth boundary.

C—40 to 65 inches, dark yellowish-brown (10YR 4/4) to yellowish-brown (10YR 5/4) medium sand; common, coarse, prominent mottles of yellowish brown (10YR 5/8) and brownish yellow (10YR 6/8); single grained; loose; slightly acid.

The solum ranges from 24 to 40 inches in thickness. Typically these soils lack gravel, but in some places the C horizon is as much as 5 percent fine gravel.

Nymore soils are adjacent to Plainfield and Friendship soils. They have a thicker and less gray A horizon and redder hues in the upper part of the solum than Friendship soils. They have a darker A horizon than Plainfield soils.

Nymore loamy sand, 0 to 2 percent slopes (NyA).—This very gently undulating soil is on outwash plains. Slopes are both concave and convex. Areas are 40 to 200 acres in size. Runoff is slow.

This soil has a profile similar to the one described as representative of the series, but the subsoil does not have the red colors.

The hazard of soil blowing is very severe. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. The potential for irrigation is high if soil blowing is controlled. Capability unit IVs–3; woodland group 3s1.

Nymore loamy sand, red subsoil, 0 to 2 percent slopes (NzA).—This soil is on stream terraces and outwash plains. Areas are 10 to 50 acres in size. The surface layer is almost uniformly dark reddish brown. Runoff is slow.

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

Included with this soil in mapping are some small areas of soils that have slopes of as much as 6 percent. Also included are areas that have been cultivated and have a redder plow layer as a result of removal of part of the surface layer through soil blowing and subsequent mixing of material from the subsurface layer or subsoil into the plow layer.

The hazard of soil blowing is very severe. If this soil is protected, it is suited to corn, small grain, hay, and other crops commonly grown in the county. If irrigated it is suited to such specialty crops as potatoes and other vegetables. Capability unit IVs–3; woodland group 3s1.

Nymore loamy sand, red subsoil, 2 to 6 percent slopes (NzB).—This soil is along the sides of stream valleys that are incised into the outwash plains. Slopes are uniform, convex, and 100 to 300 feet long. Areas are long, narrow, and 5 to 20 acres in size. Runoff is slow.

Included with this soil in mapping are areas of soils that have been cultivated and have a redder plow layer as a result of soil blowing and subsequent mixing of material from the subsurface layer or subsoil into the plow layer.

The hazard of soil blowing is very severe, and the hazard of water erosion is slight. Most of the acreage of this soil is in woodland or is idle, but some areas are used for such general farm crops as corn, small grain, and hay. If irrigated, this soil is suited to potatoes and other vegetables, but slope restricts the use of some types of irrigation equipment. Capability unit IVs–3; woodland group 3s1.

Onamia Series

The Onamia series consists of deep, well-drained, loamy soils on small stream terraces. These soils formed under mixed pine-hardwood forest in 20 to 40 inches

of loamy sediment over outwash sand that contains a small amount of gravel.

In a representative profile the surface layer is dark-brown loam about 7 inches thick. The subsurface layer is brown loam 6 inches thick. The subsoil is 12 inches thick. The upper 5 inches is dark yellowish-brown and brown, friable loam, and the lower 7 inches is brown, friable heavy loam. The substratum is yellowish-brown sand that grades to very pale brown in the lower part.

The water table is at a depth of about 6 feet. Available water capacity is medium, and permeability is moderate in the upper part and rapid in the substratum. Natural fertility is medium. These soils are medium acid to strongly acid throughout. The depth to bedrock is more than 6 feet.

Most of the acreage of these soils has been cleared and is used for such general crops as corn, grain, and hay. Some areas are in pasture or woodlots. The soils are suited to northern hardwoods, pine, and aspen.

Onamia soils are moderately limited for building sites that have onsite sewage-disposal systems by the danger of contaminating ground water.

Representative profile of Onamia loam, 1 to 3 percent slopes, in a cultivated pasture, 200 feet north of old Highway 13 in SE¼SE¼SE¼SW¼ sec. 29, T. 23 N., R. 4 E.:

Ap—0 to 7 inches, dark-brown (10YR 3/3) loam; weak, fine, subangular blocky structure; friable; common roots; strongly acid; clear, wavy boundary.

A2—7 to 13 inches, brown (10YR 4/3) loam; moderate, medium, platy structure; friable; few roots; strongly acid; clear, wavy boundary.

B&A—13 to 18 inches, dark yellowish-brown and brown (10YR 4/4 and 5/3) loam; moderate, medium, subangular blocky structure; friable; few roots; clay films on peds; very strongly acid; clear, wavy boundary.

B2t—18 to 25 inches, brown (7.5YR 4/4) heavy loam; moderate, medium, subangular blocky structure; friable; sticky; clay films on peds; very strongly acid; clear, wavy boundary.

IIC1—25 to 40 inches, yellowish-brown (10YR 5/6) medium sand; single grained; loose; strongly acid; clear, wavy boundary.

IIC2—40 to 56 inches, light yellowish-brown (10YR 6/4) medium sand; single grained; loose; about 5 percent, by volume, medium gravel; medium acid; clear, wavy boundary.

IIC3—56 to 60 inches, very pale brown (10YR 8/3) medium sand; few, medium, distinct mottles of strong brown (7.5YR 5/8); single grained; loose; about 5 percent, by volume, medium gravel; medium acid.

The B2t horizon is heavy loam or sandy clay loam. The B2t horizon ranges from 6 to 10 inches in thickness. Content of gravel in the IIC horizon ranges from none to 10 percent.

Onamia soils as mapped in Wood County have less gravel in the substratum than is normal for Onamia soils in other survey areas.

Onamia soils are on the higher parts of stream terraces adjacent to the well-drained Antigo soils, the somewhat poorly drained Poskin soils, and the poorly drained Rib soils. They are less silty than Antigo, Poskin, and Rib soils. They are better drained than Poskin and Rib soils.

Onamia loam, 1 to 3 percent slopes (OnA).—This soil is on low rises on outwash plains. Slopes are convex, uniform, and 100 to 300 feet long. Areas are 4 to 40 acres in size. The cultivated surface layer is almost uniformly dark brown. Runoff is moderately slow.

Included with this soil in mapping are some areas of soils in which the surface layer and subsoil are sandy loam 12 to 20 inches thick over sandy outwash.

Available water capacity is medium, and moisture-conserving practices are beneficial. This soil is well suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIs–1; woodland group 2o1.

Plainbo Series

The Plainbo series consists of moderately deep, excessively drained, sandy soils on isolated hills and ridges on the outwash plain. These soils formed under pine-oak forest in 20 to 40 inches of sandy sediment or sandy residuum over sandstone bedrock.

In a representative profile the surface layer is very dark grayish-brown fine sand about 3 inches thick. The subsoil is 18 inches thick. The upper 13 inches is dark yellowish-brown fine sand, and the lower 5 inches is yellowish-brown fine sand. The substratum, which extends to a depth of 36 inches, is very pale brown loose fine sand. Very pale brown, soft sandstone bedrock is below a depth of 36 inches.

The water table is below a depth of 5 feet. Available water capacity is very low, and permeability is rapid. Natural fertility is low. These soils range from medium acid to strongly acid throughout. The depth to bedrock ranges from 2 to 4 feet.

Most of the acreage of these soils is in woodland. The soils are poorly suited to general farm crops but are suited to jack pine and pin oak for pulpwood.

Plainbo soils are severely limited for building sites that have onsite sewage-disposal systems by the sandstone bedrock at a depth of less than 4 feet or by slope.

Representative profile of Plainbo sand, 2 to 12 percent slopes, in an oak-aspen woodlot, 50 feet east of a town road in SW¼SW¼NW¼NW¼ sec. 4, T. 22 N., R. 5 E.:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) fine sand; weak, medium, granular structure; very friable; many roots; strongly acid; clear, wavy boundary.

B2—3 to 16 inches, dark yellowish-brown (10YR 4/4) fine sand; very weak, coarse, subangular blocky structure; very friable; common roots; strongly acid; gradual, wavy boundary.

B3—16 to 21 inches, yellowish-brown (10YR 5/4) fine sand; single grained; loose; common roots; strongly acid; clear, wavy boundary.

C—21 to 36 inches, very pale brown (10YR 7/3) fine sand; single grained; loose; few roots; strongly acid.

R—36 inches, very pale brown (10YR 7/3) soft sandstone.

In some places the upper part of the B2 horizon is moderately high in chroma. The C horizon is mostly quartz, but it contains 5 to 15 percent darker colored minerals. The underlying sandstone bedrock ranges from soft to very hard and platy.

Plainbo soils are adjacent to Merrillan soils. Plainbo soils are shallower over bedrock and better drained than Merrillan soils. They are shallower over bedrock and have a lighter-colored A horizon than Nymore soils.

Plainbo sand, 2 to 12 percent slopes (PbB).—This soil is on broad, low ridges. Slopes are uniform, convex, and 100 to 300 feet long. Areas are 5 to 60 acres in size. Runoff is slow.

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

The hazard of water erosion is moderate, and the

hazard of soil blowing is very severe. Available water capacity is very low. Most of the acreage of this soil is in woodland. Capability unit VIs–9; woodland group 4s1.

Plainbo sand, 12 to 30 percent slopes (PbD).—This soil is on isolated hills or on the sides of ridges. Slopes are convex, uniform, and 50 to 300 feet long. Areas are 50 to 80 acres in size. Runoff is medium.

This soil has a profile similar to the one described as representative of the series, but the sandstone is generally at a depth of less than 24 inches.

Included with this soil in mapping are areas where the sandstone outcrops at the surface. Also included are some areas where many large blocks of hard sandstone are on the surface.

The hazards of water erosion and soil blowing are very severe. Available water capacity is very low. The steepness of the slopes makes management difficult. Almost all of the acreage of this soil is in woodland. Capability unit VIs–9; woodland group 4s2.

Plainfield Series

The Plainfield series consists of deep, excessively drained, sandy soils on outwash plains. These soils formed under jack pine-oak forest and grass in deep outwash sand that has a very high content of quartz. Most areas of these soils are on high terraces, but some areas are on low ridges on the glacial lake plains.

In a representative profile the surface layer is very dark grayish-brown sand 3 inches thick. The subsoil is dark yellowish-brown, very friable sand about 17 inches thick. The substratum, which reaches a depth of 60 inches, is yellowish-brown, loose sand in the upper part that grades to light yellowish-brown loose sand in the lower part.

The water table is generally below a depth of 5 feet. Available water capacity is low, and permeability is rapid. Natural fertility is low. The surface layer and subsoil are strongly acid to very strongly acid in the upper part and slightly acid to medium acid in the lower part. The depth to bedrock is more than 6 feet.

These soils are suited to jack pine and Norway pine for pulpwood or to Norway pine and Scotch pine for Christmas trees.

Plainfield soils are moderately or severely limited for building sites that have onsite sewage-disposal systems by the hazard of contaminating ground water or by slope.

Representative profile of Plainfield sand, 0 to 2 percent slopes, in a jack pine-oak forest, 50 feet north of a town road in SE¼SE¼SW¼SW¼ sec. 22, T. 21 N., R. 6 E.:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) sand, grayish brown (10YR 5/2) dry; fine, granular structure; very friable; many roots; few grains of white sand; very strongly acid; clear, smooth boundary.

B2—3 to 9 inches, dark yellowish-brown (10YR 3/4) sand, grayish brown (10YR 6/3) dry; weak, medium, subangular blocky structure; very friable; many roots; few grains of white sand; strongly acid; clear, smooth boundary.

B3—9 to 20 inches, dark yellowish-brown (10YR 4/4) sand; weak, medium, subangular blocky structure; very friable; few roots; strongly acid; gradual, smooth boundary.

C1—20 to 32 inches, yellowish-brown (10YR 5/4) sand; single grained; loose; medium acid; gradual, wavy boundary.

C2—32 to 48 inches, light yellowish-brown (10YR 6/4) sand; single grained; loose; less than 95 percent quartz; slightly acid; gradual, wavy boundary.

C3—48 to 60 inches, light yellowish-brown (10YR 6/4) sand; few, fine, prominent, yellowish-brown (10YR 5/8) mottles; single grained; loose; less than 95 percent quartz; slightly acid.

In cultivated areas the Ap horizon is brown (10YR 4/3) or dark grayish brown (10YR 4/2).

The annual temperature of these soils in Wood County is a few degrees cooler than is defined as within the range for the series, but this difference does not alter their usefulness and behavior.

Plainfield soils are adjacent to the moderately well drained Friendship soils and the somewhat poorly drained Meehan soils. They are better drained than Friendship and Meehan soils. They have a lighter colored A horizon than Nymore soils and are coarser textured than Dunnville soils.

Plainfield loamy sand, 0 to 2 percent slopes (PgA).—This soil is on outwash plains. Slopes are slightly concave to slightly convex in a pattern of low hummocks. Areas are 10 to 200 acres in size. The cultivated surface layer is almost uniformly dark grayish brown. Runoff is slow.

This soil has a profile similar to the one described as representative of the series, but the upper 12 to 15 inches is loamy sand.

The hazard of soil blowing is very severe. Much of the acreage of this soil has been cleared and is used for such general farm crops as corn, small grain, and hay. Some areas are in pasture or woodland. If irrigated, the soil is suited to general farm crops or such specialty crops as green vegetables or potatoes. Water for irrigation is generally available from wells of moderate depth. Capability unit IVs–3; woodland group 3s1.

Plainfield loamy sand, 2 to 6 percent slopes (PgB).—This soil is on low rises or near steep breaks on outwash plains. Slopes are convex and 100 to 200 feet long. Areas are 5 to 40 acres in size. Runoff is slow.

This soil has a profile similar to the one described as representative of the series, but the upper 12 to 15 inches is loamy sand.

The hazard of water erosion is slight on this soil, and the hazard of soil blowing is very severe. Most of the acreage of this soil has been cleared and is used for general farm crops, but some is idle or is in woodland. The soil is suited to such general farm crops as corn, small grain, and hay. It is also suited to irrigated general or specialty crops, but slope restricts the use of some types of irrigation equipment. Capability unit IVs–3; woodland group 3s1.

Plainfield sand, 0 to 2 percent slopes (PfA).—This soil is on outwash plains. Slopes are slightly concave to very gently convex. Areas are 10 to 1,000 acres in size. The cultivated surface layer is almost uniformly brown. Runoff is slow.

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

Included with this soil in mapping are some areas of soils that have a surface layer of loamy sand.

The hazard of soil blowing is very severe in cultivated areas. Most of the acreage of this soil is in woodland, but at one time it was cleared for cultivation. Many of these areas have been replanted to trees

or allowed to stand idle. Capability unit VIs–9; woodland group 4s1.

Plainfield sand, 2 to 6 percent slopes (PfB).—This soil is on low rises or in drainageways on outwash plains. Slopes are uniform, convex, and 100 to 300 feet long. Areas are 10 to 100 acres in size. Runoff is slow.

This soil has a profile similar to the one described as representative of the series, but the combined thickness of the surface layer and subsoil is 15 to 20 inches.

Included with this soil in mapping are some spots in cultivated areas where the surface layer is dark yellowish brown. Also included are some areas of soils that have been severely eroded by soil blowing.

The hazard of soil blowing is very severe, and the hazard of water erosion is slight. Most of the acreage of this soil is in woodland. Capability unit VIs–9; woodland group 4s1.

Plainfield sand, 6 to 12 percent slopes (PfC).—This soil is on low hills on the outwash plain or along the sides of drainageways. Slopes are convex, uniform, and 100 to 300 feet long. Areas are 5 to 100 acres in size. Runoff is moderate.

This soil has a profile similar to the one described as representative of the series, but the combined thickness of the surface layer and subsoil is 10 to 15 inches and the surface layer is grayish brown.

Included with this soil in mapping are some areas of soils in cultivated fields where the surface layer is yellowish brown.

The hazard of water erosion is moderate, and the hazard of soil blowing is very severe. The slopes restrict the use of irrigation equipment. Most of the acreage of this soil is in woodland, but some areas are pastured. The soil is poorly suited to general farm crops. Capability unit VIs–9; woodland group 4s1.

Plainfield sand, 12 to 35 percent slopes (PfE).—This soil is on long narrow breaks along the sides of streams. Slopes are convex, uniform, and 25 to 100 feet long. Areas are 5 to 50 acres in size. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but the combined thickness of the surface layer and subsoil is 5 to 10 inches.

The hazards of water erosion and soil blowing are very severe. Almost all of the acreage of this soil is in woodland. This soil is suited to such permanent vegetation as grass or trees. Capability unit VIs–9; woodland group 4s2.

Point Series

The Point series consists of deep, somewhat poorly drained, loamy soils on uplands. These soils formed under mixed hardwood-coniferous forest in 20 to 40 inches of sandy and loamy sediment and in the underlying loamy residuum from granitic rocks.

In a representative profile the surface layer is very dark grayish-brown loamy sand 7 inches thick. The subsurface layer is 19 inches thick. The upper 7 inches is grayish-brown loamy fine sand; the next 6 inches is light brownish-gray fine sandy loam; and the lower 6 inches is grayish-brown fine sandy loam that has isolated bodies of yellowish-brown loam. The upper 10 inches of the subsoil is variegated silty clay loam that grades to firm loam in the lower part, and the lower 4 inches is dark-brown, mottled loam. The substratum is variegated, firm heavy loam.

A seasonal high water table is at a depth of 1 to 3 feet. Available water capacity is medium, and permeability is moderate in the upper part and moderately slow in the substratum. Natural fertility is medium. Bedrock is at a depth of more than 5 feet.

Most of the acreage of these soils has been cleared and is used for general farm crops, but some areas are in native pasture or woodland. The soils are suited to Norway pine and jack pine for sawlogs or pulpwood.

Point soils are severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table and the moderately slow permeability of the substratum.

Representative profile of Point loamy sand, 2 to 6 percent slopes, in a red clover meadow, 140 feet east of a town road in NW¼NW¼NW¼NE¼ sec. 25, T. 25 N., R. 5 E.:

Ap—0 to 7 inches, very dark grayish-brown (10YR 3/2) loamy sand, grayish brown (10YR 5/2) dry; weak, fine and medium, subangular blocky structure; friable; many fine fibrous roots; slightly acid; abrupt, smooth boundary.

A21—7 to 14 inches, grayish-brown (10YR 5/2) loamy fine sand; many, medium, distinct and prominent mottles of yellowish brown (10YR 5/4 and 5/6); weak, very thin, platy structure; friable; common fine fibrous roots; slightly acid; clear, wavy boundary.

A22—14 to 20 inches, light brownish-gray (10YR 6/2) fine sandy loam; many, medium, prominent mottles of strong brown (7.5YR 5/6–5/8) and yellowish brown (10YR 5/6–5/8); weak, very thin, platy structure; friable; few fine fibrous roots; medium acid; clear, wavy boundary.

A&B—20 to 26 inches, grayish-brown (10YR 5/2) fine sandy loam (A2); many, fine and medium, distinct and prominent mottles of strong brown (7.5YR 5/6–5/8) and yellowish brown (10YR 5/6–5/8); weak, thin, platy structure; friable; isolated remnants and upward extensions of yellowish-brown (10YR 5/4) loam (B2t) make up about 20 percent by volume; common, thin, dark-brown (10YR 3/3) clay films on faces of plates and in pores of Bt part; strongly acid; clear, wavy boundary.

IIB21t—26 to 34 inches, variegated strong-brown (7.5YR 5/6), yellowish-red (5YR 5/8), and dark grayish-brown (10YR 4/2) silty clay loam; moderate, fine, angular blocky structure; firm; common, thin, dark-brown (10YR 3/3) clay films on faces of peds and in pores; strongly acid; clear, wavy boundary.

IIB22t—34 to 36 inches, variegated dark-brown (7.5YR 4/4–4/2), brown (7.5YR 5/4), and dark reddish-brown (5YR 3/3) heavy loam; moderate, fine and medium, angular blocky structure; firm; common, thin, dark-brown (10YR 3/3) clay films on faces of peds and in pores; medium acid; clear, wavy boundary.

IIB3t—36 to 40 inches, dark-brown (7.5YR 4/4) heavy loam; common, fine, distinct and prominent mottles of strong brown (7.5YR 5/6–5/8) and light brownish gray (2.5Y 6/2); weak, medium, subangular and angular blocky structure; firm; few thin clay films on faces of some peds; 5 to 10 percent, by volume, fine and medium (5 to 50 millimeters in diameter) fragments of igneous rock; medium acid; clear, wavy boundary.

IIC—40 to 60 inches, variegated brown (10YR 5/3), light-gray (10YR 7/2), strong-brown (7.5YR 5/6–5/8), and pale-red (10YR 6/3) heavy loam; weak, fine and medium, subangular blocky structure; firm; few thin clay films on vertical faces of

some peds; 5 to 10 percent, by volume, fine and medium (5 to 50 millimeters in diameter) fragments of igneous rocks; medium acid.

The surface layer of loamy sand and sandy loam sediment ranges from 20 to 40 inches in thickness. The solum ranges from 24 inches to about 50 inches in thickness, but it is commonly 30 to 40 inches thick. Fine fragments of igneous rocks make up 1 to 10 percent, by volume, of the lower part of the solum, but they make up 10 to 30 percent of the IIC horizon.

Point soils are adjacent to the higher lying, well drained to moderately well drained Guenther soils and the lower lying, poorly drained Dancy soils; these soils form a drainage sequence. Point soils are saturated for longer periods than Guenther soils and for shorter periods than Dancy soils.

Point loamy sand, 2 to 6 percent slopes (PoB).—This soil is on the lower slopes of broad valley sides. Slopes are convex, uniform, and 200 to 300 feet long. Areas are 3 to 15 acres in size. The surface layer is almost uniformly very dark grayish brown. Runoff is slow.

Included with this soil in mapping are some areas of soils that have slopes of less than 2 percent. Also included are areas of soils that have a surface layer of sandy loam.

The hazard of water erosion is moderate, and the hazard of soil blowing is slight. This soil is extremely wet during the early part of the growing season. It is suited to such general farm crops as corn, small grain, and hay. Capability unit IIIw–6; woodland group 3o1.

Poskin Series

The Poskin series consists of deep, somewhat poorly drained, silty soils on outwash terraces. These soils formed under mixed hardwood-coniferous forest in 20 to 36 inches of silty sediment and in the underlying sandy outwash.

In a representative profile the surface layer is dark grayish-brown silt loam about 12 inches thick. The subsurface layer is brown silt loam about 1 inch thick. The subsoil is 26 inches thick. The upper 6 inches is dark-brown silt loam that has tongues of grayish-brown silt loam extending downward into it from the layer above; the next 17 inches is dark-brown heavy silt loam that has grayish-brown and yellowish-brown mottles; and the lower 3 inches is dark-brown loam. The substratum is brown sand that contains a small amount of gravel.

A seasonal high water table is at a depth of 1 to 3 feet. Available water capacity is medium, and permeability is moderate in the upper part and rapid in the substratum. Natural fertility is medium. These soils are medium acid to very strongly acid throughout. Bedrock is at a depth of more than 5 feet.

Most of the acreage of these soils has been cleared and is used for general farm crops, generally as a part of larger fields. Some areas are in native pasture or woodland. The soils are suited to northern hardwoods, aspen, balsam fir, and white spruce for sawlogs, pulpwood, or Christmas trees.

Poskin soils are severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table and the danger of contaminating ground water.

Representative profile of Poskin silt loam in a cultivated field, 50 feet west of County Highway K and 150 feet south of the Mill Creek bridge in NW¼NE¼ SE¼SE¼ sec. 2, T. 24 N., R. 4 E.:

Ap—0 to 11 inches, dark grayish-brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; moderate, medium, granular structure; friable; many roots; medium acid; abrupt, smooth boundary.

A2—11 to 12 inches, brown (10YR 5/3) silt loam; many medium, faint mottles of grayish brown (10YR 5/2) and many, medium, prominent mottles of yellowish brown (10YR 5/6); moderate, thin, platy structure; friable; few roots; very strongly acid; clear, irregular boundary.

B&A—12 to 18 inches, dark-brown (10YR 4/3) silt loam; many, medium, distinct mottles of yellowish brown (10YR 5/6); moderate, medium, subangular blocky structure; friable; about 70 percent, by volume, upward extensions of the underlying Bt horizon; few clay films on ped faces; tongues of grayish-brown (10YR 5/2) silt loam (A2); few roots; very strongly acid; clear, wavy boundary.

B2lt—18 to 27 inches, dark-brown (10YR 4/3) heavy silt loam; many, coarse, distinct mottles of grayish brown (10YR 5/2) and common, medium, prominent mottles of yellowish brown (10YR 5/6); moderate, fine, subangular blocky structure; firm, slightly sticky; few roots; many clay films on ped faces and in pores; very strongly acid; clear, wavy boundary.

B22t—27 to 35 inches, dark-brown (10YR 4/3) heavy silt loam; many, coarse, faint mottles of grayish-brown (10YR 5/2), and common, medium, coarse, prismatic structure parting to moderate, fine, subangular blocky; firm, slightly sticky; few roots; common thin clay films on ped faces and in pores; bleached silt coatings on faces of prisms; very strongly acid; abrupt, wavy boundary.

B3t—35 to 38 inches, dark-brown (7.5YR 4/4) loam; common, medium, distinct mottles of grayish brown (10YR 5/2) and few, fine, distinct mottles of yellowish brown (10YR 5/6); weak, medium, subangular blocky structure; friable, slightly sticky; very strongly acid; abrupt, smooth boundary.

IIC—38 to 60 inches, brown (7.5YR 5/4) sand; single grained; loose; about 10 percent, by volume, fine to coarse gravel; strongly acid.

The solum extends into the outwash sand to a depth of about 40 inches. The Bt horizon is heavy silt loam, sandy clay loam, or silty clay loam. The depth to the underlying sand ranges from 20 to 36 inches.

The content of gravel in the substratum of Poskin soils in Wood County is less than is defined as within the range defined for the series. But this difference does not alter their usefulness or behavior.

Poskin soils are adjacent to the moderately well drained to well drained Antigo soils and the lower lying poorly drained Rib soils; these soils form a drainage sequence. Poskin soils are in many places near Onamia soils. They are saturated for shorter periods than Rib soils and for longer periods than Antigo and Onamia soils. They are more silty than Onamia soils.

Poskin silt loam (0 to 2 percent slopes) (Ps).—This soil is on outwash plains along small streams. Slopes are slightly convex, uniform, and 100 to 300 feet long. Areas are 3 to 30 acres in size. Runoff is slow.

Included with this soil in mapping are some areas of somewhat poorly drained soils that have a surface layer and subsoil of loam and that are in similar positions and have similar management needs. Also included are small areas of soils that have layers of silt and very fine sand 1 to 3 inches thick in the substratum.

Wetness is a moderate limitation during part of the growing season. This soil is suited to such general farm crops as corn, small grain, and hay. Corn growth is fre-

quently restricted by wetness. Capability unit IIw–5; woodland group 2o1.

Rib Series

The Rib series consists of deep, poorly drained, silty soils in depressions on stream terraces. These soils formed under water-tolerant hardwood forest in 24 inches to 40 inches of silty sediment and in the underlying sandy outwash.

In a representative profile the surface layer is black silt loam 6 inches thick. The subsurface layer is grayish-brown and gray silt loam 4 inches thick. The subsoil is about 20 inches thick and is mostly gray, firm silt loam mottled with yellowish red and strong brown. The substratum is light yellowish-brown loose sand that grades to strong-brown gravelly sand.

A seasonal high water table is at or near the surface in spring and in part of summer. Available water capacity is medium, and permeability is moderate in the subsoil and rapid in the substratum. Natural fertility is medium. The surface layer and subsoil range from medium acid to strongly acid. Bedrock is below a depth of 5 feet.

Most of the acreage of these soils has been cleared and is used for general farm crops, but some areas are in native pasture and woodlots. The soils are suited to red maple, ash, elm, white spruce, and balsam fir for sawlogs, pulpwood, or Christmas trees.

Rib soils are very severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table and the danger of contaminating ground water.

Representative profile of Rib silt loam in a red clover-bluegrass meadow, in NE¼SE¼SW¼SW¼ sec. 36, T. 23 N., R. 5 E.:

Ap—0 to 6 inches, black (10YR 2/1) silt loam; moderate, medium, granular structure; friable; many roots; strongly acid; abrupt, smooth boundary.

A2—6 to 10 inches, grayish-brown and gray (10YR 5/2 and 6/1) silt loam; few, fine, distinct mottles of yellowish brown (10YR 5/4); moderate, medium, platy structure; friable; many roots; strongly acid; clear, wavy boundary.

B21g—10 to 18 inches, gray (10YR 5/1) silt loam; many, medium, prominent mottles of yellowish red (5YR 4/6 and 5/8); weak, coarse, angular blocky structure parting to moderate, medium, platy; firm; numerous roots; strongly acid; clear, wavy boundary.

B22g—18 to 28 inches, gray (10YR 5/1) heavy silt loam; many, medium, prominent mottles of yellowish red (5YR 4/6) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; firm; strongly acid; clear, wavy boundary.

IIB3—28 to 30 inches, grayish-brown (10YR 5/2) sandy loam; few, fine, prominent mottles of strong brown (7.5YR 5/6); moderate, coarse, subangular blocky structure; friable; strongly acid; abrupt, wavy boundary.

IIC1—30 to 38 inches, light yellowish-brown, brownish-yellow, and yellowish-brown (10YR 6/4, 6/6, and 5/6) sand; single grained; loose; bands of dusky-red (2.5YR 3/2) and dark reddish brown (5YR 3/4) ½ to 3 inches thick; medium acid; abrupt, wavy boundary.

IIC2—38 to 60 inches, strong-brown (7.5YR 5/6) gravelly sand; single grained; loose; rounded pebbles of sandstone and granite.

The solum ranges from 24 inches to 40 inches in thickness, and it extends into the underlying outwash sand. The layer of silty sediment over the outwash sand ranges from about 20 to 36 inches in thickness.

The content of gravel in the substratum of Rib soils as mapped in Wood County is generally less than in the range defined for the series, but this difference does not affect their usefulness or behavior.

Rib soils are adjacent to the higher lying, somewhat poorly drained Poskin soils and the moderately well drained to well drained Antigo soils; these soils form a drainage sequence. Rib soils are saturated for longer periods than Antigo, Poskin, and Onamia soils. They have less silt and more sand in the solum and are in lower positions in the landscape than Onamia soils.

Rib silt loam (0 to 2 percent slopes) (Rb).—This soil is on stream terraces. Slopes are concave. Areas are 5 to 50 acres in size. The cultivated surface layer is almost uniformly black to very dark grayish brown. Runoff is very slow to ponded.

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

This soil has a high water table and is subject to ponding during wet seasons. Some areas are subject to frost late in spring and early in fall. If drained, this soil is well suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIw–5; woodland group 3w5.

Rietbrock Series

The Rietbrock series consists of moderately deep, somewhat poorly drained, silty soils on uplands. These soils formed under mixed hardwood-coniferous forest in 7 to 15 inches of silty sediment and in the underlying loamy residuum from the underlying fine-grained granitic and greenstone rocks.

In a representative profile the surface layer is very dark grayish-brown silt loam 3 inches thick. The subsurface layer is 15 inches thick. The upper 9 inches is brown silt loam, and the lower 6 inches is brown loam that contains isolated bodies of dark yellowish-brown loam. The subsoil is 20 inches thick. The upper 4 inches is yellowish-brown loam mottled with light brownish gray, and the lower 16 inches is light silty clay loam that is yellowish brown in the upper part and strong brown in the lower part. The lower part of the subsoil contains numerous angular fragments of rock. The substratum is angular fragments of granitic rock and a small amount of strong-brown loam.

A seasonal high water table is at a depth of 1 to 3 feet for part of the year. Available water capacity is medium, and permeability is moderate. Natural fertility is medium. The surface layer and subsoil are slightly acid to strongly acid in the upper part and strongly acid to very strongly acid in the lower part. Bedrock is at a depth of 3 to 5 feet.

Most of the acreage of these soils is in pasture or woodland, but some areas have been cleared and are used for general farm crops. The soils are suited to hemlock, white spruce, white pine, elm, ash, and red maple for lumber or pulpwood.

Rietbrock soils are severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table.

Representative profile of Rietbrock silt loam, 2 to 6 percent slopes, in a pastured woodlot, 100 feet north of the town road in SE¼SE¼SE¼SE¼ sec. 26, T. 24 N., R. 2 E.:

A1—0 to 3 inches, very dark grayish-brown (10YR 3/2) silt loam; weak, very fine, subangular blocky structure; friable; many roots; medium acid; clear, smooth boundary.

A21—3 to 9 inches, brown (10YR 5/3) silt loam; few, fine, prominent mottles of yellowish brown (10YR 5/6); moderate, medium, platy structure; friable; common roots; strongly acid; clear, wavy boundary.

A22—9 to 12 inches, brown (10YR 5/3) silt loam; common, fine, prominent mottles of yellowish brown (10YR 5/8) and strong brown (7.5YR 5/6 and 5/8); moderate, medium, platy structure; friable; common roots; strongly acid; clear, wavy boundary.

IIA&Bt—12 to 18 inches, brown (10YR 5/3) loam (A2); common, medium, prominent mottles of strong brown (7.5YR 5/6 and 5/8); moderate, medium, platy structure; friable; dark yellowish-brown (10YR 4/4) loam remnants of Bt horizon are scattered throughout and make up about 20 percent, by volume; few thin clay films on faces of peds in Bt part; common roots; strongly acid; clear, wavy boundary.

IIB21t—18 to 22 inches, yellowish-brown (10YR 5/4) loam; many, coarse, distinct mottles of light brownish gray (10YR 6/2) and strong brown (7.5YR 5/8); moderate, medium, subangular blocky structure; friable; common thin clay films on faces of peds; few roots; very strongly acid; clear, wavy boundary.

IIB22t—22 to 28 inches, yellowish-brown (10YR 5/8) light silty clay loam; weak, coarse, prismatic structure parting to moderate, medium, angular blocky; firm; light-gray (10YR 7/1) sand coatings on prism faces; many, thin, continuous clay films on faces of peds and in pores; very strongly acid; clear, wavy boundary.

IIB3t—28 to 38 inches, strong-brown (7.5YR 5/8) light silty clay loam; moderate, medium, angular blocky structure; firm; gray (10YR 5/1) and dark-gray (10YR 4/1) thin clay films on some ped faces; many angular fragments of granitic rock; very strongly acid; gradual, wavy boundary.

IIC—38 to 50 inches, angular fragments of yellowish-red (5YR 5/8), reddish-yellow (7.5YR 6/6), and light yellowish-brown (10YR 6/4) granitic rock and strong-brown (7.5YR 5/8) loam material between fragments. At a depth of 48 inches the concentration of rock fragments is such as to make further penetration difficult.

The silt mantle ranges from about 7 to 15 inches in thickness. The solum ranges from 20 to 50 inches in thickness. The concentration of rock fragments typically is at a depth of 30 to 50 inches, but in some places it is as shallow as 20 inches. In some places the rock fragments are 10 to 20 inches in diameter and are accompanied by only a small amount of smaller fragments.

Rietbrock soils are adjacent to the higher lying, well-drained Fenwood soils; these soils form a drainage sequence. Rietbrock soils are saturated for longer periods than Fenwood soils. They are in positions similar to those of nearby Milladore soils, but they overlie residuum from granitic rocks rather than gneissic rocks high in mica content as do Milladore soils.

Rietbrock silt loam, 2 to 6 percent slopes (ReB).—This soil is on the lower side slopes of hills. Slopes are convex, uniform, and 200 to 300 feet long. Areas are 5 to 40 acres in size. Runoff is slow.

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

Included with this soil in mapping are some areas of soils that have many stones on the surface.

The hazard of water erosion is moderate. Wetness is a limitation during part of the growing season. If drained, the soil is suited to such general farm crops as corn, small grain, and hay. Capability unit IIw–3; woodland group 3o1.

Rietbrock silt loam, 6 to 12 percent slopes (ReC).—This soil is on hillsides. Slopes are convex, uniform, and 150 to 300 feet long. Areas are 5 to 25 acres in size. Runoff is medium.

This soil has a profile similar to the one described as representative of the series, but the silty sediment is about 10 to 15 inches thick and the depth to the concentration of rock fragments is about 20 to 30 inches.

Included with this soil in mapping are some areas of soils that have many stones on the surface.

The hazard of water erosion is severe. Wetness is a limitation. Almost all of the acreage of this soil is in woodland or pasture, but small areas have been cleared and are used for general farm crops, generally as part of a larger field. If suitable erosion-control measures are used, this soil is suited to corn, small grain, and hay. Capability unit IIIe–8; woodland group 3o1.

Rifle Series

The Rifle series consists of deep, very poorly drained, organic soils in broad depressions and in valleys of slow-moving streams. These soils formed in more than 51 inches of organic residue from decomposed grasses, sedges, reeds, and woody plants. The organic material accumulated and is only partly decomposed, because of the high water table. Mineral material underlies the organic material.

In a representative profile the surface layer is dark reddish-brown to black mucky peat 32 inches thick. The next 8 inches is yellowish-brown sedge peat that includes irregularly shaped bodies of black mucky peat. Below this, and extending to a depth of 62 inches, is black and dark reddish-brown mucky peat.

A seasonal high water table is at or near the surface for most of the year. Available water capacity is very high, and permeability is moderately rapid. Natural fertility is low. These soils are medium acid to neutral throughout. Bedrock is at a depth of more than 6 feet.

Most of the acreage of these soils is in woodland or wildlife habitat, but a few small areas are pastured or are drained and used for grain and hay. Some areas are used for cranberries. The soils are poorly suited to wood crops.

Rifle soils are very severely limited for building sites by the seasonal high water table and low bearing capacity.

Representative profile of Rifle mucky peat, 75 feet south of County Highway H, in NW¼NE¼NE¼NE¼ sec. 17, T. 25 N., R. 5 E.:

Oe1—0 to 7 inches, hemic material, dark reddish brown (5YR 2/2) broken face and rubbed, dark reddish brown (5YR 3/2) pressed; about 40 percent fiber, 10 percent rubbed; weak, very fine, granular structure; slightly sticky; about 80 percent herbaceous fibers and 20 percent woody fibers; slightly acid; abrupt, smooth boundary.

Oe2—7 to 17 inches, hemic material, black (10YR 2/1) broken face and rubbed, very dark brown (10YR 2/2) pressed; about 40 percent fiber, 15 percent rubbed; moderate, fine, granular structure; slightly sticky; about 90 percent herbaceous fibers and 10 percent woody fibers; medium acid; abrupt, smooth boundary.

Oe3—17 to 32 inches, hemic material, dark reddish brown (5YR 2/2) broken face and rubbed, dark reddish brown (5YR 3/3) pressed; about 40 percent fiber, 15 percent rubbed; weak, coarse, subangular blocky

structure parting to moderate, medium, subangular blocky; mainly herbaceous fibers but 10 percent woody fibers; medium acid; clear, smooth boundary.

Oil—32 to 40 inches, fibric material, yellowish brown (10YR 5/4) broken face and rubbed, light yellowish brown (10YR 6/4) pressed; about 80 percent sphagnum moss fibers, 10 percent rubbed; irregularly shaped bodies, black (5YR 2/1) broken face and rubbed, dark reddish-brown (5YR 2/2) pressed; few wood fragments 10 to 30 centimeters in diameter; massive; friable; slightly acid, clear, smooth boundary.

Oe4—40 to 62 inches, hemic material, black (5YR 2/1) broken face and rubbed, dark reddish-brown (5YR 2/2) pressed; about 60 percent fiber, and 20 percent rubbed; weak, fine, subangular blocky structure; mainly herbaceous fibers, few pieces of woody material; friable; slightly acid.

The O layer is more than 51 inches thick. The organic material is estimated to be mainly herbaceous fibers. In some areas the profile is less than 15 percent, by volume, woody fragments that cannot be crushed with the fingers. In some areas as much as 10 inches of sphagnum moss is on the surface. The profile is dominantly hemic material. In some areas layers of fibric or sapric material are in the subsurface or bottom tier, but the total thickness of either material is less than 10 inches.

Rifle soils are adjacent to Cathro and Markey soils. They formed in deeper organic deposits that Cathro or Markey soils. Rifle soils are less acid throughout than Greenwood soils.

Rifle mucky peat (0 to 2 percent slopes) (Rf).—This soil is in broad stream valleys and lake basins. Areas are 20 to 300 acres in size. Vegetation is mainly sedges and cattails and some poor-quality aspen. Runoff is ponded.

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

Included with this soil in mapping are small areas of Cathro mucky peat, Markey mucky peat, and Rifle peat.

If the soil is cultivated, the hazard of soil blowing is very severe. Frost is a hazard to row crops. Where sufficient water is available, the soil is well suited to cranberries. If drained, this soil is suitable for limited cropping to small grain and hay. In many places drainage is difficult because of the lack of suitable outlets. If drained, the soil is subject to shrinkage. Most of this soil is now in wildlife habitat, but some areas are used for cranberries or for grain, hay, or pasture. Capability unit IVw–9; not placed in a woodland group.

Rifle peat (0 to 2 percent slopes) (Rg).—This soil is on the glacial lake plains. Areas are 50 to 200 acres in size. The vegetation is mostly sphagnum moss and some poor-quality aspen and black spruce. Runoff is ponded.

This soil has a profile similar to the one described as representative of the series, but the upper 6 to 10 inches is fibrous material from sphagnum moss and other plants.

Included with this soil in mapping are small areas of Rifle mucky peat.

If sufficient water is available, this soil is suited to cranberries. The sphagnum moss generally is removed in preparing sites for cranberries. Almost all of the acreage of this soil is used as wildlife habitat. Capability unit IVw–9; not placed in a woodland group.

Santiago Series

The Santiago series consists of deep, moderately well drained and well drained, silty soils on low ridges and hills. These soils formed under mixed northern hardwood and coniferous forest in a mantle of silt and in the underlying heavy sandy loam glacial till.

In a representative profile the surface layer is dark-brown silt loam 7 inches thick. The subsurface layer is brown silt loam 12 inches thick. The subsoil is 21 inches thick. The upper 5 inches is brown silt loam that has tongues of pale-brown silt loam extending downward into it from the layer above; the next 10 inches is reddish-brown heavy silt loam mottled with yellowish red; and the lower 6 inches is reddish-brown heavy sandy loam. The substratum is reddish-brown heavy sandy loam.

A seasonal high water table is at a depth of 3 feet to more than 5 feet. Available water capacity is high, and permeability is moderate or slow. Natural fertility is medium. These soils are slightly acid to strongly acid in the upper part and strongly acid to very strongly acid in the lower part. The depth to bedrock is more than 5 feet.

Most of the acreage of these soils is used for such general farm crops as corn, small grain, and hay. Some areas, particularly those that have steeper slopes, are in pasture or woodlots. The soils are well suited to northern hardwoods.

Santiago soils, except those that have a clayey substratum or that have slopes of more than 12 percent, are slightly limited for building sites that have onsite sewage-disposal systems.

Representative profile of Santiago silt loam, 2 to 6 percent slopes, in a timothy-red clover meadow, 50 feet south of the town road in NE¼NE¼NW¼SE¼ sec. 26, T. 25 N., R. 2 E.:

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

A21—7 to 12 inches, brown (10YR 4/3) silt loam; weak, thin to medium, platy structure; friable; common roots; neutral; clear, wavy boundary.

A22—12 to 19 inches, brown (10YR 4/3) silt loam; moderate, medium, subangular blocky structure; friable; few roots; strongly acid; clear, wavy boundary.

B&A—19 to 24 inches, brown (10YR 5/3) silt loam (Bt); moderate, medium, subangular blocky structure; friable; few clay films and brown (10YR 4/3) silt coatings on peds; about 20 percent, by volume, tongues of pale-brown (10YR 6/3) silt loam extending downward from A22 horizon, moderate, medium, subangular blocky structure in tongues; few roots; very strongly acid; clear, wavy boundary.

B2t—24 to 34 inches, reddish-brown (5YR 4/4) heavy silt loam; common, medium, prominent mottles of yellowish red (5YR 4/8); moderate, coarse, subangular blocky structure; firm; yellowish-brown (10YR 5/4) sand coatings on peds; many clay films on peds; many rounded pebbles and cobblestones 10 to 100 millimeters in diameter; few roots; very strongly acid; clear, wavy boundary.

IIB3t—34 to 40 inches, reddish-brown (5YR 4/4) heavy sandy loam; moderate, coarse, subangular blocky structure; firm; few clay films on peds; very strongly acid; clear, wavy boundary.

IIC—40 to 60 inches, reddish-brown (5YR 4/4) heavy sandy loam; massive; firm; many glacial pebbles; very strongly acid; clear, wavy boundary.

The silt mantle ranges from 15 to 25 inches in thickness. The solum ranges from 20 to 40 inches in thickness and extends into the underlying sandy loam glacial till. In places the underlying glacial till is heavy loam. In other places

the glacial till evidences sorting in the form of thin layers of clean sand and fine gravel below a depth of 40 inches.

Santiago soils are on higher parts of the landscape adjacent to the somewhat poorly drained Withee soils. They are saturated for shorter periods and are coarser textured in the C horizon than Withee soils.

Santiago silt loam, 2 to 6 percent slopes (SaB).—This soil is on broad ridgetops on the glaciated upland plain. Slopes are convex, uniform, and 200 to 300 feet long. Areas are 10 to 100 acres in size. Runoff is medium.

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

The hazard of water erosion is moderate. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIe–1; woodland group 1o1.

Santiago silt loam, 6 to 12 percent slopes (SaC).—This soil is on the sides of low ridges on the glaciated upland plain. Slopes are convex, uniform, and 100 to 200 feet long. Areas are 5 to 30 acres in size. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but the surface and subsurface layers are slightly thinner and the depth to glacial till is about 20 inches.

Included with this soil in mapping are some areas of soils that have a brown surface layer.

The hazard of water erosion is severe. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIIe–1; woodland group 1o1.

Santiago silt loam, 12 to 20 percent slopes, eroded (SaD2).—This soil is on the sides of ridges on the glaciated upland plain. Slopes are convex, uniform, and 100 to 200 feet long. Areas are 5 to 15 acres in size. Runoff is rapid.

This soil has a profile similar to the one described as representative of the series, but it has a brown surface layer and a thinner subsurface layer, and the depth to glacial till is 15 to 20 inches. The till tends to be somewhat sorted and sandy loam in texture.

Included with this soil in mapping are areas of soils that have a very dark grayish-brown surface layer.

The hazard of water erosion is very severe. This soil is suited to small grain and hay. Corn can be grown under intensive management. Capability unit IVe–1; woodland group 1r2.

Santiago silt loam, clayey substratum, 2 to 6 percent slopes (SbB).—This soil is on the tops and sides of long, low ridges. Slopes are convex, uniform, and 100 to 300 feet long. Areas are 5 to 100 acres in size. The surface layer is almost uniformly very dark grayish brown. Runoff is medium.

This soil has a profile similar to the one described as representative of the series, but the substratum, below a depth of about 30 to 40 inches, is sandy and clayey residuum from stratified sandstone and shale.

Included with this soil in mapping are small areas of soils that have slopes of as much as 10 percent.

The hazard of water erosion is moderate. This soil is well suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIe–1; woodland group 1o1.

Sherry Series

The Sherry series consists of deep, poorly drained, silty soils in depressions and drainageways on the upland plain. These soils formed under sedges and water-tolerant forest in 15 to 30 inches of silty sediment and in the underlying loamy residuum from disintegrated and weathered micaceous gneiss.

In a representative profile the surface layer is black to very dark gray silt loam about 9 inches thick. The subsoil is 47 inches thick. The upper 11 inches is dark-gray heavy silt loam to silty clay loam mottled with strong brown; the next 13 inches is variegated sandy clay loam; the next 16 inches is dark-brown and reddish-brown sandy loam; and the lower 7 inches is reddish-brown and dark reddish-brown silty clay loam. Below this is dark reddish-brown silty clay loam that grades into variegated silty clay loam at a depth of about 68 inches.

A seasonal high water table is at or near the surface for part of the year. Available water capacity is high, and permeability is moderately slow. Natural fertility is medium. These soils are medium acid to very strongly acid in the upper part and medium acid to neutral in the subsoil and substratum. Bedrock is at a depth of 5 feet or more.

Most of the acreage of these soils is in pasture or woodland, but some areas have been cleared and drained and are used for general farm crops. The soils are suited to red maple, elm, and black ash.

Sherry soils are very severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table and moderately slow permeability.

Representative profile of Sherry silt loam in a plowed pasture, 200 feet south of the town road in NW¼NW¼NE¼NW¼ sec. 4, T. 24 N., R. 5 E.:

Ap1—0 to 4 inches, black (10YR 2/1) and very dark brown (10YR 2/2) silt loam, grayish brown (10YR 5/2) dry; common, fine, prominent mottles of very strong brown (7.5YR 4/6–4/8); moderate, fine, subangular blocky structure; friable; slightly acid; clear, wavy boundary.

Ap2—4 to 9 inches, very dark gray (10YR 3/1) silt loam mixed with a small amount of dark gray (10YR 4/1) material from B1 horizon below; many, fine, prominent mottles of yellowish red (5YR 4/6–4/8); weak, fine, subangular blocky structure; friable; strongly acid; abrupt, smooth boundary.

B1—9 to 14 inches, dark-gray (10YR 4/1) heavy silt loam; many, fine and medium, prominent mottles of strong brown (7.5YR 5/6–5/8) and yellowish red (5YR 5/6–5/8); weak, medium, subangular blocky structure; firm; few thin interfingers of bleached silt from an old A2 horizon above; few black (10YR 2/1) and very dark gray (10YR 3/1) organic stains on faces of some peds; strongly acid; clear, wavy boundary.

B21t—14 to 20 inches, dark-gray (10YR 4/1) light silty clay loam; many, fine and medium, prominent mottles of strong brown (7.5YR 5/6–5/8); weak, medium, angular and subangular blocky structure; few thin clay films on faces of peds and in continuous tubular pores; medium acid; clear, wavy boundary.

IIB22t—20 to 33 inches, variegated yellowish-brown (10YR 5/6–5/8), strong-brown (7.5YR 5/6–5/8), dark yellowish-brown (10YR 4/4), and dark-brown (7.5YR 4/4) sandy clay loam; common, medium, prominent mottles of brown (7.5YR 5/2); moderate, medium, angular blocky structure; very firm; many, thin, dark-brown (7.5YR 3/2) clay films on faces of peds and in tubular pores; slightly acid; gradual, wavy boundary.

IIB31t—33 to 49 inches, dark-brown (7.5YR 4/4) and

reddish-brown (5YR 4/4) sandy loam; weak, medium and coarse, subangular blocky structure; friable; few thin clay films on faces of peds and as clay bridging of sand grains; neutral; clear, wavy boundary.

IIB32t—49 to 56 inches, reddish-brown (5YR 4/4) and dark reddish-brown (2.5YR 3/4) silty clay loam; weak, medium, subangular blocky structure; firm; few, thin, dark reddish-brown (5YR 3/4) clay films on faces of peds and in tubular pores; neutral; clear, wavy boundary.

IIC1—56 to 68 inches, dark reddish-brown (5YR 3/2) and dark-brown (7.5YR 3/2) silty clay loam, brown (7.5YR 4/2–5/2) rubbed; weak, medium and thick, platy structure; firm; few thin clay films in root pores; neutral; clear, wavy boundary.

IIC2—68 to 84 inches, variegated dark reddish-brown (5YR 3/2–3/3), yellowish-brown (10YR 5/6–5/8), and olive (5Y 4/3) silty clay loam; weak, medium and thick, platy structure; firm; few thin clay films in root pores; neutral.

The silty upper part of the solum ranges from 15 to 30 inches in thickness. The solum ranges from 36 to 72 inches in thickness but typically is 40 to 60 inches thick.

Sherry soils are adjacent to the well-drained Eaupleine soils, sandy subsoil variant, and the somewhat poorly drained Milladore soils. They are saturated for longer periods than Eaupleine soils, sandy subsoil variant, and Milladore soils.

Sherry silt loam (0 to 2 percent slopes) (Sh).—This soil is in broad depressions and in drainageways. Slopes are concave, uniform, and 100 to 500 feet long. Areas are 10 to 300 acres in size. Runoff is very slow to ponded.

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

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

This soil is severely limited by wetness and ponding. Surface drainage and land smoothing help to reduce these limitations. If this soil is drained, it is suited to corn, small grain hay, and other crops commonly grown in the county. Because of its location in depressions, this soil is subject to frosts late in spring and early in fall. Capability unit IIIw–3; woodland group 3w5.

Sherry stony silt loam (0 to 2 percent slopes) (Ss).—This soil is in upland drainageways. Slopes are concave, uniform, and 100 to 300 feet long. Areas are 10 to 50 acres in size. The surface layer is almost uniformly black. Runoff is very slow to ponded.

This soil has a profile similar to the one described as representative of the series, but it has so many stones that use of cultivating machinery is impractical. The stones are 1 foot or more in diameter and 2 to 15 feet apart.

This soil is severely limited by wetness and is very severely limited by the presence of stones. It is suited to pasture, woodland, or wildlife habitat. Capability unit Vw–16; woodland group 3w5.

Veedum Series

The Veedum series consists of moderately deep, very poorly drained soils in upland drainageways and depressions. These soils formed in 10 to 30 inches of silty sediment and in the underlying residuum from stratified soft sandstone and shale.

In a representative profile the surface layer is black silt loam about 12 inches thick. The subsurface layer is light brownish-gray loamy sand 4 inches thick. The subsoil is about 14 inches thick and is layers of mottled grayish-brown, strong-brown, yellowish-red, and yellowish-brown, firm light clay loam and friable sandy loam. The substratum is about 6 inches of dark grayish-brown sand over pale-brown, soft sandstone that has thin layers of yellowish-brown, soft sandy shale.

A seasonal high water table is at or near the surface in spring and part of summer. Available water capacity is medium, and permeability is moderately slow in the subsoil and slow in the substratum. Natural fertility is medium. The solum ranges from medium acid to very strongly acid throughout. Bedrock is at a depth of 2 to 4 feet.

Most of the acreage of these soils is in native pasture, wildlife habitat, or woodland. A few areas have been drained and are used for general farm crops. The soils are suited to red maple, black ash, and elm for pulpwood or sawlogs.

Veedum soils are very severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table, the relatively shallow depth to bedrock, and slow permeability.

Representative profile of Veedum silt loam in a cultivated field, 100 feet south of a town road in NE¼ NE¼NW¼NW¼ sec. 2, T. 22 N., R. 4 E.:

Ap—0 to 8 inches, black (5Y 2/2) silt loam, gray (5Y 5/1) dry; weak, fine and very fine, subangular blocky structure; friable; many fine fibrous roots; medium acid; clear, smooth boundary.

A12—8 to 12 inches, black (5Y 2/1) silt loam, dark gray (5Y 4/1) dry; weak, fine, subangular blocky structure; friable; many fine fibrous roots; medium acid; abrupt, smooth boundary.

IIA2g—12 to 16 inches, light brownish-gray (2.5Y 6/2) loamy sand; common, fine, prominent mottles of brownish yellow (10YR 6/6); weak, very thick, platy structure parting to weak, fine, subangular blocky; friable; hard, slightly sticky; common fine fibrous roots; strongly acid; clear, smooth boundary.

IIIB21g—16 to 20 inches, mottled grayish-brown (2.5Y 5/2), strong-brown (7.5YR 5/6–5/8), and yellowish-red (5YR 5/6–5/8) light clay loam, dark grayish brown (10YR 4/2) rubbed; moderate, fine and medium, subangular and angular blocky structure; firm; very hard, slightly sticky; few fine roots; strongly acid; clear, smooth boundary.

IIIB22g—20 to 24 inches, mottled grayish-brown (2.5Y 5/2), yellowish-brown (10YR 5/6–5/8), and strong-brown (7.5YR 5/6) sandy loam, grayish-brown (10YR 5/2) rubbed; weak, medium, subangular blocky structure; friable; hard, slightly sticky; very strongly acid; abrupt, smooth boundary.

IIIB23g—24 to 30 inches, grayish-brown (2.5Y 5/2) light clay loam; many, fine and medium, prominent mottles of strong brown (7.5YR 5/6–5/8) and yellowish red (5YR 5/6–5/8); weak, medium, subangular blocky structure; firm; very hard, sticky; strongly acid; abrupt, smooth boundary.

IVC—30 to 36 inches, very dark grayish-brown (10YR 3/2) and dark grayish-brown (10YR 4/2) medium sand; single grained; loose; few small (5 to 15 millimeters in diameter) fragments of sandstone; strongly acid; clear, smooth boundary.

IVR—36 to 60 inches, pale-brown (10YR 6/3), medium-grained, soft sandstone stratified with thin laminae of yellowish-brown (10YR 5/4), soft sandy shale; slightly acid.

The surface layer of silty sediment ranges from about 10 to 30 inches in thickness. The solum generally ranges from 24 to 40 inches in thickness but is as thick as 50 inches in places. The thickness and arrangement of the sandy, loamy, and clayey horizons that formed in stratified sandstone and shale residuum are extremely variable.

Veedum soils are adjacent to the well drained to moderately well drained Hiles soils, the somewhat poorly drained Kert soils, and the poorly drained Vesper soils. They are saturated for longer periods than Hiles or Kert soils. They are saturated for longer periods and have a thicker and generally less grayish A1 horizon than Vesper soils.

Veedum silt loam (0 to 2 percent slopes) (Ve).—This soil is in large upland drainageways and depressions. Slopes are concave. Areas are 10 to 60 acres in size. The surface layer is almost uniformly black. Runoff is very slow to ponded.

A high water table is present in spring and part of summer. The hazard of frost is moderate late in spring and early in fall. Row crops can be grown if surface and open-ditch drains are installed. If drained, this soil is suited to small grain and hay. If not drained, it is suited to native pasture, woodland, or wildlife habitat. Capability unit IVw–3; woodland group 5w5.

Vesper Series

The Vesper series consists of moderately deep, poorly drained, silty soils in upland depressions and drainageways. These soils formed under mixed water-tolerant deciduous and coniferous forest and sedges in 10 to 30 inches of silty sediment and in the underlying residuum from stratified sandstone and shale.

In a representative profile the surface layer is very dark grayish-brown silt loam about 8 inches thick. The subsurface layer is light brownish-gray silt loam 8 inches thick. The subsoil is 18 inches thick. The upper 9 inches is light brownish-gray, friable loam; and the lower 9 inches is olive-gray, firm silty clay. The substratum, which reaches a depth of 65 inches, is light brownish-gray sand that grades to dark gray at a depth of about 48 inches and has one or more thin layers of silty clay.

A seasonal high water table is near the surface in spring and part of summer. Available water capacity is medium, and permeability is moderately slow in the subsoil and slow in the substratum. Natural fertility is medium.

Most of the acreage of these soils is in woodland or wooded pasture. About 30 percent of the acreage has been cleared and drained and is used for general farm crops. The soils are suited to white pine, elm, ash, and red maple for pulpwood or sawlogs.

Vesper soils are very severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table and slow permeability in the substratum.

Representative profile of Vesper silt loam in a plowed pasture, 100 feet south and 600 feet east of the road culvert on County Highway E in NE¼NE¼NE¼ NW¼ sec. 7, T. 22 N., R. 3 E.:

Ap—0 to 8 inches, very dark grayish-brown (10YR 3/2) silt loam, grayish brown (10YR 5/2) dry; weak, fine and very fine, subangular blocky structure; friable; many fine fibrous roots; strongly acid; abrupt, smooth boundary.

A2—8 to 16 inches, light brownish-gray (10YR 6/2) silt loam; weak, thin, platy structure; friable; common fine fibrous roots; strongly acid; clear, wavy boundary.

IIB21g—16 to 25 inches, light brownish-gray (2.5Y 6/2) light loam; many, coarse, prominent mottles of yellowish brown (10YR 5/6–5/8) and strong brown (7.5YR 5/6–5/8); weak, medium, subangular blocky structure; friable, hard; few fine roots; layer of light brownish-gray (10YR 6/2) fine sand in lower 2 inches; very strongly acid; clear, smooth boundary.

IIB22g—25 to 34 inches, olive-gray (5Y 5/2) silty clay; common, fine and medium, prominent mottles of strong brown (7.5YR 5/6–5/8); weak, fine and medium, subangular blocky structure; firm, very hard; few fine roots; layer of very dark grayish-brown (10YR 3/2) sandy clay loam in upper 1 inch; very strongly acid; clear, smooth boundary.

IIICg—34 to 65 inches, light brownish-gray (2.5Y 6/2) fine sand that grades to dark gray (10YR 4/1) below a depth of 48 inches; single grained, grading to massive in lower part; loose, grading to friable in lower part; 4-inch band of greenish-gray (5GY 5/1) silty clay near lower boundary; very strongly acid.

The solum generally ranges from 30 to 40 inches in thickness, but it is as thick as 50 inches in places. The A horizon of silty sediment ranges from about 10 to 30 inches in thickness. The thickness and arrangement of the sandy horizons that formed in stratified sandstone residuum and the clayey horizons that formed in shale residuum are extremely variable. The sandstone material in the C horizon ranges from loose sandy residuum from weathered sandstone to hard sandstone bedrock, and the shaly parts range from silty clay or clay to indurated clayey shale.

The poorly drained Vesper soils are adjacent to the well drained to moderately well drained Hiles soils, the somewhat poorly drained Kert soils, and the very poorly drained Veedum soils. Vesper soils are saturated for longer periods than Hiles and Kert soils. They are in positions similar to those of Veedum soils, but they are less poorly drained and have a thinner and generally lighter colored A1 or Ap horizon.

Vesper silt loam (0 to 2 percent slopes) (Vs).—This soil is in upland drainageways and depressions. Slopes are concave, uniform, and 100 to 300 feet long. Areas are 10 to 200 acres in size. Runoff is very slow to ponded.

A high water table is present in spring and part of summer. The hazard of frost is moderate late in spring and early in fall. Row crops can be grown if surface and open-ditch drainage is installed. If drained, this soil is suited to corn, small grain, hay, and other crops commonly grown in the county. If not drained, it is suited to hay, pasture, woodland, and wildlife habitat. Capablity unit IIIw–3; woodland group 5w5.

Withee Series

The Withee series consists of deep, somewhat poorly drained, nearly level to gently sloping soils on uplands of the glacial plain. These soils formed under northern hardwood forest in 15 to 25 inches of silty sediment and in the underlying loamy glacial till.

In a representative profile the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsurface layer is about 10 inches thick. The upper 3 inches is grayish-brown silt loam, and the lower 7 inches is thick tongues of light-gray silt loam extending downward into pale-brown and light yellowish-brown mottled silt loam. The subsoil is 22 inches thick. The upper 6 inches is pale-brown and light yellowish-brown, mottled heavy loam that has thin tongues of light-gray silt loam extending into it from the horizon above, and the lower 16 inches is reddish-brown, mottled, firm loam. The substratum, which reaches a depth of 60 inches, is reddish-brown heavy loam.

A seasonal high water table is at a depth of 1 to 3

feet. Available water capacity is high, and permeability is moderately slow. Natural fertility is medium. The surface layer and subsoil are strongly acid to very strongly acid. Bedrock is at a depth of more than 5 feet.

Most of the acreage of these soils has been cleared and is used for such general farm crops as corn, grain, and hay. The rest of the acreage is in pasture and woodland. The soils are suited to red oak, sugar maple, basswood, and ash for sawlogs or pulpwood.

Withee soils are severely limited for building sites that have onsite sewage-disposal systems by the seasonal high water table and moderately slow permeability.

Representative profile of Withee silt loam, 2 to 6 percent slopes, in an alfalfa field, on the University of Wisconsin Marshfield Branch Experiment Station, 400 feet south and 550 feet east of the northwest corner of sec. 22, T. 25 N., R. 3 E.:

Ap—0 to 8 inches, dark grayish-brown (10YR 4/2) silt loam, light brownish gray (10YR 6/2) dry; weak, medium, subangular blocky structure; friable; common fine fibrous roots; neutral; abrupt, smooth boundary.

A2g—8 to 11 inches, grayish-brown (10YR–2.5Y 5/2) and light brownish-gray (10YR–2.5Y 6/2) silt loam; many, medium, prominent mottles of yellowish brown (10YR 5/6—5/8); weak, thin, platy structure; friable; common fine fibrous roots; very strongly acid; abrupt, smooth boundary.

Ag&Bg—11 to 18 inches, pale-brown (10YR 6/3) and light yellowish-brown (2.5Y 6/3) silt loam (B2t); many, medium and large, faint, distinct, and prominent mottles of light brownish gray (2.5Y 6/2), yellowish brown (10YR 5/4, 5/6, 5/8), and strong brown (7.5YR 5/6); weak, medium, prismatic structure parting to weak, fine, subangular blocky; friable; thick tongues of light-gray (2.5Y 7/2) silt loam (A2) penetrate this horizon from A2 horizon above and make up approximately 60 percent, by volume, of the horizon; few fine fibrous roots; very strongly acid; clear, wavy boundary.

IIB&A—18 to 24 inches, pale-brown (10YR 6/3) and light yellowish-brown (2.5Y 6/4) loam and silt loam that has moderate sand content (B2t); many, medium, faint and prominent mottles of grayish brown (2.5Y–10YR 5/2) and strong brown (7.5 YR 5/6); weak, medium, prismatic structure parting to weak, medium, subangular blocky; friable; tongues of light-gray (10YR–2.5Y 7/2) silt loam (A2) extend along prism faces and make up approximately 25 percent, by volume; few fine fibrous roots; few thin clay films on faces of some subangular blocky peds (B2t); very strongly acid; abrupt, wavy boundary.

IIB2t—24 to 36 inches, reddish-brown (5Y 4/3) heavy loam; common, medium, prominent mottles of yellowish red (5YR 5/6–5/8) and many, fine, distinct mottles of pinkish gray (5YR–7.5YR 6/2) and brown (7.5YR 5/2); moderate, coarse, prismatic structure parting to moderate, medium, subangular blocky; firm; many thin clay films on faces of peds; thin coatings of bleached silt on faces of some peds and along primary vertical cleavage planes; very strongly acid; gradual, smooth boundary.

IIB3t—36 to 40 inches, reddish-brown (5YR 4/3–5/3) loam; common, medium, faint and prominent mottles of yellowish red (5YR 4/6) and brown (7.5YR 5/2); weak, coarse, subangular blocky structure; firm; few thin clay films; very strongly acid; clear, smooth boundary.

IIC—40 to 60 inches, reddish-brown (5YR 4/4) heavy loam; few, large, distinct, yellowish-red (5YR 5/6) mottles; very weak, coarse, subangular blocky structure grading to massive with increasing depth; firm; few thin clay films in root and worm channels; very strongly acid.

The upper layer of silty sediment ranges from about 15 to 25 inches in thickness. The solum ranges from 24 to 48 inches in thickness and extends into the underlying glacial till of heavy sandy loam, loam, or sandy clay loam texture. Gravel, cobblestones, and stones are at the surface or throughout the profile in most areas, but they rarely exceed 12 percent, by volume.

Withee soils are on broad, nearly level to gently sloping parts of the glacial till plain adjacent to the moderately well drained to well drained Santiago soils, the poorly drained Marshfield soils, and the very poorly drained Mann soils. They are slightly finer textured and are saturated for longer periods than Santiago soils. They are at higher elevations, are better drained, and have a lighter colored A1 or Ap horizon than Marshfield and Mann soils.

Withee silt loam, 0 to 2 percent slopes (WeA).—This soil is on broad upland glacial plains. Slopes are slightly convex, uniform, and 100 to 300 feet long. Areas are 10 to 150 acres in size. The surface layer is nearly uniformly dark grayish brown. Runoff is very slow to ponded.

This soil has a profile similar to the one described as representative of the series, but the silt mantle is generally 22 to 25 inches thick.

Wetness is a moderate limitation on this soil because of slow permeability and slow runoff. This delays farming operations and decreases yields. Surface drains and land smoothing help to reduce the hazard of wetness. This soil is suitable for moderately intensive cropping of corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIw–4; woodland group 1o1.

Withee silt loam, 2 to 6 percent slopes (WeB).—This soil is on glacial uplands. Slopes are convex, uniform, and 200 to 400 feet long. Areas are 10 to 300 acres in size. Runoff is slow.

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

Included with this soil in mapping are some areas of soils that have a brown surface layer and a thinner subsurface layer. Also included are some small areas of soils that have slopes of 6 to 8 percent.

The hazard of water erosion is slight. Wetness is a limitation. Surface drains or terraces are effective in reducing erosion and wetness. This soil is suited to corn, small grain, hay, and other crops commonly grown in the county. Capability unit IIw–4; woodland group 1o1.

Use and Management of the Soils

The first part of this section explains the basic management practices that apply to all of the soils of Wood County that are suitable for tilled crops or for pasture. This is followed by a discussion of the system of capability classification used by the Soil Conservation Service. The next part describes the capability units in Wood County and the use and management of the soils in each unit. Next is a table of predicted average yields of the principal crops. Other parts present considerations relative to the use of soils for woodland, for wildlife habitat, for recreation, for engineering, and for nonfarm uses.

Crops and Pasture

Corn, oats, hay, and such specialty crops as peas for canning and cranberries are commonly grown in Wood County. A large acreage is used for either native or rotational pasture.

In the following pages the basic practices for managing the soils for the commonly grown crops and for pasture are explained. This is followed by a discussion of the system of capability classification. The next part describes the capability units and the management practices that are applicable to each of them. Finally, predicted average yields of some of the principal crops are given for each mapping unit under a defined level of management.

Basic management practices

In the paragraphs that follow, basic practices of management for all of the soils of Wood County that are suitable for tilled crops and pasture are discussed. The chief problems in farming the soils are maintaining fertility, managing water, and controlling erosion. Technical assistance in planning and applying practices suitable for the soils on a particular farm can be obtained through the Wood County Soil and Water Conservation District.

Maintaining fertility.—Fertility can be maintained or improved by choosing a cropping system that adds organic matter to the soil. Most of the farms in Wood County support dairy operations. Dairy farms use a diversified cropping system that includes hay or pasture in the rotation. In addition, large amounts of barnyard manure are added to the soil.

All of the soils in Wood County are acid and respond well to lime. The soils are generally low in nitrogen and potassium and have moderate amounts of phosphorus. All crops respond well to commercial fertilizer. Fertilizer and lime should be applied in the rates and amounts indicated by the results of soil tests.

Managing water.—Many of the silty soils in the county have a slowly permeable or moderately slowly permeable subsoil. Because of this they tend to be wet late in spring and early in summer and again in fall, thus interferring with planting and harvesting of crops. Long gentle slopes concentrate runoff near the base of the slopes. Observations on these soils indicate that the silty upper layers of the soil become saturated but that the water is not able to enter the subsoil rapidly enough to provide adequate drainage. As a result, the excess water moves laterally down the slope in the silty upper layers and eventually drains away. Tile drains are ineffective because they must be laid so deep that the excess water cannot reach them. Diversions, terraces, grassed waterways, land smoothing, and surface drains, generally in combination, are effective in removing the excess water and in controlling erosion as well.

Open ditches are commonly used to lower the water table in the sandy soils that have a high water table.

Controlling erosion.—Although most of the soils in Wood County are gently sloping, the slopes are commonly long and the accumulation of water as it runs down the slope creates an erosion hazard. The same diversions, terraces, and waterways that serve to safely remove excess runoff are effective in controlling erosion. Contour stripcropping and conservation cropping systems are effective in controlling erosion on slopes that are steeper than about 6 percent.

Sandy soils, such as those of the Plainfield and Friendship series, are subject to serious soil blowing if they are cultivated. Wind stripcropping, shelterbelts, tree and shrub plantings, and cover crops can be used to help to control soil blowing.

Renovating pasture.—Most of the forage used in the county is obtained from hay grown in the crop rotation. On some farms the hay is chopped and fed green. Most grazing is done in the last year of the rotation. Some areas are in permanent pasture. These areas generally are too steep, too stony, or too wet to be cultivated. The yield from many of these areas can be improved by renovation. Renovation involves destruction of the old sod, application of proper amounts of lime and fertilizer, and preparation of a good seedbed, generally by using a field cultivator that leaves the plant residue on or near the surface as mulch. A suitable mixture of grasses and legumes can then be sown together with a cover crop, usually oats, to help to control erosion until the sod develops.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crop. The soils are grouped according to their limitations when used for field crops, the risk of damage when they are so 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 range, for forest trees, or for engineering.

In the capability system, the 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. (None in Wood County)

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, range, woodland, or wildlife habitat.

Class VI soils have severe limitations that make them generally unsuited to cultivation and limit their use largely to pasture or range, woodland, or wildlife habitat.

Class VII soils have very severe limitations that make them unsuited to cultivation and that restrict their use largely to pasture or range, woodland, or wildlife habitat.

Class VIII soils and landforms have limitations that preclude their use for commercial plants and restrict their use to recreation, wildlife habitat, 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 Wood County but not in all parts of the United States, 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, although they have other limitations that restrict their use largely to pasture, range, woodland, wildlife habitat, 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–4 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.

Management by capability units

In the following pages, the capability units in Wood County are described and suggestions for the use and management of the soils are given. The capability units are not numbered consecutively, because not all of the units used in Wisconsin are in this county.

Under each capability unit is a discussion of the characteristics of the soils in the unit, of the suitability of the soils for crops and other uses, and of the management practices applicable to the soils.

The names of the soil series represented are mentioned in the description of each capability unit, but not all of the soils of a given series are in the unit. To find the names of all of the soils in any given capability unit, refer to the "Guide to Mapping Units" at the back of this survey.

CAPABILITY UNIT IIe–1

This unit consists of deep and moderately deep, well drained and moderately well drained, gently sloping, loamy soils of the Eaupleine and Santiago series. These soils have a silty surface layer and a loamy subsoil and substratum. Permeability is moderate or moderately slow, and available water capacity is high. Natural fertility is medium. Good tilth is easily maintained, and the hazard of water erosion is moderate.

The soils in this unit are used for such general farm crops as corn, small grain, and hay. If limed and fertilized, the soils are well suited to alfalfa hay mixtures. They are well suited to pasture, woodland, or wildlife habitat.

CAPABILITY UNIT IIe–2

This unit consists of moderately deep and deep, well-drained, gently sloping, loamy soils of the Fenwood, Gale, Marathon, and Mosinee series. These soils are underlain by bedrock at a depth of 2 to 6 feet. They have a silty or loamy surface layer and a loamy subsoil. Permeability is moderate in the upper part and moderate to moderately rapid in the substratum. Available water capacity is medium. Natural fertility is medium. Good tilth is easily maintained, and the hazard of water erosion is moderate.

The soils in this unit are used for such general farm crops as corn, small grain, and hay. If limed and fertilized, the soils are well suited to alfalfa hay mixtures. They are suited to pasture, woodland, or other less intensive uses.

CAPABILITY UNIT IIe–6

This unit consists of moderately deep and deep, moderately well drained and well drained, gently sloping soils of the Hiles series and the Eaupleine series, clayey subsoil variant. These soils have a silty surface layer and a clayey subsoil. Permeability is slow, and the available water capacity is medium. Natural fertility is medium. Good tilth is easily maintained, and the hazard of water erosion is moderate.

Most of the soils in this unit are used for corn, small grain, and hay. Applications of lime and fertilizer are needed for alfalfa-hay mixtures. The soils are well suited to pasture, woodland, and wildlife habitat.

CAPABILITY UNIT IIe–7

The only soil in this unit is Eaupleine fine sandy loam, sandy subsoil variant, 2 to 6 percent slopes. This is a deep, well-drained, gently sloping, loamy soil. The upper part of the subsoil is sandy loam, and the lower part of the subsoil and the substratum are loamy. Permeability is moderately slow, and available water capacity is medium. Natural fertility is medium. Good tilth is easy to maintain.

This soil is used for such general farm crops as corn, small grain, and hay, but it is not so well suited to these crops as Eaupleine silt loam, 2 to 6 percent slopes. This soil is slightly droughty during extended dry seasons. The hazards of water erosion and soil blowing are moderate. If limed and fertilized, this soil

is well suited to alfalfa-hay mixtures. It is also suited to such less intensive uses as pasture, woodland, and wildlife habitat.

CAPABILITY UNIT IIw-3

This unit consists of moderately deep and deep, somewhat poorly drained, nearly level and gently sloping soils of the Dolph, Kert, and Rietbrock series. The surface layer is silty, and the lower part of the subsoil and substratum are loamy or clayey. Bedrock generally is at a depth of 3 to 6 feet. Permeability is moderate to slow, and available water capacity is medium. Natural fertility is medium or low. These soils are seasonally saturated for long periods and are slow to warm up and dry in spring or after heavy rains. The water is held in the upper layers because of the moderately slow or slow permeability of the lower part of the subsoil and the substratum. Water ponds for a few days in spring in some of the nearly level areas. The hazard of water erosion is moderate in gently sloping areas.

The soils in this unit are commonly used for corn, oats, and hay. Alfalfa does poorly and is subject to winterkill unless the excess water is removed and lime and fertilizer are applied. The soils are also suited to pasture, woodland, or other less intensive uses.

Surface drains and land smoothing can be used to remove excess water. Diversions and waterways can be used to intercept and dispose of surface water flowing from higher lying areas. Contour stripcropping in combination with diversions can be used to control erosion on the gently sloping areas. The strips need to be established on a slight grade to facilitate removal of excess surface water.

CAPABILITY UNIT IIw-4

This unit consists of deep, somewhat poorly drained, nearly level and gently sloping soils of the Milladore and Withee series. The surface layer is silty, and the substratum is loamy. Permeability is moderately slow, and available water capacity is high. Natural fertility is medium. The soils are seasonally saturated and are slow to warm up and dry in spring or after heavy rains. Water is held in the upper layers because of moderately slow permeability in the lower part of the subsoil and the substratum. Water ponds for a few days in spring on some of the nearly level areas. The hazard of water erosion is moderate on the gently sloping areas.

Most areas of the soils in this unit are used for such general farm crops as corn, small grain, and hay. Alfalfa does not grow well and is subject to winterkill on these soils unless the excess water is removed and adequate lime and fertilizer are applied. The soils of this unit are also suitable for pasture, woodland, or other less intensive uses.

Excess surface water can be removed from these soils by the use of surface drains and land smoothing. Diversions and waterways can be used to intercept and safely dispose of surface water flowing from higher lying areas. Contour stripcropping and diversions help to control erosion on the gently sloping soils, but the strips need to be established on a slight grade to aid in removing surface water.

CAPABILITY UNIT IIw-5

This unit consists of deep, nearly level, somewhat poorly drained soils of the Poskin series and deep, nearly level, poorly drained soils of the Rib series. These soils have a silty surface layer and are underlain by sand or by sand and gravel. Permeability is moderate in the upper layers and rapid in the substratum. Available water capacity is medium. Natural fertility is medium. These soils have a seasonal high water table. Water temporarily ponds in some of the lower lying areas during wet seasons.

Most of the acreage of the Poskin soils is used for corn, small grain, and hay, but some areas remain in native pasture or woodland. Some areas of Rib soils are used for general farm crops, but most are in native pasture or woodland. Unless the excess water is removed, alfalfa grows poorly and is subject to winterkill. The soils of this unit are also suitable for pasture, woodland, or other less intensive uses.

Excess surface water can be removed from these soils by surface drains. Land smoothing between the surface drains helps to eliminate depressions and allows more uniform removal of surface water. Deep open ditches help to remove the excess water from the root zone. Diversions and waterways can be used to intercept and dispose of surface water flowing from higher lying areas.

CAPABILITY UNIT IIw-13

This unit consists only of Alluvial land. This is moderately well drained and somewhat poorly drained, silty and sandy soil on flood plains. It has a seasonal high water table and is subject to flooding in spring and after heavy rains. Permeability ranges from rapid to slow, depending on the texture of the sediment. Available water capacity is medium. Natural fertility is medium.

Most areas are in pasture, woodland, or wildlife habitat, but a few of the better drained areas are used for corn.

Open ditches can be used to remove excess water from areas of this land type after floods. Dikes can be constructed in places to protect the soils from flooding.

CAPABILITY UNIT IIs-1

This unit consists of deep, well-drained, nearly level soils of the Antigo, Onamia, and Dunnville series. These soils have a silty or loamy surface layer and subsoil and are underlain by sand or sand and gravel. Permeability is moderate. Natural fertility is medium. Good tilth is easy to maintain, but growth of crops is sometimes hampered by lack of moisture during extended dry periods in summer.

Corn, small grain, and alfalfa or red clover-hay mixtures are the commonly grown crops. The soils are also suited to pasture, woodland, wildlife habitat, and other less intensive uses.

The soils in this unit respond well to irrigation and other intensive management practices. Adequate supplies of water for irrigation are generally available at relatively shallow depths.

CAPABILITY UNIT IIIe-1

This unit consists of deep, well-drained, sloping soils of the Eaupleine and Santiago series. The surface layer

is silty, and the subsoil is loamy. Permeability is moderate to moderately slow. Available water capacity is medium to high. Natural fertility is medium. Because the soils of this unit are sloping, runoff is medium and the hazard of water erosion is severe. Good tilth is easy to maintain under proper management.

Most of the acreage of the soils of this unit is used for such general farm crops as corn, small grain, and hay. If the soils are limed and fertilized, they are well suited to alfalfa-hay mixtures. They are also suited to less intensive uses such as pasture, woodland, or wildlife habitat.

Contour stripcropping and adding more years of meadow to the rotation help to control erosion. In some cases diversions and waterways can be used to divert excess runoff from higher lying areas.

CAPABILITY UNIT IIIe-2

This unit consists of moderately deep, well-drained, sloping, loamy soils of the Fenwood and Gale series. They have a silty surface layer and loamy subsoil and are underlain by bedrock at a depth of 20 to 40 inches. Permeability is moderate, and available water capacity is medium. Natural fertility is medium. Good tilth is easy to maintain under proper management. Because the soils in this unit are sloping, runoff is medium and the hazard of water erosion is severe.

The soils of this unit are used for such general farm crops as corn, small grain, and hay. Alfalfa-hay mixtures can be grown if the soils are limed and fertilized. The soils are also suited to such less intensive uses as pasture, woodland, and wildlife habitat.

Contour stripcropping and adding more years of meadow to the rotation help to control erosion. In some places diversions and waterways can be used to divert surface water flowing from higher lying areas, but the depth to bedrock interferes with these installations in other places.

CAPABILITY UNIT IIIe-3

This unit consists of shallow, well drained and moderately well drained, gently sloping, loamy soils of the Elkmound and Norgo series. These soils are underlain by bedrock at a depth of less than 20 inches. Permeability is moderate or moderately rapid, and available water capacity is low or very low. Natural fertility is low. Because of the slope and shallow depth to bedrock, the hazard of water erosion is severe. Crops grown on these soils are hampered by a lack of moisture during dry periods.

The soils in this unit are suited to corn, small grain, and hay. If limed and fertilized, the soils are well suited to alfalfa. They are also suited to pasture, woodland, or wildlife habitat.

In some places contour stripcropping can be used to control water erosion, but generally the shape and size of the areas of soils in this unit make this practice impractical. Rotations that have more years of meadow help to control erosion and to maintain the organic-matter content of the soils.

CAPABILITY UNIT IIIe-4

This unit consists of deep, moderately well drained and well drained, gently sloping, sandy soils of the Guenther and Humbird series. They have a loamy or clayey subsoil. Permeability is moderately slow to slow, and available water capacity is medium. Natural fertility is low. The hazards of water erosion and soil blowing are severe on these soils, and crops are hampered by a lack of moisture in dry periods.

The soils in this unit are used for such general farm crops as corn, small grain, and hay. If limed and fertilized, they are well suited to alfalfa-hay mixtures. The soils are also suited to pasture, woodland, and wildlife habitat. Rotations that have more years of meadow help to control erosion and maintain the organic-matter content of these soils.

CAPABILITY UNIT IIIe-6

This unit consists of moderately deep and deep, moderately well drained to well drained, sloping, loamy soils of the Hiles series and the Eaupleine series, clayey subsoil variant. The subsoil is clayey. Permeability is slow, and available water capacity is medium. Natural fertility is medium. Because these soils are sloping, runoff is medium, and the hazard of water erosion is severe.

Most of the acreage of the soils in this unit is cultivated. Corn, small grain, and hay are the main crops. Alfalfa can be grown if the soils are limed and fertilized. These soils are also suited to pasture, woodland, and wildlife habitat.

Contour stripcropping and adding more years of hay to the rotation are the principal erosion-control practices used on the soils in this unit. In some places diversions and waterways can be used to intercept and dispose of surface water flowing from higher lying areas.

CAPABILITY UNIT IIIe-8

Rietbrock silt loam, 6 to 12 percent slopes, is the only soil in this unit. This is a moderately deep, somewhat poorly drained, sloping, loamy soil that is underlain by bedrock at a depth of 3 to 5 feet. Permeability is moderate, and available water capacity is medium. Natural fertility is medium. Because this soil is sloping, the hazard of water erosion is severe. Wetness is a slight hazard because of seepage from higher lying soils.

Most of the acreage of this soil is in pasture or woodland, but some areas are used for corn, small grain, and hay. The soil is also suited to wildlife habitat.

Water management is needed for good crop production. Diversions and waterways can be used to intercept and dispose of runoff from higher lying soils. Contour stripcropping, along with diversions, established on a slight grade help to control erosion and to remove excess surface water.

CAPABILITY UNIT IIIw-3

This unit consists of moderately deep and deep, poorly drained, nearly level, loamy soils of the Altdorf, Marshfield, Vesper, and Sherry series. Permeability is moderately slow or slow, and available water capacity is medium or high. Natural fertility is medium. A seasonal high water table is near the surface during spring and part of summer, and therefore wetness is a severe limitation to the use of these soils. The soils are subject to ponding in wet seasons.

If properly drained, the soils in this unit can be used for corn, small grain, and hay. Ladino, alsike, and red clovers are better suited to these soils than alfalfa. These soils are also well suited to pasture, wildlife habitat, and some types of woodland.

Surface drainage and land smoothing are the main practices that are used to remove excess surface water. In some places diversions and waterways can be used to intercept and dispose of surface water flowing from higher lying areas.

CAPABILITY UNIT IIIw-6

This unit consists of moderately deep and deep, somewhat poorly drained, nearly level and gently sloping, loamy and sandy soils of the Merrillan and Point series. They are underlain by loamy material at a depth of less than 40 inches. Permeability is moderate in the upper part of the profile and moderately slow in the lower part. Available water capacity is low. Natural fertility is low to medium. These soils are severely limited by a seasonal high water table at a depth of less than 3 feet.

Under proper water management, the soils of this unit are suited to corn, small grain, and hay. Water management is needed for good crop growth. Because of the seasonal high water table, alsike, ladino, and red clovers are better suited than alfalfa. These soils are also suited to pasture, woodland, and wildlife habitat.

Surface drainage and land smoothing are the main practices used to remove excess surface water.

CAPABILITY UNIT IIIs-4

This unit consists of moderately deep and deep, well-drained, nearly level to sloping, loamy soils of the Dunnville and Eleva series. These soils have a loamy surface layer and a sandy substratum. Permeability is moderate to moderately rapid, and available water capacity is low to medium. Natural fertility is low to medium. These soils are severely limited by the lack of moisture in summer, so that in most years production is reduced. If these soils are cultivated, there are hazards of soil blowing and water erosion.

The soils in this unit are suited to corn, small grain, and hay. Alfalfa can be grown if the soils are limed and fertilized. These soils are well suited to pasture, woodland, and wildlife habitat.

Wind stripcropping, planting trees, and establishing shelterbelts help to control soil blowing on these soils. Contour stripcropping can be used to control water erosion on gently sloping and sloping soils. Applying manure, green manuring, and planting cover crops help to maintain the organic-matter content of these soils. Crops grown on these soils respond well to irrigation, but adequate supplies of water generally are not available near the Eleva soils. Adequate water supplies are available near the Dunnville soils.

CAPABILITY UNIT IVe-1

This unit consists of moderately deep and deep, well-drained, moderately steep, silty soils of the Fenwood and Santiago series. Permeability is moderate, and available water capacity is medium to high. Natural fertility is medium.

The soils in this unit are suited to corn, small grain, and hay They are also well suited to pasture, woodland, and wildlife habitat. If limed and fertilized, they are suited to alfalfa. The hazard of water erosion is very severe because of steep slopes and rapid runoff.

Contour stripcropping and diversions help to control erosion. With stripcropping and good management, row crops can be grown in the rotation. In some places diversions and waterways can be used to intercept and dispose of runoff from higher lying areas.

CAPABILITY UNIT IVe-3

This unit consists of shallow, well-drained, sloping, loamy soils of the Elkmound and Norgo series. These soils have a loamy surface layer underlain by sandstone bedrock at a depth of less than 20 inches. Permeability is moderate or moderately rapid, and available water capacity is low or very low. Natural fertility is low. Because runoff is rapid and the bedrock is at a shallow depth, the hazard of water erosion is severe.

The soils of this unit are suited to corn, small grain, and hay. They are also suited to pasture, woodland, and wildlife habitat.

Contour stripcropping and diversions help to control erosion on these soils. If stripcropping is established, row crops can be grown in the rotation. In some places diversions and waterways can be used to intercept and dispose of runoff from higher lying areas.

CAPABILITY UNIT IVw-3

This unit consists of moderately deep and deep, poorly drained and very poorly drained, nearly level soils of the Dancy, Mann, and Veedum series. Dancy soils have a sandy surface layer and a loamy substratum. Mann and Veedum soils have a silty surface layer and a loamy substratum. Permeability is moderate to slow, and available water capacity is medium to high. Natural fertility is medium or low. A seasonal high water table is at a depth of less than 1 foot during wet seasons. Ponding on the surface occurs in spring or after heavy rains. Wetness is a very severe limitation. Because of their low position, the soils are subject to frost late in spring and early in fall.

If drained, the soils of this unit are suited to small grain and hay. Alsike, red, and ladino clovers are better suited to these soils than other legumes, because of the high water table and ponding. Corn is rarely grown on these soils because of the hazard of frost. The soils are also suited to pasture, some types of woodland, and wildlife habitat.

Surface drainage and land smoothing are effective in controlling the excess surface water. Open ditches can be used to help to control the water table in Dancy soils, but they are difficult to maintain because the upper part of the profile is sandy.

CAPABILITY UNIT IVw-5

This unit consists of deep, somewhat poorly drained and poorly drained, nearly level, sandy soils of the Au Gres, Meehan, Elm Lake, and Newson series. Permeability is rapid, and available water capacity is very low and low. Natural fertility is low. These soils have a seasonal high water table between the surface and a depth of 3 feet during spring and part of summer. Some areas pond after heavy rains. Wetness is a very

severe limitation. Frost is a moderate hazard because of the low positions.

Most of the acreage of these soils is in woodland, but some areas are used for such general farm crops as corn, small grain, and hay. The soils are also suited to pasture and wildlife habitat.

Under good management these soils can be cropped. Open-ditch drainage helps to lower the water table. If these soils are drained and cultivated, the hazard of soil blowing is severe. Establishing shelberbelts, planting trees, and wind stripcropping help to control soil blowing.

CAPABILITY UNIT IVw–9

This unit consists of deep, very poorly drained, nearly level, organic soils of the Cathro, Dawson, Markey, and Rifle series. Rifle soils have more than 50 inches of organic material overlying mineral material, and Cathro soils have 16 to 50 inches of organic material overlying loamy and sandy mineral material. These soils are subject to ponding and have a seasonal high water table at a depth of less than 1 foot. Permeability is moderately rapid, and available water capacity is high or very high. Natural fertility is low.

Because of the seasonal high water table and the hazard of frost late in spring and early in fall, these soils are very severely limited for cultivated crops. Additional factors that affect the use of these soils if they are drained are the need to control soil blowing and subsidence, or shrinkage. Most of the acreage of the soils of this unit remain in their natural state and are used as wildlife habitat, but small areas are in cranberries, woodland, or pasture.

Water management is needed if these soils are to be cultivated. Open ditches can be used to lower the water table. Shelterbelts at right angles to the prevailing winds help to control soil blowing. Subsidence can be reduced by maintaining the water table just below the root zone. This also provides subsurface irrigation in dry seasons. Sprinkler irrigation can be used to reduce the hazard of frost during the growing season. If these soils are intensively managed, they are well suited to vegetables, specialty crops, corn, and sod crops.

CAPABILITY UNIT IVs–3

This unit consists of deep, excessively drained and moderately well drained, nearly level and gently sloping, sandy soils of the Nymore, Plainfield, Croswell, and Friendship series. The Nymore and Plainfield soils are excessively drained. The Croswell and Friendship soils have a fluctuating water table at a depth of 3 to 5 feet during part of the year. Permeability is rapid, and available water capacity is very low or low. Natural fertility is low to medium.

Some areas of the soils of this unit are used for general farm crops, such as corn, small grain, and hay. Because of the very low or low available water capacity and the serious hazard of soil blowing in cultivated areas, these soils are severely limited for cultivated crops. If these soils are limed and fertilized, they are suited to alfalfa. If irrigation and other practices are used, these soils are well suited to specialized vegetable crops such as potatoes, snap beans, and sweet corn. They are also suited to pasture, woodland, and wildlife habitat. Most of the acreage of these soils is in native jack pines-oak forest, and large areas that once were cultivated have been planted to Norway pine or Scotch pine for pulpwood and Christmas trees.

The soils of this unit respond well to irrigation. Adequate water generally is available at economical pumping depths. Establishing shelterbelts and stripcropping perpendicular to the prevailing winds help to control soil blowing. Plowing under cover crops and green-manure crops helps to maintain organic-matter content.

CAPABILITY UNIT Vw–14

This unit consists of Alluvial land, wet. This is a deep, poorly drained and very poorly drained, sandy and loamy soil on nearly level flood plains. Permeability ranges from rapid to slow, depending on the texture of the material. Available water capacity is medium. Natural fertility is medium. The water table is at a depth of less than 1 foot during spring and part of summer. The soil is subject to frequent overflow from adjacent streams.

This land type is very severely limited for cultivation by frequent flooding and the high water table. Protecting these soils from flooding and removing excess water are generally impractical. The soils are suited to pasture, woodland, and wildlife habitat.

CAPABILITY UNIT Vw–16

The only soil in this unit is Sherry stony silt loam, which has slopes of 0 to 2 percent. This is a moderately deep, poorly drained, nearly level, very stony soil in upland drainageways and depressions. So many stones are on the surface that the use of tillage equipment or removal of the stones is impractical. This soil has a water table that is at or near the surface during part of the year, and it ponds in wet seasons.

The soil is well suited to pasture, woodland, and wildlife habitat.

CAPABILITY UNIT VIe–3

This unit consists of shallow, well-drained, moderately steep, eroded, loamy soils of the Elkmound and Norgo series. They are underlain by sandstone bedrock at a depth of less than 20 inches. Permeability is moderate or moderately rapid, and available water capacity is low or very low. Natural fertility is low.

These soils are severely limited for cultivation by rapid runoff and the shallow depth over bedrock. They are suited to pasture, woodland, and wildlife habitat. If these soils are used for pasture, controlling grazing and renovating the sod help to control erosion. Woodland and wildlife areas need to be protected from fire and grazing.

CAPABILITY UNIT VIs–6

This unit consists of moderately deep, well-drained, gently sloping to moderately steep stony silt loams of the Fenwood series. Permeability is moderate, and available water capacity is medium. Natural fertility is medium. These soils have so many stones on the surface that the use of tillage equipment or removal of the stones is impractical.

The use of these soils is limited to pasture, woodland, or wildlife habitat. Renovation of some areas of pas-

ture is feasible. Woodland and wildlife areas need protection from fire and grazing.

CAPABILITY UNIT VIs–9

This unit consists of moderately deep and deep, excessively drained, nearly level to steep, sandy soils of the Plainbo and Plainfield series. Plainfield soils formed in deep sandy outwash, and Plainbo soils are underlain by sandstone bedrock at a depth of 2 to 4 feet. Permeability is rapid, and available water capacity is low to very low. Natural fertility is low.

These soils are very severely limited for cultivated crops by the very low available water capacity. In most years crop growth is seriously restricted by a lack of moisture. If these soils are cultivated, the hazard of soil blowing is severe. The sloping soils are subject to water erosion. The soils of this unit, except the steeply sloping soils, are suitable for permanent pasture if grazing is controlled. They are also suited to woodland and wildlife habitat. Woodland and wildlife areas need to be protected from fire and grazing.

If irrigation, adequate lime and fertilizer, shelter-practices are used, the nearly level or gently sloping soils in this unit are suited to potatoes, sweet corn, green vegetables, and general farm crops.

CAPABILITY UNIT VIIw–10

Greenwood peat is the only soil in this unit. This is a deep, very poorly drained, organic soil in large basins or depressions. Permeability is moderately rapid, and available water capacity is very high. Natural fertility is low. This soil is very strongly acid. The water table is at or near the surface for part of the year. Low natural fertility, very strong acidity, a severe frost hazard, and the need for drainage limit the use of this soil for cultivated crops.

If an adequate frost-protection (sprinkler) system is installed and if the soil is properly drained, limed, and fertilized, it is suited to such high-value crops as vegetables, but production costs are very high. Some areas are used for cranberries, to which the soils are well suited. Native sphagnum moss is harvested in some areas. This soil is well suited to wildlife habitat and is suitable for water storage.

CAPABILITY UNIT VIIIw–15

This unit consists of Marsh, which consists of deep, very poorly drained organic and mineral soils in depressions bordering lakes and streams. Water ponds most of the year, and drainage is not feasible. Vegetation consists of cattails, reeds, bulrushes, and other water-tolerant plants.

Marsh is suitable for wildlife habitat and recreation. In most places, level ditching improves wildlife habitat.

Predicted yields

Table 2 gives predicted average yields per acre for the farm crops commonly grown in Wood County. The predictions are based on interviews with farmers, on results obtained from Experimental Station test plots, and on observations made by soil scientists and other agricultural workers who are familiar with the soils and crops of the county. Irrigation was not considered in the predictions.

The development of new techniques may, in the future, increase the average yields over those shown, but little change is expected in the relative response of the different soils.

Yields shown in table 2 are predicted yields for the best management practical on the soils. These yields represent about what can be expected using the best knowledge, equipment, crop varieties, and methods known at present. Among the practices included in the best management are—

1. Applying lime and fertilizer according to soil-test recommendations for the kind of crop, the kind of soil, and the past history of the field.
2. Providing adequate drainage and, where needed, diverting excess surface water flowing from higher lying soils.
3. Installing and maintaining needed erosion–control practices.
4. Using timely and proper methods of seedbed preparation and seeding.
5. Controlling weeds and harmful insects.
6. Harvesting crops carefully and at the right time.

Yields from renovated pasture are about the same as the yields listed for alfalfa-brome hay. Hay yields are greatest if the hay is cut early and fed while green.

Woodland [2]

Wood County was covered with forest when the first settlers arrived. The northern half of the county supported a northern hardwood forest in which sugar maple, basswood, red maple, yellow birch, and red and white oak were dominant. Some red and white pine and hemlock were scattered throughout the stand. The southern half of the county, on the plain of Glacial Lake Wisconsin, supported a pine subclimax forest of jack, white, and red pine and northern pin oak (*3*).

The latest published inventory of the forest resources of Wood County gives a forested area of about 214,000 acres, or 41 percent of the County (*17*). Of this acreage, about 185,000 acres, or 36 percent of the county, was considered commercial forest. Nearly 60,000 acres of this commercial forest land was considered poorly stocked or unstocked. Subsequent reforestation has stocked part of this acreage, but a considerable amount remains to be planted.

A large acreage is used for Christmas trees. Most growers produce high-quality sheared Scotch pine and lesser amounts of other species.

Windbreak planting is not of primary importance. The greatest hazard of soil blowing is present on the sandy soils, and on these, row-crop farming is on the decline.

Woodland suitability groups

The soils of Wood County have been placed in woodland suitability groups to assist owners in planning the use of their soils for wood crops. Each group is made up of soils that are suited to the same kinds of trees; that need approximately the same management when the vegetation on them is similar; and that have about the same potential productivity.

[2] By GEORGE W. ALLEY, forester, Soil Conservation Service.

TABLE 2.—*Predicted average yields per acre of principal crops*

[Absence of a 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 [1]	Alfalfa-brome hay [2]	Blue-grass pasture
	Grain	Silage			
	Bu	*Tons*	*Bu*	*Tons*	*AUD* [3]
Alluvial land	60	12	60	3.5	100
Alluvial land, wet					
Altdorf silt loam	75	12.5	60	3.5	80
Antigo silt loam, 1 to 3 percent slopes	80	13	80	3.5	100
Au Gres loamy sand	50	8	55	2.5	40
Cathro mucky peat	80	15			75
Croswell loamy sand, 0 to 3 percent slopes	50	8	40	2.5	40
Dancy sandy loam			60	3.5	80
Dawson mucky peat					80
Dawson peat					80
Dolph silt loam	75	12.5	65	3.5	130
Dunnville loam, 0 to 3 percent slopes	70	12	60	2.75	100
Dunnville sandy loam, 0 to 3 percent slopes	70	12	50	2.5	70
Eaupleine fine sandy loam, sandy subsoil variant, 2 to 6 percent slopes	70	12	65	3.0	100
Eaupleine silt loam, 2 to 6 percent slopes	85	14	75	4.0	130
Eaupleine silt loam, 6 to 12 percent slopes	80	13	70	3.5	120
Eaupleine silt loam, clayey subsoil variant, 2 to 6 percent slopes	80	13	70	3.5	130
Eaupleine silt loam, clayey subsoil variant, 6 to 12 percent slopes	75	12	65	3.5	120
Eaupleine silt loam, silty subsoil variant, 2 to 6 percent slopes	90	15	75	4.0	130
Eleva sandy loam, 2 to 6 percent slopes	70	12	50	2.5	70
Eleva sandy loam, 6 to 12 percent slopes	70	12	50	2.5	60
Elkmound sandy loam, 2 to 6 percent slopes	65	11	50	2.25	60
Elkmound sandy loam, 6 to 12 percent slopes	65	11	50	2.25	60
Elkmound sandy loam, 12 to 20 percent slopes, eroded				2.0	60
Elm Lake loamy sand	60	10	45	2.5	50
Fenwood silt loam, 2 to 6 percent slopes	85	14	75	3.75	100
Fenwood silt loam, 6 to 12 percent slopes	70	12	60	3.0	95
Fenwood silt loam, 12 to 20 percent slopes	65	11	55	3.0	90
Fenwood stony silt loam, 2 to 6 percent slopes					
Fenwood stony silt loam, 6 to 12 percent slopes					
Fenwood stony silt loam, 12 to 20 percent slopes					
Friendship loamy sand, 1 to 3 percent slopes	50	8	40	2.5	40
Gale silt loam, 2 to 6 percent slopes	90	15	65	3.5	100
Gale silt loam, 6 to 12 percent slopes	85	14	60	3.5	90
Greenwood peat					70
Guenther loamy sand, 2 to 6 percent slopes	70	12	50	2.5	60
Hiles silt loam, 2 to 6 percent slopes	85	14	60	3.5	120
Hiles silt loam, 6 to 12 percent slopes	75	12	55	3.0	120
Humbird loamy sand, 2 to 6 percent slopes	50	8	40	2.25	50
Humbird sandy loam, 2 to 6 percent slopes	60	11	45	2.5	50
Kert silt loam, 0 to 3 percent slopes	80	13	60	3.5	130
Mann silt loam			65	4.0	100
Marathon silt loam, 2 to 6 percent slopes	80	13	70	3.5	100
Markey mucky peat	80	15			80
Marsh					
Marshfield silt loam	70	12	60	3.5	100
Meehan loamy sand	50	9	45	2.25	40
Merrillan sandy loam, 1 to 3 percent slopes	80	12	55	2.5	80
Milladore silt loam	90	15	80	4.0	130
Mosinee loam, 2 to 6 percent slopes	70	12	60	2.5	100
Newson loamy sand	60	10	45	2.5	40
Norgo silt loam, 2 to 6 percent slopes	75	13	60	3.0	80
Norgo silt loam, 6 to 12 percent slopes, eroded	70	12	55	2.75	80
Norgo silt loam, 12 to 20 percent slopes, eroded				2.5	70
Nymore loamy sand, 0 to 2 percent slopes	50	8	40	2.25	40
Nymore loamy sand, red subsoil, 0 to 2 percent slopes	50	8	40	2.25	40
Nymore loamy sand, red subsoil, 2 to 6 percent slopes	45	7.5	40	2.25	40
Onamia loam, 1 to 3 percent slopes	75	12.5	75	3.0	100
Plainbo sand, 2 to 12 percent slopes	40	7	35	1.5	30
Plainbo sand, 12 to 30 percent slopes					
Plainfield loamy sand, 0 to 2 percent slopes	45	7.5	35	2.25	35
Plainfield loamy sand, 2 to 6 percent slopes	45	7.5	35	2.25	30
Plainfield sand, 0 to 2 percent slopes				1.5	30
Plainfield sand, 2 to 6 percent slopes				1.5	30
Plainfield sand, 6 to 12 percent slopes				1.25	25
Plainfield sand, 12 to 35 percent slopes					
Point loamy sand, 2 to 6 percent slopes	85	12	65	3.5	100
Poskin silt loam	80	13	70	3.5	150

TABLE 2.—*Predicted average yields per acre of principal crops*—Continued

Soil	Corn		Oats [1]	Alfalfa-brome hay [2]	Blue-grass pasture
	Grain	Silage			
	Bu	*Tons*	*Bu*	*Tons*	*AUD* [3]
Rib silt loam	75	11	65	3.5	120
Rietbrock silt loam, 2 to 6 percent slopes	80	13	70	4.0	130
Rietbrock silt loam, 6 to 12 percent slopes	70	11	60	3.5	120
Rifle mucky peat	----------	17	----------	----------	60
Rifle peat	----------	17	----------	----------	60
Santiago silt loam, 2 to 6 percent slopes	85	14	75	4.0	130
Santiago silt loam, 6 to 12 percent slopes	80	13	70	3.75	120
Santiago silt loam, 12 to 20 percent slopes, eroded	70	12	65	3.0	110
Santiago silt loam, clayey substratum, 2 to 6 percent slopes	85	14	75	4.0	130
Sherry silt loam	70	12	60	3.5	80
Sherry stony silt loam	----------	----------	----------	----------	----------
Veedum silt loam	----------	----------	60	3.5	80
Vesper silt loam	80	13	65	3.5	80
Withee silt loam, 0 to 2 percent slopes	80	13	70	3.75	130
Withee silt loam, 2 to 6 percent slopes	80	13	70	3.75	130

[1] Yields are for oats seeded with a grass-legume mixture. Higher yields can be obtained, but a poorer stand of grass-legume seeding usually results.

[2] Average annual yields for hay cut from first- and second-year stands.

[3] Animal-unit-days, a term used to indicate the carrying capacity of pasture. It is the number of animal units (1,000 pounds live weight) grazed on a pasture multiplied by the number of days the herd can be kept on the pasture without damage to the sod.

Each woodland group is identified by a three-part symbol, such as 2d1 or 3r2. The first part of the symbol (woodland suitability class), always a number, indicates relative potential productivity of the soils in the group: 1 indicates high; 2, moderately high; 3, moderate; 4, moderately low; 5, low; and 6, unproductive.

The foregoing ratings (classes) are based on growth potential expressed as site index, which is the average height of dominant and codominant trees of a given species at the age of 50 years. The site indices for some of the more important species and soils have been measured, and the others are estimated from measurements made on similar soils and species.

Site indices are based on recognized site index curves for red oak (*8*), sugar maple (*4*), red maple (*5*), jack pine (*6*), red pine (*9*), white pine (*12*), northern pin oak (*8*), aspen (*7*), tamarack (*10*), and northern white cedar (*11*). Annual yields for tree species were estimated from yields based on site indices for upland oaks (*14*) and the above listed references.

The second part of the symbol identifying a woodland group is a small letter. This letter (subclass) indicates an important soil property that imposes a slight to severe limitation in managing the soils of the group for wood crops. Definitions of the subclass are—

Subclass w (excessive wetness): Soils in which excessive water, either seasonally or all year, significantly limits woodland use or management. These soils have restricted drainage, a high water table, or a hazard of overflow that adversely affects either stand development or management.

Subclass d (restricted rooting depth): Soils restricted or limited for woodland use or management by a restricted root zone. These soils are shallow to hard rock, hardpan, or other layers that restrict roots.

Subclass s (sandy soils): Dry, sandy soils that have little or no textural B horizon and therefore are moderately to severely restricted or limited for woodland use or management. These soils impose equipment limitations, have low available water capacity, and normally are low in available plant nutrients.

Subclass r (relief or slope steepness): Soils restricted or limited for woodland use or management by steepness of slope.

Subclass o (slight or no limitation): Soils not significantly restricted or limited for woodland use or management.

The third part of the symbol (woodland suitability group) indicates the degree of hazard or limitation to be considered in management.

The numerals 1, 2, and 3 involve slope factors and apply to subclasses *d*, *s*, *r*, and *o*.

The numeral *1* indicates that the slopes are less than 12 percent and, therefore, that the hazard of erosion and equipment limitations are generally slight.

The numeral *2* indicates that the slopes are between 12 and 30 percent and, therefore, that the hazard of erosion and equipment limitations are moderate to severe, depending on the subclass involved.

The numeral *3* indicates that the slopes are more than 30 percent and, therefore, that the hazard of erosion and equipment limitations are severe.

The numerals 4, 5, and 6 involve soil factors and apply only to subclass *w*.

The numeral *4* indicates deep, poorly drained to somewhat poorly drained, sandy soils.

The numeral *5* indicates poorly drained to somewhat poorly drained soils that have a loamy or clay subsoil.

The numeral *6* indicates deep, organic soils.

The hazards or limitations that affect management of soils for woodland in Wood County are equipment

TABLE 3.—*Productivity and limitations of the soils for woodland*

Woodland group and mapping units	Potential productivity				Suitable species for reforestation	Equipment limitations	Hazard of erosion	Seedling mortality
	Tree species	Average site index	Number of plots	Yearly growth				
				Fbm per acre				
Group 1s1: GuB.	Northern red oak	70	2	250	Red pine, eastern white pine.	Slight	Slight	Slight.
Group 1r2: SaD2.	Northern red oak	70	(1)	250	Red pine, eastern white pine.	Moderate	Moderate	Slight where slopes face north and east; moderate where slopes face south and west.
	Sugar maple	65	(1)	100				
Group 1o1: SaB, SaC, SbB, WeA, WeB.	Northern red oak	70	(1)	250	Red pine, eastern white pine, white spruce.	Slight	Slight	Slight.
	Sugar maple	65	(1)	100				
Group 2r2: FeD, FfD.	Northern red oak	65	(1)	220	Red pine, eastern white pine.	Moderate	Moderate	Slight where slopes face north and east; moderate where slopes face south and west.
	Sugar maple	62	(1)	95				
Group 2o1: Af, AnA, EaB, EaC, EbB, EcB, EdB, EdC, FeB, FeC, FfB, FfC, GaB, GaC, HsB, HsC, KeA, MbB, OnA, Ps.	Northern red oak	70	5	250	Red pine, eastern white pine, white spruce.	Slight	Slight	Slight.
	Sugar maple	63	1	100				
Group 3w4: Au, Da, Mh.	Jack pine	60	(1)	95	Jack pine, poplar species.	Slight	Slight	Slight.
Group 3w5: Mf, Rb, Sh, Ss.	Northern red oak	60	(1)	190	White spruce, eastern white pine, soft maple.	Slight	Slight	Moderate: plant competition.
	Red maple	60	1	80				
Group 3d1: EkB, EkC, HuB, HwB, MsB, NoB, NoC2.	Northern red oak	56	3	165	Red pine, eastern white pine.	Slight	Slight	Slight.
	Jack pine	60	(1)	95				
Group 3d2: EkD2, NoD2.	Northern red oak	50	5	130	Red pine, eastern white pine.	Moderate	Moderate	Moderate.
Group 3s1: CrA, FrA, NyA, NzA, NzB, PgA, PgB.	Red pine	55	(1)	300	Red pine, eastern white pine, jack pine.	Slight	Slight	Slight.
	Jack pine	60	(1)	95				
	White pine	50	(1)	220				
	Northern pin oak	47	4	115				
Group 3o1: Aa, Do, DvA, DwA, EeB, EeC, MpA, Mr, PoB, ReB, ReC.	Northern red oak	59	6	185	Red pine, eastern white pine, white spruce.	Slight	Slight	Slight.
	Red maple	61	3	80				
Group 4w4: Em, Ne.	Golden aspen	55	(1)	120	Poplar species, red maple.	Moderate	Slight	Moderate.
	Eastern white pine	48	(1)	220				
Group 4w5: Ab.	Red maple	50	(1)	70	Red maple, white ash, poplar species.	Moderate	Slight	Moderate.
Group 4s1: PbB, PfA, PfB, PfC.	Eastern white pine	48	(1)	250	Red pine, eastern white pine, jack pine.	Slight	Slight	Slight.
	Red pine	48	1	200				
	Jack pine	50	1	60				

TABLE 3.—*Productivity and limitations of the soils for woodland*—Continued

Woodland group and mapping units	Potential productivity				Suitable species for reforestation	Equipment limitations	Hazard of erosion	Seedling mortality
	Tree species	Average site index	Number of plots	Yearly growth				
				Fbm per acre				
Group 4s2: PbD, PfE.	Eastern white pine	45	(1)	220	Red pine, eastern white pine, jack pine.	Moderate	Moderate	Moderate where slopes face north and east; severe where slopes face south and west.
	Red pine	45	(1)	220				
	Jack pine	45	(1)	60				
Group 5w5: Ma, Ve, Vs.	Red maple	50	(1)	20	Red maple, poplar species.	Severe	Slight	Severe.
Group 6w5: Md. Unsuitable for forestry.								
Group 6w6: Db, Dc, Gr. Unsuitable for forestry.								
Organic soils:[2] Ca, Mc, Rf, Rg.	Northern white-cedar	35	3	50	Soils unsuitable for planting.	Severe	Slight	Severe.
	Tamarack	51	2	100				

[1] No test plots. Productivity estimated.

[2] These soils are so variable in their response to forest management that they are not included in this ordination system. In addition to the species listed, these soils support stands of red maple, silver maple, American elm, or other water-tolerant species. Rate of growth of all species is frequently low and quite variable. Occasionally red maple, silver maple, and white ash make rapid growth on these soils.

limitations, hazard of erosion, and seedling mortality. Table 3 gives ratings for these hazards or limitations for each woodland suitability group. These ratings are always *slight, moderate,* or *severe.*

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 Wood County, soil characteristics that have the most limiting effect are excessive soil wetness, slope, and texture of the surface layer. The limitation is *slight* if no restriction is on the kind of equipment or the time of year it is used; *moderate* if use of equipment is restricted for less than 3 months of the year, and *severe* if special equipment is needed and its use is restricted for more than 3 months of the year.

Erosion hazard refers to the potential hazard of soil losses in woodland. The hazard is *slight* if expected soil losses are small; *moderate* if some soil losses are expected and care is needed during logging and construction to reduce losses; and *severe* if special methods of operation are necessary to prevent excessive soil losses.

Seedling mortality refers to the expected degree of mortality of planted seedlings as influenced by the soil. Considered in the ratings are excessive soil wetness, hazard of flooding, slope and aspect, texture, structure, and plant competition. Normal rainfall, good planting stock, and proper planting are assumed. The rating is *slight* if the expected loss is less than 25 percent of the planted seedlings; *moderate* if 25 to 50 percent; and *severe* if more than 50 percent.

Landscaping and windbreaks

This section gives information about some of the trees, shrubs, and vines used in landscaping sites for homes, schools, industry, and recreational areas. Also, it provides information on species suitable for windbreaks around farmsteads or open fields.

A significant acreage in Wood County is subject to soil blowing if it is farmed. Sandy soils of the Croswell, Friendship, Nymore, and Plainfield series need protection of windbreaks and careful management to reduce soil losses. Red and white pine are suitable for field windbreaks on these soils.

Height growth of windbreaks has been measured on some important soils in Wisconsin. On Plainfield soils, red pine range from 33 to 45 feet in height at 25 years of age. White pine growth was about the same.[3]

Different tree and shrub species vary widely in their suitability for different soils and site conditions. The soils in the county have been placed in four tree and shrub groups, mainly on the basis of the degree and length of time that the soil is water saturated and on the available water capacity.

The soils in a specific group have similar suitabilities for tree, shrub, and vine plantings. The tree and shrub

[3] Windbreak-Soil Site Study, Soil Conservation Service, Madison, Wisconsin, 1972. [Unpublished]

TABLE 4.—*Tree*

[The letters in parentheses following each species indicate the general height and shape of that species at maturity. The letters the oblique slash indicate shape: C, columnar; O, oval; P, pyramidal; Pe, pendulous; and R, round. Dawson

Tree and shrub groups, description of soils, soil series, and mapping units	Species suitable for—			
	Shade trees		Street trees	
	Sunny sites	Partial shade	Sunny sites	Partial shade
1. Moderately deep to deep, moderately well drained and well drained, medium-textured soils that have moderate to high available water capacity. Antigo: AnA; Dunnville: DvA, DwA; Eaupleine: EaB, EaC; Eaupleine, clayey subsoil variant: EdB, EdC; Eaupleine, sandy subsoil variant: EbB; Eaupleine, silty subsoil variant: EcB; Eleva: EeB, EeC; Fenwood: FeB, FeC, FeD, FfB, FfC, FfD; Gale: GaB, GaC; Guenther: GuB; Hiles: HsB, HsC; Marathon: MbB; Onamia: OnA; Santiago: SaB, SaC, SaD2, SbB.	American beech (L/O), sugar maple (L/O), red maple (M/O), red oak (L/R), white oak (L/R), basswood (L/O), hackberry (M/R), white ash (L/O), sycamore (L/O), bur oak (L/R), Norway maple (M/R), silver maple (L/O), thornless honeylocust (M/O).	American beech (L/O), sugar maple (L/O), red maple (M/O), red oak (L/R), hackberry (M/R), white ash (L/O), basswood (L/O).	Norway maple (M/R), southern pin oak (M/P), thornless honeylocust (M/O), basswood (L/O), white ash (L/O), sugar maple (L/O), hackberry (M/R), red maple (M/O).	Norway maple (M/P), white ash (L/O), basswood (L/O), sugar maple (L/O).
2. Somewhat excessively drained to excessively drained, coarse-textured or shallow soils that have low available water capacity. Croswell: CrA; Elkmound: EkB, EkC, EkD2; Friendship: FrA; Humbird: HuB, HwB; Mosinee: MsB; Norgo: NoB, NoC2, NoD2; Nymore: NyA, NzA, NzB; Plainbo: PbB, PbD; Plainfield: PfA, PfB, PfC, PfE, PgA, PgB.	Bur oak (L/R), hackberry (M/R), black oak (L/R), silver maple (L/O), green ash (M/O), thornless honeylocust (M/O).	Hackberry (M/R).	Green ash (M/O), white ash (L/O), hackberry (M/R), thornless honeylocust (M/O).	Hackberry (M/R).
3. Somewhat poorly drained and poorly drained mineral soils. Alluvial land: Aa, Ab; Altdorf: Af; Au Gres: Au; Dancy: Da; Dolph: Do; Elm Lake: Em; Kert: KeA; Mann: Ma; Marshfield: Mf; Meehan: Mh; Merrillan: MpA; Milladore: Mr; Newson: Ne; Point: PoB; Poskin: Ps; Rib: Rb; Rietbrock: ReB, ReC; Sherry: Sh, Ss; Veedum: Ve; Vesper: Vs; Withee: WeA, WeB.	Swamp white oak (L/R), hackberry (M/R), red maple (M/O), basswood (L/O), green ash (M/O), white ash (L/O), silver maple (L/O), cottonwood (L/O).	Swamp white oak (L/R), hackberry (M/R), rep maple (M/O), basswood (L/O), green ash (M/O), white ash (L/O).	Green ash (M/O), basswood (L/O), red maple (M/O).	Green ash (M/O), basswood (L/O), red maple (M/O).
4. Poorly drained organic soils. Cathro: Ca; Markey: Mc; Rifle: Rf, Rg.	Silver maple (L/O), red maple (M/O).	Red maple (M/O).	Red maple (M/O), laurel willow (M/O).	None.

group for a specific soil can be found by referring to the "Guide to Mapping Units" at the back of this survey.

Table 4 lists trees suitable for specified uses on soils in the four tree and shrub groups. Table 5 gives the uses, growth form, and esthetic value of shrubs and vines. Plants listed in the tables are only a partial list of the plants suited to soils in the county. Many of the plants serve a dual purpose of landscaping and of providing food and cover for wildlife.

Wildlife[4]

The soils of Wood County vary widely in physical and chemical characteristics that affect the kinds and amounts of vegetation and wildlife that the soils will support. There is a direct relationship between soil fertility and wildlife numbers and vigor.

Food and cover plantings on lands used primarily or secondarily for wildlife are expected to encourage

[4] By LAVERNE C. STRICKER, biologist, Soil Conservation Service.

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preceding the oblique slash indicate height: S, less than 30 feet; M, 30 to 60 feet; and L, more than 60 feet. The letters following soils (Db, Dc), Greenwood soils (Gr), and Marsh (Md) are not suitable for landscape or windbreak planting]

Species suitable for—Continued					
Lawn trees		Hedges and screens		Windbreaks	
Sunny sites	Partial shade	Sunny sites	Partial shade	Sunny sites	Partial shade
Flowering crab (S/R), mountain ash (S/O), blue beech (S/R), paper birch (M/O), river birch (M/O), Russian-olive (S/R), southern pin oak (M/P), serviceberry (S/R), horse chestnut (L/R), Norway spruce (L/P), red pine (L/P), white pine (L/P), white spruce (M/P), black cherry (L/O), blue spruce (L/P), hawthorn (S/R).	Blue beech (S/P), serviceberry (S/R), white pine (L/P), white spruce (M/P), blue spruce (L/P), Norway spruce (L/P).	Redcedar (S/P), white-cedar (M/C, P), white pine (L/P), white spruce (M/P), Lombardy poplar (L/C), Russian-olive (S/R), upright yew (S/P).	White-cedar (M/C), white pine (L/P), white spruce (M/P), upright yew (S/P).	White spruce (M/P), white-cedar (M/C, P), white pine (L/P), red pine (L/P), Norway spruce (L/P).	White-cedar (M/C, P), white pine (L/P), white spruce (M/P).
Flowering crab (S/R), paper birch (M/O), redcedar (S/P), white pine (L/P), white spruce (M/P), red pine (L/P), Russian-olive (S/R).	White pine (L/P), white spruce (M/P).	Redcedar (S/P), Russian-olive (S/R), red pine (L/P), white pine (L/P), upright yew (S/P), white spruce (M/P).	Upright yew (S/P), white pine (L/P), white spruce (M/P).	Red pine (L/P), white pine (L/P), redcedar (S/P).	White pine (L/P).
White spruce (M/P), paper birch (M/O), mountain ash (S/O), weeping willow (M/Pe), white-cedar (M/P), river birch (M/O).	White spruce (M/P), mountain ash (S/O).	White-cedar (M/C), white spruce (M/P), Lombardy poplar (L/C), laurel willow (M/O).	White-cedar (M/C), white spruce (M/P).	White-cedar (M/C), white spruce (M/P), white pine (L/P).	White-cedar (M/C), white spruce (M/P).
White-cedar (M/C), white spruce (M/P), weeping willow (M/Pe).	White-cedar (M/C), white spruce (M/P).	White-cedar (M/C), laurel willow (M/O).	White-cedar (M/C).	Laurel willow (M/O), poplar selections (L/P), tree lilac (S/O), white-cedar (M/C).	White-cedar (M/C).

wildlife production. Wildlife benefits from such soil and water conservation practices as stripcropping, fertilization, and tree planting on lands used for pasture, woodland, and other purposes.

Most of the major soils are suitable for fairly intensive farming and have high potential for wildlife habitat. They are used mainly for purposes other than wildlife habitat.

The soils of Wood County have been placed in seven groups for wildlife interpretation purposes, according to a statewide system of grouping and identification. Of the nine groups in the statewide system, soils in groups 1, 2, 3, 4, 5a, 5b, and 6 are in Wood County.

The soils in groups 5a, 5b, and 6, which consist of somewhat poorly drained and poorly drained soils and organic soils, are the most important soils for wildlife in the county. The soils in these three groups are the wetlands. About 372,000 acres of the county has a permanent or seasonal high water table or is subject to flooding.

TABLE 5.—*Shrub and*

[A list of the soils in each tree and shrub

Common name	Botanical name	Tree and shrub group	Uses	
			Landscaping	Hedge, screen, windbreak
Arborvitae (shrub type)	*Thuja* spp.	1, 2, 3, 4	Yes	Yes
Barberry, Japanese	*Berberis thunbergi*	1, 2	Yes	Yes
Bayberry or waxmyrtle	*Myrica pensylvanica*	2, 3	Yes	No
Bittersweet	*Celastrus scandens*	1, 2	Yes	No
Blackberry, dewberry, blackcap raspberry	*Rubus* spp.	1, 2	No	No
Chokeberry, black	*Aronia melanocarpa*	1, 3	Yes	No
Cotoneaster	*Cotoneaster* spp.	1, 2	Yes	Yes
Crabapple	*Malus* spp.	1, 2	Yes	Yes
Currant, alpine	*Ribes alpinum*	1, 2	Yes	Yes
Dogwood, gray	*Cornus racemosa*	1, 2, 3	No	No
Dogwood, pagoda	*Cornus alternifolia*	1, 3	No	No
Dogwood, red-osier	*Cornus stolonifera*	1, 3	Yes	No
Dogwood, roundleaf	*Cornus rugosa*	1, 3, 4	No	No
Dogwood, silky	*Cornus amomum*	1, 3, 4	No	Yes
Elder, American	*Sambucus canadensis*	1, 3, 4	No	No
Filbert (hazelnut)	*Corylus americana*	1, 2	No	No
Forsythia	*Forsythia* spp.	1, 2	Yes	No
Grape, wild	*Vitis* spp.	1, 2	No	No
Hawthorn or thornapple	*Crataegus* spp.	1, 2, 3	Yes	No
Honeysuckle, shrub type	*Lonicera* spp.	1, 2, 3, 4	Yes	Yes
Juniper, creeping	*Juniperus horizontalis*	1, 2	Yes	No
Juniper, Pfitzer	*J. chinensis pfitzeria*	1, 2	Yes	No
Lilac	*Syringa* spp.	1, 2	Yes	Yes
Maple, Amur	*Acer ginnala*	1, 2	Yes	Yes
Mockorange	*Philadelphus* spp.	1	Yes	Yes
Myrtle (periwinkle)	*Vinca minor*	1, 2	Yes	No
Ninebark, common	*Physocarpus opulifolius*	1, 2, 3, 4	Yes	Yes
Olive, autumn	*Elaeagnus umbellata*	1, 2, 3	Yes	Yes
Peashrub, Siberian	*Caragana arborescens*	1, 2	Yes	Yes
Pine, mugho	*Pinus mugo mughus*	1, 2	Yes	No
Plum, American	*Prunus americana*	1, 2, 3	No	Yes
Privet, Amur	*Ligustrum amurense*	1, 2	Yes	Yes
Privet, Regels border	*Lobtusifolium regelianum*	1, 2	Yes	Yes
Redcedar, eastern	*Juniperus virginiana*	1, 2	No	Yes
Rose, rugosa and horticultural varieties	*Rosa* spp.	1	Yes	No
Russian-olive	*Elaeagnus angustifolia*	1, 2, 3	Yes	Yes
Snowberry	*Symphoricarpos* spp.	1, 2	Yes	No
Spirea, Anthony Waterer	*Spirea bumalda*	1, 2	Yes	No
Spirea, narrow leaf-meadow-sweet	*Spirea alba*	3, 4	No	No
Spirea, van houtte	*Spirea van houttei*	1, 2, 3	Yes	Yes
Sumac, fragrant	*Rhus aromatica*	1, 2	Yes	No
Sumac, smooth	*Rhus glabra*	1, 2	No	No
Sumac, staghorn	*Rhus typhina*	1, 2	Yes	No
Viburnum, American cranberrybush	*Viburnum trilobum*	1, 3, 4	Yes	Yes
Viburnum, arrowwood	*Viburnum dentatum*	1	Yes	Yes
Viburnum, blackhaw	*Viburnum prunifolium*	1, 2	No	Yes
Viburnum, mapleleaf	*Viburnum acerifolium*	1, 3, 4	No	No
Viburnum, nannyberry	*Viburnum lentago*	1, 2, 3, 4	No	Yes
Viburnum, rafinesque	*Viburnum rafinesquianum*	1, 2	No	No
Viburnum, wayfaringtree	*Viburnum lantana*	1, 2, 3, 4	Yes	No
Virginia creeper	*Parthenocissus quinquefolia*	1, 2	Yes	No
Wahoo, eastern	*Euonymus atropurpureus*	1	Yes	No
Weigela	*Weigela* spp.	1	Yes	Yes
Willow, pussywillow and other shrub types	*Salix* spp.	1, 2, 3, 4	Yes	Yes
Winterberry, common	*Ilex verticulata*	1, 3, 4	No	No
Yew, shrub type	*Taxus* spp.	1	Yes	No

vine planting guide

group can be found in table 4, p. 62]

Uses—continued		Growth characteristics					Esthetic value		
Roadside planting	Ground cover	Potential height	Type of plant	Shade tolerant	Thorns	Thicket forming	Flowers	Fruit or berries	Leaf color in fall
		Ft							
No	No	3–7	Shrub	Yes	No	No	No	No	Yes
No	No	6	Shrub	Yes	Yes	No	No	Yes	Yes
No	Yes	5–9	Shrub	Yes	No	No	No	Yes	Yes
Yes	Yes	Climbs	Vine	Yes	No	No	No	Yes	Yes
Yes	Yes	1–5	Bramble	No	Yes	Yes	Yes	Yes	Yes
Yes	Yes	1–3	Shrub	Yes	No	Yes	No	Yes	Yes
No	No	4–8	Shrub	No	No	No	No	Yes	Yes
Yes	No	25	Shrub	No	No	No	Yes	Yes	Yes
No	No	6–7	Shrub	Yes	No	No	Yes	No	No
Yes	No	6–10	Foliage shrub	Yes	No	No	Yes	Yes	Yes
Yes	No	10–15	Shrub	Yes	No	No	Yes	Yes	Yes
No	No	3–9	Shrub	Yes	No	Yes	Yes	Yes	Yes
Yes	Yes	3–9	Shrub	Yes	No	No	Yes	Yes	Yes
Yes	No	6–10	Shrub	Yes	No	No	Yes	Yes	Yes
Yes	No	3–10	Shrub	No	No	Yes	Yes	Yes	No
Yes	No	5–8	Shrub	Yes	No	Yes	No	Yes	Yes
No	No	4–8	Shrub	Yes	No	No	Yes	No	No
Yes	Yes	Climbs	Vine	Yes	No	No	No	Yes	Yes
Yes	No	5–20	Shrub	Yes	Yes	No	No	Yes	Yes
No	No	6–12	Shrub	Yes	No	No	Yes	Yes	Yes
Yes	Yes	1–2	Shrub	No	To touch	No	No	Yes	Yes
No	No	8–10	Shrub	No	No	No	No	No	Yes
Yes	No	8–10	Shrub	No	No	Yes	Yes	No	No
No	No	15+	Tall shrub	No	No	No	No	No	Yes
No	No	6–9	Shrub	No	No	No	Yes	No	No
Yes	Yes	1	Short vine	Yes	No	Forms mat	Yes	No	No
Yes	No	6–9	Shrub	Yes	No	Yes	Yes	No	Yes
No	No	10–15	Shrub	Yes	No	No	No	Yes	Yes
Yes	No	10–15	Shrub	No	No	No	No	Yes	Yes
No	No	6–9	Shrub	No	No	No	No	No	Yes
Yes	No	10–15	Shrub	Yes	Yes	Yes	Yes	Yes	Yes
No	No	10	Shrub	Yes	No	No	Yes	Yes	Yes
No	No	6–9	Shrub	Yes	No	No	No	Yes	Yes
Yes	No	10–30	Shrub	No	To touch	No	No	Yes	Yes
Yes	No	2–6	Shrub	No	No	No	Yes	Yes	No
No	No	15+	Shrub	No	Yes	No	No	Yes	Yes
Yes	Yes	3–4	Shrub	Yes	No	Yes	No	Yes	Yes
No	No	2–3	Shrub	No	No	No	Yes	No	Yes
Yes	No	3–4	Shrub	No	No	No	Yes	No	Yes
No	No	5–6	Shrub	Yes	No	No	Yes	No	No
Yes	Yes	3	Shrub	Yes	No	Yes	No	Yes	Yes
Yes	No	6–10	Shrub	No	No	No	No	Yes	Yes
Yes	No	10–15	Shrub	Yes	No	Yes	Yes	Yes	Yes
Yes	No	7–9	Shrub	Yes	No	No	Yes	Yes	Yes
No	No	10–12	Shrub	Yes	No	No	Yes	Yes	Yes
Yes	No	8–10	Shrub	Yes	No	No	Yes	Yes	Yes
Yes	No	3–5	Shrub	Yes	No	No	Yes	Yes	Yes
Yes	No	9–12	Shrub	Yes	No	No	Yes	Yes	Yes
Yes	No	2–4	Shrub	Yes	No	No	Yes	No	Yes
Yes	No	4–9	Shrub	Yes	No	No	Yes	Yes	Yes
Yes	Yes	Climbs	Vine	Yes	No	No	No	Yes	Yes
Yes	No	4–9	Shrub	Yes	No	No	No	Yes	Yes
No	No	4–8	Shrub	No	No	No	Yes	No	No
No	No	2–8	Shrub	No	No	No	No	No	No
Yes	No	6–9	Shrub	Yes	No	No	No	Yes	Yes
No	No	3–10	Shrub	Yes	No	No	No	Yes	Yes

TABLE 6.—*Soil interpretations*

Wildlife group, description of the soils, and mapping units	Grain and seed crops	Grasses and legumes
Group 1: Well drained and moderately well drained soils that are loamy throughout and are not subject to flooding. Aa, AnA, EaB, EaC, EbB, EcB, EeB, EeC, FeB, FeC, FeD, FfB, FfC, FfD, GaB, GaC, HsB, HsC, HuB, HwB, MbB, MsB, OnA, SaB, SaC, SaD2, SbB.	Good where slopes are 0 to 6 percent, fair where slopes are 6 to 12 percent, poor where slopes are steeper than 12 percent: hazard of water erosion.	Good where slopes are 0 to 12 percent, fair where slopes are 12 to 20 percent.
Group 2: Well drained and moderately well drained soils that have a clayey subsoil. EdB, EdC, GuB.	Good where slopes are 2 to 6 percent, fair where slopes are 6 to 12 percent.	Good
Group 3: Excessively drained soils that are sandy throughout and soils that have a shallow rooting zone. CrA, EkB, EkC, EkD2, FrA, NoB, NoC2, NoD2, NyA, NzA, NzB, PbB, PbD, PfA, PfB, PfC, PfE, PgA, PgB.	Fair where slopes are 0 to 6 percent, poor where slopes are steeper than 6 percent: hazard of water erosion.	Good where slopes are 0 to 12 percent, fair where slopes are 12 to 20 percent, poor where slopes are steeper than 20 percent.
Group 4: Well drained and moderately well drained soils that have a thick dark surface layer and are loamy throughout. DvA, DwA.	Good	Good
Group 5a: Somewhat poorly drained soils. Au, Do, KeA, Mh, MpA, Mr, PoB, Ps, ReB, ReC, WeA, WeB.	Good where soil has been drained, fair where soil is undrained and wet.	Good where soil has been drained, fair where soil is undrained and wet; few species suited.
Group 5b: Poorly drained soils. Ab, Af, Da, Em, Ma, Mf, Ne, Rb, Sh, Ss, Ve, Vs.	Good where soil has been drained, very poor where soil is undrained and wet.	Fair where soil has been drained, poor where soil is undrained and wet.
Group 6: Organic soils. Ca, Db, Dc, Gr, Mc, Md, Rf, Rg.	Fair where soil has been drained, very poor where soil is undrained and wet.	Fair where soil has been drained, very poor where soil is undrained and wet: few species suited.

In 1958, 47,000 acres of the wet soils in the county were still in their natural condition. This indicates that about seven-eighths of the wetlands has been altered by drainage or other means and less than one-eighth of the original wetlands remains in the county. This has affected the remaining wildlife.

In table 6, the wildlife groups of soils in Wood County are rated for producing various elements of wildlife habitat. These elements are briefly described in the following paragraphs.

Grain and seed crops are used for food and cover for wildlife. Examples are corn, oats, sorghum, wheat, barley, rye, and soybeans.

Grasses and legumes are used by wildlife for food and cover. They include bluegrass, bromegrass, timothy, fescue, alfalfa, birdsfoot trefoil, red clover, sweet clover, and vetch.

Wild herbaceous upland plants include native or introduced grasses, legumes, and forbs that provide food and cover for upland wildlife and are generally established by natural means. Examples are bluegrass, prairie grasses, roundhead lespedeza, beggarticks, aster, and goldenrod.

Woody plants include shrubs, hardwood trees, and coniferous trees. Shrubs are low-growing woody plants (including conifers less than 8 feet tall) that furnish fruit, seeds, browse, and cover for wildlife. Examples are viburnum, dogwood, and hazelnut. Such hardwood trees as oak, maple, cherry, and nut trees furnish mast, fruit, seeds, dens, cover, and browse for wildlife. Coniferous trees (more than 8 feet tall), including pine, fir, spruce, tamarack, and cedar, furnish seeds, fruit, browse, and cover for wildlife.

Wetland plants used for food and cover include forbs, grasses, sedges, aquatic plants, and woody plants that grow well in wet areas. They furnish fruit, seeds,

for elements of wildlife habitat

Wild herbaceous upland plants	Woody plants		Wetland plants	Shallow- and deep-water developments
	Hardwood trees and shrubs	Coniferous trees		
Good	Good	Good	Poor where slopes are 0 to 2 percent, very poor where slopes are steeper than 2 percent: few species suited.	Poor where slopes are 0 to 2 percent, very poor where slopes are steeper than 2 percent: moderate permeability.
Good	Good	Good	Poor where slopes are 2 to 6 percent, very poor where slopes are steeper than 2 percent: few species suited.	Poor where slopes are 0 to 2 percent, very poor where slopes are steeper than 2 percent: moderately slowly or slowly permeable substratum.
Good where slopes are 0 to 20 percent, fair where slopes are steeper than 20 percent.	Good where slopes are 0 to 20 percent, fair where slopes are steeper than 20 percent.	Good where slopes are 0 to 20 percent, fair where slopes are steeper than 20 percent.	Poor where slopes are 0 to 2 percent, very poor where slopes are steeper than 2 percent: few species suited.	Very poor: shallow to very porous substratum or bedrock.
Good	Fair: grass competition.	Fair: grass competition.	Poor: few species suited.	Poor: moderate permeability.
Fair: wet soil; some species not suited.	Fair: wet soil; some species of hardwoods not suited.	Fair: wet soil; some species of conifers not suited.	Fair: wet soil; some species not suited.	Fair where slopes are 0 to 2 percent, poor where slopes are steeper than 2 percent: moderately rapid or rapid permeability in some soils in the group.
Unsuitable: very wet soil; few species suited.	Poor: very wet soil; few species of hardwood suited.	Poor: very wet soil; few species suited.	Good	Good.
Very poor: wet soil; few species suited.	Poor: wet soil; some species suited.	Fair: wet soil; some species not suited.	Good	Good where slopes are 0 to 2 percent, fair where slopes are steeper than 2 percent.

browse, and cover for wildlife that live in wet areas and on or near open water. Examples are smartweed, canarygrass, sedges, and sagittaria. These plants grow well in three types of wetland: seasonally flooded basins and nearly level areas covered with water or saturated with water during seasonal wet periods but generally relatively dry during much of the growing season; fresh meadows that are generally not covered by water during the growing season but are saturated within a few inches of the soil surface; and shrub swamp areas in which the soil generally is saturated during the growing season and is often covered with as much as 6 inches of water.

Shallow-water areas are less than 5 feet deep and include natural and dug-out ponds or water areas formed by a combination of dug-out areas and low embankments. Common plants are cattails, bulrushes, sedges, and reeds. These areas include 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 about 3 feet of water during the growing season. Deep-water areas are more than 5 feet deep and consist of natural water areas, dug-out areas, or water areas formed by a combination of dug-out areas and embankments. Common plants are coontail, water lilies, milfoil, and waterweed. The deep-water areas consist of ponds, lakes, and open fresh-water areas that include shallow ponds and reservoirs or wet areas where water is less than 10 feet deep.

Table 7 lists the important kinds and species of wildlife in Wood County and rates the importance of the various habitat elements for the stated species of wildlife.

Using tables 6 and 7, the suitability of a particular soil for a given species of wildlife can be determined.

TABLE 7.—*Importance of elements of wildlife habitat for selected species of wildlife*

[Numerals have the following meanings: 1, element has little or no value for use by the stated species of wildlife; 2, element has some value; 3, element is important; 4, element is very important; and 5, element is critical to the survival of the stated species of wildlife. Absence of a numeral means that the element is not applicable to use by the stated species of wildlife]

Wildlife	Grain and seed crops		Grasses and legumes		Wild herbaceous upland plants	Woody plants			Wetland plants	Water areas	
						Hardwood		Coniferous trees			
	Harvested	Unharvested	Harvested	Unharvested		Shrubs	Trees			Shallow	Deep
Migratory waterfowl:											
Ducks	3	3	1	3	3		1		5	5	4
Geese	4	5	4	1					2	3	3
Upland game birds:											
Hungarian partridge	4	4	3	4	4	1			1		
Pheasant	4	4		5	5	4		1	5	3	
Quail	4	4	2	4	4	5	2	1	4	3	
Woodcock			1	3	3	4	4	2	3		
Small game:											
Cottontail rabbit	3	4	3	5	5	5	3	1	2	3	
Raccoon	3	4		1	1	2	4		1	5	4
Squirrels, fox and gray	3	4		1	1	2	5	1			
Large game:											
Deer	3	4	3	3	4	4	4	4	3	3	2
Furbearers:											
Beaver						4	5		4	4	5
Red fox [1]	2	3	2	3	3	3	2	1	3	3	1
Mink [1]						2	1	1	3	5	5
Muskrat	1	1				1			4	5	5

[1] Carnivorous species are not strictly dependent on elements listed.

For example, critical parts of the habitat for ring-necked pheasant are grass and legumes, wild herbaceous upland plants, and herbaceous wetland plants. Only a combination of soil groups would be well suited for all of these habitat elements. An environment containing soils in group 1 (loamy, well-drained soils) and group 6 (organic soils) would be desirable.

Recreation

Recreational use of land is increasing in importance in Wood County. To aid in planning the use of soils for this purpose, the soils of the county have been placed in nine recreation groups according to the degree of limitation affecting their use for various recreational purposes. In table 8, these groups of soils are briefly described, the degree of limitation for specified recreational uses is rated, and important soil properties that determine these limitations are listed. These ratings and properties are helpful in predicting the behavior of the groups of soils when used for specific facilities.

In order to reduce the number of groups in table 8, certain soils are included in groups into which they only partly fit. That is, they have the same limitations for some uses as the other soils in the group but have limitations for certain uses that differ from those of the other soils in the group. Therefore, it is necessary to read through the entire paragraph describing the limitations for a specific use so that the exceptions will be noted.

The facilities rated in table 8 are for outdoor recreation. They are playgrounds, athletic fields, and other intensive play areas; picnic areas, parks, and other extensive play areas; bridle paths and nature and hiking trails; sites for tents and camp trailers; golf course fairways; and sites for cottages and service and utility buildings.

The soils are rated as having slight, moderate, severe, and very severe limitations. A rating of *slight* means that the soils have no limitations for the given use or have limitations that are easily overcome. A rating of *moderate* indicates that the soils have limitations for a given use that can be overcome by good management and careful design. A rating of *severe* means that the soils have limitations for a given use that are difficult to overcome. A rating of *very severe* indicates that the soils have limitations that generally preclude their use for a given purpose.

In evaluating the limitations for recreation groups, consideration was not given to esthetic qualities, because these qualities vary from place to place for the same kind of soil. For the same reason, the size and shape of the soil areas and the pattern these areas form with areas of other soils were not considered. All of these factors are important and must be considered before a final evaluation is made.

For poorly drained soils, the ratings in table 7 as-

TABLE 8.—*Degree and kinds of limitation for recreational uses of the soils by recreation groups*

Recreation group, description of the soils, soil series, and mapping units	Playgrounds	Picnic areas	Paths and trails	Camp areas	Golf course fairways
Group 1: Well-drained, nearly level and gently sloping soils. Antigo: AnA; Eaupleine: EaB; Eaupleine, clayey subsoil variant: EdB; Eaupleine, sandy subsoil variant: EbB; Eaupleine, silty subsoil variant: EcB; Fenwood: FeB; Gale: GaB; Hiles: HsB; Marathon: MbB; Onamia: OnA; Santiago: SaB, SbB.	Slight where slopes are 0 to 2 percent. Moderate where slopes are more than 2 percent.	Slight	Slight	Slight	Slight.
Group 2: Moderately well drained and well drained, nearly level to sloping, loamy soils. Dunnville: DvA, DwA; Eleva: EeB, EeC; Elkmound: EkB; Humbird: HuB, HwB; Mosinee: MsB.	Slight where slopes are 0 to 2 percent. Moderate where slopes are 2 to 6 percent. Severe where slopes are more than 6 percent.	Slight where slopes are 0 to 6 percent. Moderate where slopes are more than 6 percent.	Slight	Slight where slopes are 0 to 6 percent. Moderate where slopes are 6 to 12 percent.	Moderate: slightly droughty.
Group 3: Well-drained and somewhat poorly drained, gently sloping and sloping soils. Eaupleine: EaC; Eaupleine, clayey subsoil variant: EdC; Elkmound: EkC; Fenwood: FeC; Gale: GaC; Guenther: GuB; Hiles: HsC; Norgo: NoB, NoC2; Rietbrock: ReB, ReC; Santiago: SaC.	Moderate where slopes are 2 to 6 percent. Severe where slopes are more than 6 percent: leveling may expose bedrock.	Slight where slopes are 2 to 6 percent. Moderate where slopes are more than 6 percent.	Slight	Slight where slopes are 2 to 6 percent. Moderate where slopes are more than 6 percent.	Slight.
Group 4: Somewhat poorly drained, nearly level and gently sloping, loamy and sandy soils. Alluvial land: Aa; Au Gres: Au; Dolph: Do; Kert: KeA; Meehan: Mh; Merrillan: MpA; Milladore: Mr; Point: PoB; Poskin: Ps; Withee: WeA, WeB.	Moderate: hazard of flooding; wet.	Moderate: wet; hazard of flooding.	Moderate	Moderate: hazard of flooding.	Moderate: hazard of flooding.
Group 5: Moderately well drained and well drained, sandy soils. Croswell: CrA; Friendship: FrA; Nymore: NyA, NzA, NzB.	Moderate: droughty; difficult to maintain a good sod.	Moderate: droughty; difficult to maintain a good sod.	Moderate: droughty; difficult to maintain.	Moderate: droughty; difficult to maintain a good sod.	Moderate: droughty; difficult to maintain a good turf.
Group 6: Sandy, excessively drained, nearly level to sloping soils. Elkmound: EkD2; Plainbo: PbB; Plainfield: PfA, PfB, PfC, PgA, PgB.	Moderate: droughty; difficult to maintain plant cover.	Moderate: droughty; difficult to maintain plant cover.	Moderate: poor stability; difficult to maintain.	Moderate: droughty; difficult to maintain plant cover.	Severe: droughty; difficult to maintain a good turf.
Group 7: Moderately steep and steep soils that are stony in some places. Fenwood: FeD, FfB, FfC, FfD; Norgo: NoD2; Plainbo: PbD; Plainfield: PfE; Santiago: SaD2.	Severe: too steep, too stony, or both.	Severe: too steep, too stony, or both.	Severe: too steep, too stony, or both.	Severe: too steep, too stony, or both.	Severe: too steep, too stony, or both.
Group 8: Nearly level, poorly drained soils. Altdorf: Af; Dancy: Da; Elm Lake: Em; Mann: Ma; Marshfield: Mf; Newson: Ne; Rib: Rb; Sherry: Sh, Ss; Veedum: Ve; Vesper: Vs.	Severe: wet soils; occasional ponding; poor trafficability.	Severe: poor trafficability; sites remain wet for long periods.	Severe: soils remain wet for extended periods.	Severe: sites remain wet for extended periods; poor trafficability.	Severe: seasonal high water table; sites remain wet and soft for long periods; poor trafficability.

TABLE 8.—*Degree and kinds of limitation for recreational uses of the soils by recreation groups*—Continued

Recreation group, description of the soils, soil series, and mapping units	Playgrounds	Picnic areas	Paths and trails	Camp areas	Golf course fairways
Group 9: Poorly drained and very poorly drained organic and alluvial soils. Alluvial land: Ab; Cathro: Ca; Dawson: Db, Dc; Greenwood: Gr; Markey: Mc; Marsh: Md; Rifle: Rf, Rg.	Very severe: seasonal high water table; seasonal flooding.	Severe: seasonal high water table.	Very severe: seasonal high water table; wet for long periods.	Very severe: sites remain wet and soft for long periods.	Severe: seasonal high water table; sites remain wet and soft for long periods.

sume that the soils are not disturbed and not artificially drained. If drainage is improved, it is possible that these soils can be used for many kinds of recreational development. Soils subject to flooding vary considerably in their degree of limitation for some uses.

For intensive play areas, including athletic fields and playgrounds, the sites are assumed to be 2 acres or more in size. These areas require nearly level soils that have a firm surface and good drainage and that are not flooded during periods of use. The areas should be free of coarse fragments and outcrops and should be capable of supporting a good sod.

Extensive play areas, such as picnic grounds and parks, have requirements similar to those of intensive play areas but should be 3 to 5 acres or more in size.

Bridle paths and nature and hiking trails generally are developed on natural terrain, and little soil is moved. Soils used for this purpose should be relatively dry during the season of use, should be relatively free of dust, and should have good trafficability. Small amounts of stones and rock outcrops are not a serious problem. Silty soils are likely to be slippery when wet and dusty when dry. Slope is important in relation to soil erodibility and the gradient of the paths.

Campsites for tents and trailers require soils that are relatively well drained and have gentle slope, good trafficability, and few stones and rocks. Ponding or flooding are very undesirable on areas used for this purpose.

Soils used for golf course fairways are rated in an undisturbed condition. Generally, the soils should be relatively dry during the season of use, have good trafficability, and be capable of supporting a good sod without special management. Flooding or ponding are undesirable but can be tolerated for a short period. Stone fragments and rocks are highly undesirable.

For cottages and service and utility buildings the ratings apply to seasonal and year-round homes, washrooms and bathhouses, and service buildings without public sewer and water facilities. Soils used for these purposes should have good drainage, should have the capacity to absorb waste from domestic sewage disposal systems, should not be subject to flooding, and should be nearly level to gently sloping. They need high bearing capacity and low shrink-swell potential, and they should not be subject to frost heave. In addition, hard bedrock or a water table should not occur above a depth of 6 feet.

Engineering Uses of the Soils [5]

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 soil properties highly important in engineering are permeability, strength, compaction characteristics, drainage condition, shrink-swell potential, grain size, plasticity, and reaction. Also important are depth to the water table, depth to bedrock, and 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 and 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 9, 10, 11, and 12, which show, respectively, several estimated soil properties significant to engineering; interpretations for various engineering uses; interpretations for various farm uses; and results of engineering laboratory tests on soil samples.

This information, along with the soil map and other

[5] ROBERT C. BINTZLER, engineer, Soil Conservation Service, assisted in preparation of this section.

parts of this publication, can be used to make interpretations in addition to those given in tables 10 and 11, and it also can be used to make other useful maps.

This information, however, does not eliminate the need for further investigation at sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths of more than those shown in the tables, generally depths of more than 5 feet. Also, inspection of sites, especially small ones, is needed because many delineated areas of a given mapping unit 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 classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*2*), used by SCS engineers, the Department of Defense, and others, and the AASHTO system (*1*), adopted by the American Association of State Highway and Transportation Officials.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic-matter content. 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 AASHTO system is used to classify soils according to those properties that affect use in highway construction and maintenance. In this system, a soil is placed in one of seven basic groups, ranging from A–1 to 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, 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 AASHTO classification for tested soils, with group index numbers in parentheses, is shown in table 12; the estimated classification, without group index numbers, is given in table 9 for all soils mapped in the survey area.

Soil properties significant in engineering

Estimates of several soil properties significant in engineering are given in table 9. These estimates are made for typical 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 9.

Depth to bedrock is the distance from the surface of the soil to the upper surface of the rock layer.

Depth to seasonal high water table is the 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 9 in the standard terms used by the Department of Agriculture. These terms take into account relative percentages of sand, silt, and clay in 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," "silt," "clay," and some of the other terms used in USDA textural classification are defined in the Glossary of this survey.

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 a semisolid to a 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 9, but in table 12 the data on liquid limit and plasticity index are based on tests of soil samples.

Permeability is that 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 9 do not take into account lateral seepage or such transient soil features as plowpans and surface crusts.

Available water capacity is the ability of soils to hold water for use by most plants. It is commonly 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 as pH. 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 out 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*

TABLE 9.—*Estimates of soil properties*

[The symbol > means more than;

Soil series [1] and map symbols	Depth to—		Depth from surface	Dominant USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHTO
	Ft	*Ft*	*In*			
Alluvial land: Aa, Ab. No valid estimates can be made.						
Altdorf: Af	>6	0–1	0–17	Silt loam	ML, CL, or CL–ML	A–4
			17–76	Clay	CH or MH	A–7
			76–107	Sandy loam	SC	A–6
Antigo: AnA	>6	>5	0–17	Silt loam	ML, CL, or CL–ML	A–4
			17–30	Silt loam	CL	A–6
			30–60	Loamy sand	SM or SP–SM	A–2–4
Au Gres: Au	>6	1–3	0–7	Loamy sand	SM	A–2–4
			7–22	Loamy sand	SM or SP–SM	A–2–4
			22–60	Sand	SP	A–3
Cathro: Ca	>6	0–1	0–14	Muck (sapric)	Pt	
			14–31	Muck (sapric)	Pt	
			31–60	Loam	ML, CL, or CL–ML	A–4
Croswell: CrA	>6	3–5	0–9	Loamy sand	SM	A–2–4
			9–23	Loamy sand	SM or SP–SM	A–2–4
			23–60	Sand	SP	A–3
Dancy: Da	>6	0–1	0–9	Sandy loam	SM	A–2
			9–23	Loamy sand	SM	A–2–4
			23–41	Clay loam	CL	A–6
			41–60	Sandy loam	SM	A–4
Dawson: Db, Dc	>6	0–1	0–36	Muck (sapric)	Pt	
			36–60	Sand	SP	A–1–b
Dolph: Do	4–8	1–3	0–15	Silt loam	ML	A–4
			15–36	Clay	CH or MH	A–7
			36–57	Very fine sandy loam	ML or SM	A–4
			57–71	Mica schist.		
Dunnville: DvA, DwA	>6	>5	0–12	Loam	ML, CL, or CL–ML	A–4
			12–24	Loam	ML, CL, or CL–ML	A–4
			24–60	Sand	SP	A–3
Eaupleine: EaB, EaC	4–6	>5	0–14	Silt loam	ML, CL, or CL–ML	A–4
			14–38	Loam	ML, CL, or CL–ML	A–4
			38–60	Loam	ML, CL, or CL–ML	A–4
Eaupleine, clayey subsoil variant: EdB, EdC.	4–6	>5	0–13	Silt loam	ML, CL, or CL–ML	A–4
			13–31	Clay	CH or MH	A–7
			31–60	Clay	CH or MH	A–7
Eaupleine, sandy subsoil variant: EbB.	4–6	>5	0–19	Sandy loam	SM, SC, or SC–SM	A–4
			19–44	Loam	ML, CL, or CL–ML	A–4
			44–60	Loam	ML, CL, or CL–ML	A–4
Eaupleine, silty subsoil variant: EcB.	4–6	>5	0–15	Silt loam	ML, CL, or CL–ML	A–4
			15–49	Silt loam	ML, CL, or CL–ML	A–4
			49–60	Loam	ML, CL, or CL–ML	A–4
Eleva: EeB, EeC	2–4	>5	0–12	Sandy loam	SM	A–2–4
			12–38	Sandy loam	SM	A–2–4
			38–60	Sandstone.		
Elkmound: EkB, EkC, EkD2	1–2	>5	0–12	Sandy loam	SM	A–2–4
			12–60	Sandstone.		

significant in engineering

the symbol < means less than]

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity to—	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
				Pct		*In per hr*	*In per in of soil*	*pH*			
100	100	90–100	70–90	25–35	5–10	0.63–2.0	0.22–0.24	5.1–6.5	Low.		
100	90–100	90–100	80–90	60–70	35–45	0.06–0.20	0.09–0.11	5.1–7.3	High	Moderate	High.
100	90–100	70–80	35–45	30–40	15–20	0.20–0.63	0.14–0.16	6.1–7.3	Low	Moderate	Low.
100	100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	4.5–5.5	Low.		
100	95–100	85–95	80–90	25–35	15–25	0.63–2.0	0.20–0.22	4.5–5.5	Low	Low	Moderate.
95–100	90–100	80–90	10–15	[2] NP	[2] NP	6.3–20	0.08–0.10	4.5–6.0	Low	Low	Moderate.
100	100	80–90	15–20	NP	NP	6.3–20	0.10–0.12	4.0–4.5	Low.		
100	90–100	80–90	10–15	NP	NP	6.3–20	0.09–0.11	4.5–5.5	Low	Low	High.
100	90–100	70–80	1–5	NP	NP	6.3–20	0.05–0.07	4.5–5.5	Low	Low	High.
						2.0–6.3	0.25–0.35	5.1–6.0	High.		
						2.0–6.3	0.25–0.35	5.5–6.5	High	Moderate	Moderate.
90–100	80–90	60–75	55–65	25–35	5–10	0.63–2.0	0.17–0.19	6.1–7.0	Low	Moderate	Low.
100	100	80–90	15–20	NP	NP	6.3–20	0.10–0.12	4.5–5.5	Low.		
100	90–100	80–90	10–15	NP	NP	6.3–20	0.09–0.11	5.1–6.0	Low	Low	Moderate.
100	90–100	70–80	1–5	NP	NP	6.3–20	0.05–0.07	5.5–6.5	Low	Low	Moderate.
100	100	50–60	25–35		NP	0.6–2.0	0.12–0.14	6.1–6.5	Low	Low	Low.
90–100	80–90	55–75	20–30	NP	NP	2.0–6.3	0.12–0.14	6.1–7.3	Low.		
90–100	90–100	75–85	60–70	30–40	20–30	0.20–0.63	0.15–0.19	6.1–7.3	Moderate	High	Low.
90–100	90–100	60–70	35–45	NP	NP	2.0–6.3	0.11–0.13	6.6–7.3	Low	High	Low.
						2.0–6.3	0.25–0.35	4.5–5.5	High	Moderate	High.
90–100	70–90	35–45	1–5	NP	NP	6.3–20	0.05–0.07	5.5–6.5	Low	Moderate	Moderate.
95–100	90–95	85–90	75–85	35–45	5–10	0.63–2.0	0.22–0.24	5.1–6.0	Low.		
100	100	90–100	80–90	50–65	30–40	0.06–0.20	0.09–0.11	4.5–5.5	High	High	High.
100	90–100	85–95	45–55	20–30	5–10	0.20–0.63	0.11–0.13	5.6–6.5	Low	Moderate	Moderate.
100	95–100	85–95	60–75	20–30	1–10	0.63–2.0	0.20–0.22	5.1–6.5	Low.		
100	95–100	85–95	60–75	20–30	1–10	0.63–2.0	0.17–0.19	5.1–6.0	Low	Low	Low.
100	90–100	60–75	1–5	NP	NP	6.3–20	0.05–0.07	5.1–6.0	Low	Low	Low.
100	95–100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	6.1–7.3	Low.		
100	95–100	85–95	60–70	25–35	1–10	0.63–2.0	0.17–0.19	5.1–6.5	Low	Low	Moderate.
80–90	65–80	60–70	50–60	25–35	1–10	0.20–0.63	0.17–0.19	5.1–6.0	Moderate	Low	Moderate.
95–100	90–100	90–100	85–95	20–30	1–10	0.63–2.0	0.22–0.24	5.1–6.0	Low.		
[3] 95–100	95–100	90–100	80–90	50–65	30–40	0.06–0.20	0.09–0.11	4.5–5.5	High	High	High.
[3] 95–100	95–100	90–100	80–90	50–65	30–40	0.06–0.20	0.09–0.11	4.5–5.5	High	High	High.
95–100	90–100	60–75	40–50	20–30	1–10	0.63–2.0	0.16–0.18	5.6–6.5	Low.		
[3] 95–100	85–95	80–90	60–70	20–30	1–10	0.63–2.0	0.17–0.19	5.1–6.0	Low	Low	Moderate.
[3] 80–90	65–80	60–70	50–60	25–35	1–10	0.20–0.63	0.17–0.19	4.5–6.0	Moderate	Low	Moderate.
95–100	90–100	90–100	85–95	20–30	1–10	0.63–2.0	0.22–0.24	5.1–6.0	Low.		
95–100	90–100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	4.5–6.0	Low	Low	Moderate.
[3] 80–90	65–80	60–70	50–60	25–35	1–10	0.20–0.63	0.17–0.19	4.5–6.0	Moderate	Low	Moderate.
95–100	90–100	65–75	25–35	NP	NP	2.0–6.3	0.13–0.15	5.1–6.0	Low.		
90–100	85–95	65–75	25–35	NP	NP	2.0–6.3	0.12–0.14	4.5–6.0	Low	Low	High.
95–100	90–100	65–75	25–35	NP	NP	2.0–6.3	0.13–0.15	4.5–5.5	Low.		

TABLE 9.—*Estimates of soil properties*

Soil series [1] and map symbols	Depth to—		Depth from surface	Dominant USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHTO
	Ft	*Ft*	*In*			
Elm Lake: Em	2–4	0–1	0–23	Sand, silty clay	SP–SM	A–3
			23–60	Loam	CH or MH	A–7
			36–60	Sandstone.		
Fenwood: FeB, FeC, FeD, FfB, FfC, FfD.	3–5	>5	0–12	Silt loam	ML, CL, or CL–ML	A–4
			12–38	Loam	CL, ML, or CL–ML	A–4
			38–60	Shattered granite.		
Friendship: FrA	>6	3–5	0–8	Loamy sand	SM	A–2–4
			8–60	Sand	SP	A–3
Gale: GaB, GaC	2–4	>5	0–11	Silt loam	ML, CL, or CL–ML	A–4
			11–29	Silt loam	ML, CL, or CL–ML	A–4
			29–36	Sand	SP	A–3
			36–60	Sandstone.		
Greenwood: Gr	>6	0–1	0–6	Muck (sapric)	Pt	
			6–17	Mucky peat (hemic)	Pt	
			17–24	Muck (sapric)	Pt	
			24–60	Mucky peat (hemic)	Pt	
Guenther: GuB	4–8	>5	0–9	Loamy sand	SM	A–2–4
			9–30	Loamy sand	SM	A–2–4
			30–60	Loam	ML, CL, or CL–ML	A–4
Hiles: HsB, HsC	2–6	3–6	0–19	Silt loam	ML, CL, or CL–ML	A–4
			19–29	Loam	ML or CL	A–4
			29–60	Shale and sandstone.	SC, SM, or SC–SM, ML, CL, or CL–ML	A–4
Humbird: HuB, HwB	2–6	3–5	0–16	Sandy loam	SM, SC, or SC–SM	A–2–4
			16–30	Fine sand	SM or SP–SM	A–3 or A–2–4
			30–36	Silty clay	CH or MH	A–7
			36–60	Sand	SP–SM	A–1–b
Kert: KeA	2–6	1–3	0–14	Silt loam	ML, CL, or CL–ML	A–4
			14–22	Loamy fine sand	SM	A–2–4
			22–60	Clay	CH or MH	A–7
Mann: Ma	>6	0–1	0–8	Silt loam	ML, CL, or CL–ML	A–4
			8–28	Silty clay loam	CL	A–6
			28–60	Sandy loam	SM, SC, or SC–SM	A–4
Marathon: MbB	>5	>5	0–20	Silt loam	ML, CL, or CL–ML	A–4
			20–38	Loam	ML, CL, or CL–ML	A–4
			38–60	Disintegrated granite	GW	A–1–a
Markey: Mc	>6	0–1	0–47	Muck (sapric)	Pt	
			47–60	Sand	SP	A–1–b
Marsh: Md. No valid estimates can be made.						
Marshfield: Mf	>6	0–1	0–24	Silt loam	ML, CL, or CL–ML	A–4
			24–44	Loam	CL	A–6
			44–60	Silty clay loam	CL	A–6
Meehan: Mh	>6	1–3	0–7	Loamy sand	SM	A–2–4
			7–60	Loamy sand	SM	A–2–4
Merrillan: MpA	2–5	1–3	0–18	Sandy loam	SM, SC, or SC–SM	A–2–4
			18–29	Sandy clay loam	SC	A–6
			29–60	Sandstone.		

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity to—	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
				Pct		*In per hr*	*In per in of soil*	*pH*			
95–100	85–95	65–75	5–10	NP	NP	6.3–20	0.07–0.09	5.1–6.0	Low.		
100	100	90–100	80–90	50–60	25–35	0.06–0.20	0.18–0.20	4.5–5.5	High	High	High.
[3]95–100	90–100	90–100	80–90	20–30	1–10	0.63–2.0	0.22–0.24	5.6–6.5	Low.		
[3]90–100	85–95	60–70	55–65	25–35	5–10	0.63–2.0	0.17–0.19	5.1–6.0	Moderate	Low	Moderate.
95–100	90–100	75–85	20–25	NP	NP	6.3–20	0.10–0.12	5.1–6.0	Low.		
95–100	85–95	75–85	1–5	NP	NP	6.3–20	0.05–0.07	5.6–7.3	Low	Low	Moderate.
95–100	95–100	95–100	95–100	25–35	5–10	0.63–2.0	0.22–0.24	5.1–6.0	Low.		
95–100	95–100	95–100	80–90	20–30	1–10	0.63–2.0	0.20–0.22	4.5–5.5	Low	Low	Moderate.
90–100	85–95	65–75	1–5	NP	NP	6.3–20	0.05–0.07	4.5–5.5	Low	Low	High.
						2.0–6.3	0.25–0.35	4.5–5.5	High.		
						2.0–6.3	0.25–0.35	4.5–5.5	High	High	High.
						2.0–6.3	0.25–0.35	4.5–5.5	High	Moderate	High.
						2.0–6.3	0.25–0.35	5.1–6.5	High	Moderate	High.
95–100	95–100	60–75	25–35	NP	NP	2.0–6.3	0.10–0.12	5.6–6.5	Low.		
95–100	95–100	60–75	25–35	NP	NP	2.0–6.3	0.09–0.11	5.1–6.5	Low	Low	Moderate.
90–100	65–80	60–70	50–60	25–35	1–10	0.63–2.0	0.17–0.19	5.1–6.5	Moderate	Low	Moderate.
100	95–100	95–100	85–95	20–30	1–10	0.63–2.0	0.22–0.24	5.1–6.0	Low.		
95–100	80–90	70–80	50–60	30–40	1–10	0.63–20	0.17–0.19	5.1–6.0	Low	Moderate	Moderate.
70–80	70–80	60–75	40–60	25–35	1–10	0.06–0.20	0.10–0.12	5.1–6.0	Moderate	Moderate	Moderate.
95–100	90–100	80–90	25–35	20–30	1–10	2.0–6.3	0.13–0.15	5.6–6.5	Low.		
95–100	90–100	80–90	10–15	NP	NP	6.3–20	0.09–0.11	5.1–6.5	Low	Low	Moderate.
100	100	90–100	85–95	50–60	25–35	0.06–0.20	0.10–0.12	4.5–5.0	Moderate	Moderate	High.
[3]95–100	90–100	40–50	1–10	NP	NP	6.3–20	0.05–0.07	4.5–5.6	Low	Low	High.
100	95–100	95–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	6.1–7.3	Low.		
100	95–100	90–100	25–35	NP	NP	2.0–6.3	0.12–0.14	5.6–6.5	Low	Moderate	Moderate.
100	100	95–100	85–95	50–60	25–35	0.06–0.20	0.10–0.12	5.1–6.0	Moderate	High	Moderate.
100	95–100	95–100	90–100	25–35	5–10	0.63–2.0	0.22–0.24	6.1–7.3	Low.		
100	95–100	85–95	85–95	30–40	20–30	0.20–0.63	0.18–0.20	6.6–7.8	Moderate	High	Low.
95–100	85–95	60–75	35–45	20–30	1–10	2.0–6.3	0.11–0.13	6.6–7.8	Low	High	Low.
95–100	95–100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	5.6–6.5	Low.		
90–100	85–95	80–90	70–80	25–35	1–10	0.63–2.0	0.17–0.19	4.5–5.5	Low	Low	High.
35–45	25–35	10–20	1–5	NP	NP	6.3–20	0.02–0.04	4.5–5.5	Low	Low	High.
						2.0–6.3	0.25–0.35	5.1–6.0	High	Moderate	Moderate.
90–100	70–90	35–45	1–5	NP	NP	6.3–20	0.05–0.07	5.6–6.5	Low	Moderate	Moderate.
100	95–100	95–100	90–100	25–35	5–10	0.63–2.0	0.22–0.24	4.5–5.5	Low.		
100	95–100	85–95	60–75	30–40	15–25	0.20–0.63	0.17–0.19	4.5–5.5	Low	Moderate	Moderate.
90–100	85–95	75–85	70–80	25–35	15–25	0.20–0.63	0.18–0.20	5.5–6.5	Moderate	Moderate	Moderate.
100	95–100	80–90	15–30	NP	NP	6.3–20	0.10–0.12	5.1–6.0	Low.		
100	95–100	80–90	15–30	NP	NP	6.3–20	0.09–0.11	5.6–6.5	Low	Low	Moderate.
100	90–100	80–90	25–35	20–30	1–10	2.0–6.3	0.13–0.15	4.5–5.5	Low.		
95–100	90–95	35–45	40–50	30–40	15–25	0.20–0.63	0.16–0.18	4.5–5.5	Moderate	High	High.

TABLE 9.—*Estimates of soil properties*

Soil series [1] and map symbols	Depth to—		Depth from surface	Dominant USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHTO
	Ft	*Ft*	*In*			
Milladore: Mr	>5	1–3	0–15	Silt loam	ML, CL, or CL–ML	A–4
			15–29	Silt loam	CL	A–4
			29–60	Loam	ML, CL, or CL–ML	A–4
Mosinee: MsB	4–8	>5	0–17	Loam	ML, CL, or CL–ML	A–4
			17–32	Gravelly loam	SM	A–2–4
			32–60	Gravelly sandy loam	SP–SM	A–1–a
Newson: Ne	>6	0–1	0–14	Loamy sand	SM	A–2–4
			14–60	Sand	SP	A–3
Norgo: NoB, NoC2, NoD2	<2	>5	0–17	Silt loam	ML, CL, or CL–ML	A–4
			17–60	Sandstone.		
Nymore: NyA, NzA, NzB	>6	>5	0–14	Loamy sand	SM	A–2–4
			14–60	Sand	SP	A–3
Onamia: OnA	>6	>5	0–13	Loam	ML, CL, or CL–ML	A–4
			13–25	Loam	ML or CL	A–4
			25–60	Sand	SP	A–3
Plainbo: PbB, PbD	2–4	>5	0–36	Fine sand	SP	A–3
			36–60	Sandstone.		
Plainfield: PfA, PfB, PfC, PfE, PgA, PgB.	>6	>5	0–9	Sand	SM or SP–SM	A–2–4
			9–60	Sand	SP	A–1–b
Point: PoB	>5	1–3	0–14	Loamy sand	SM	A–2
			14–26	Sandy loam	SM, SC, or SC–SM	A–4
			26–40	Loam	ML, CL, or CL–ML	A–4
			40–60	Loam	ML, CL, or CL–ML	A–4
Poskin: Ps	>5	1–3	0–12	Silt loam	ML, CL, or CL–ML	A–4
			12–38	Silt loam	CL	A–6
			38–60	Sand	SP	A–1–b
Rib: Rb	>5	0–1	0–10	Silt loam	ML, CL, or CL–ML	A–4
			10–30	Silt loam	ML, CL, or CL–ML	A–4
			30–60	Sand and gravel	SP–SM	A–1–b
Rietbrock: ReB, ReC	3–5	1–3	0–12	Silt loam	ML, CL, or CL–ML	A–4
			12–22	Loam	CL, ML, or CL–ML	A–4
			22–38	Silty clay loam	CL	A–6
			38–60	Shattered granite.		
Rifle: Rf, Rg	>6	0–1	0–60	Mucky peat (hemic)	Pt	----------
Santiago: SaB, SaC, SaD2, SbB.	>5	3–5	0–19	Silt loam	ML, CL, or CL–ML	A–4
			19–34	Silt loam	ML, CL, or CL–ML	A–4
			34–60	Sandy loam	SC	A–6
Sherry: Sh, Ss	>5	0–1	0–20	Silt loam	ML, CL, or CL–ML	A–4
			20–49	Sandy clay loam	SC, SM, or SC–SM	A–4
			49–60	Silty clay loam	CL	A–6
Veedum: Ve	2–4	0–1	0–12	Silt loam	ML, CL, or CL–ML	A–4
			12–36	Stratified loamy sand, clay loam, sandy loam, and sand.	CL	A–6
			36–60	Shale and sandstone	CH or MH	A–7

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity to—	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
				Pct		*In per hr*	*In per in of soil*	*pH*			
100	90–100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	5.6–6.5	Low.		
100	90–100	90–100	85–95	30–40	5–10	0.63–2.0	0.17–0.19	5.1–6.0	Low	Moderate	Moderate.
85–95	75–85	70–80	60–70	25–35	1–10	0.20–0.63	0.17–0.19	5.1–6.5	Moderate	Moderate	High.
95–100	95–100	80–90	50–60	20–30	5–10	0.20–0.63	0.20–0.22	5.6–6.5	Low.		
65–80	50–65	35–45	20–30	NP	NP	0.63–2.0	0.10–0.12	5.6–6.5	Low	Low	Moderate.
80–90	20–30	10–20	5–10	NP	NP	2.0–6.3	0.06–0.08	5.6–6.5	Low	Low	Moderate.
95–100	95–100	85–95	20–25	NP	NP	2.0–6.3	0.10–0.12	4.5–5.5	Low.		
95–100	95–100	85–95	1–5	NP	NP	6.3–20	0.06–0.08	4.5–5.5	Low	Medium	High.
100	90–100	90–100	80–90	25–35	5–10	0.63–2.0	0.22–0.24	5.1–6.0	Low.		
95–100	90–100	65–75	20–25	NP	NP	6.3–20	0.10–0.12	5.6–6.5	Low.		
95–100	85–95	75–85	1–5	NP	NP	6.3–20	0.05–0.07	5.6–6.5	Low	Low	Moderate.
100	90–100	75–85	55–65	20–30	1–10	0.63–2.0	0.20–0.22	4.5–6.0	Low.		
90–100	90–100	70–80	55–65	30–40	5–10	0.63–2.0	0.17–0.19	4.5–5.5	Low	Low	Moderate.
90–100	75–85	60–70	1–5	NP	NP	6.3–20	0.05–0.07	5.6–6.5	Low	Low	Moderate.
95–100	85–95	60–70	1–5	NP	NP	6.3–20	0.07–0.09	5.1–6.0	Low	Low	Low.
95–100	85–95	50–60	5–15	NP	NP	6.3–20	0.07–0.09	4.5–5.5	Low.		
95–100	85–95	40–50	1–5	NP	NP	6.3–20	0.05–0.07	5.5–6.5	Low	Low	Moderate.
95–100	85–95	70–80	15–20	----	NP	2.0–6.3	0.09–0.11	----	Low	Low	Low.
95–100	85–95	70–80	35–45	20–30	1–10	2.0–6.3	0.09–0.11	5.1–6.5	Low	Moderate	High.
95–100	85–95	65–75	55–65	25–35	1–10	0.20–0.63	0.17–0.19	5.1–6.0	Moderate	High	Moderate.
90–100	65–85	60–75	50–60	25–35	1–10	0.20–0.63	0.17–0.19	5.6–6.0	Moderate	High	Moderate.
100	95–100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	4.5–6.0	Low	Moderate	Moderate.
95–100	85–95	85–95	80–90	30–40	15–25	0.63–2.0	0.20–0.22	4.5–5.5	Moderate	Moderate	Moderate.
90–100	70–90	40–50	1–5	NP	NP	6.3–20	0.05–0.07	5.1–6.0	Low	Moderate	Moderate.
95–100	95–100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	5.1–6.0	Low	Moderate	Moderate.
100	95–100	90–100	80–90	25–35	5–10	0.63–2.0	0.20–0.22	5.1–6.0	Low	High	Moderate.
85–95	75–85	40–50	5–10	NP	NP	6.3–20	0.05–0.07	5.6–6.5	Low	Moderate	Moderate.
[3]95–100	90–100	85–95	80–90	20–30	1–10	0.63–2.0	0.22–0.24	5.1–6.0	Low	High	Moderate.
[3]90–100	85–95	60–70	55–65	25–35	5–10	0.63–2.0	0.17–0.19	4.5–5.5	Low	High	High.
95–100	90–100	85–95	80–90	30–40	15–25	0.63–2.0	0.18–0.20	5.1–5.5	Moderate	Moderate	Moderate.
--------	--------	--------	--------	--------	--------	----------	0.25–0.35	5.6–6.5	High	Moderate	Moderate.
95–100	90–95	85–95	80–90	20–30	1–10	0.63–2.0	0.22–0.24	5.1–6.5	Low.		
[3]90–100	85–95	85–95	75–85	25–35	5–10	0.63–2.0	0.20–0.22	4.5–6.0	Moderate	Low	Moderate.
[3]90–100	85–95	80–90	40–50	20–30	10–20	0.63–2.0	0.11–0.13	4.5–6.0	Low	Low	Moderate.
100	90–100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	5.1–6.5	Low.		
100	90–100	75–85	40–50	20–30	5–10	0.63–2.0	0.16–0.18	5.1–6.5	Low	High	Moderate.
100	95–100	85–95	85–95	30–40	20–30	0.20–0.63	0.18–0.20	6.1–7.3	Moderate	High	Low.
100	95–100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	5.6–6.5	Low.		
100	95–100	75–85	65–75	25–35	15–25	0.20–0.63	0.17–0.19	5.1–6.0	Moderate	High	Moderate.
100	95–100	85–95	70–85	50–60	25–35	0.06–0.20	0.22–0.24	5.1–6.5	Moderate	High	Moderate.

TABLE 9.—*Estimates of soil properties*

Soil series [1] and map symbols	Depth to—		Depth from surface	Dominant USDA texture	Classification	
	Bedrock	Seasonal high water table			Unified	AASHTO
	Ft	*Ft*	*In*			
Vesper: Vs	2–4	0–1	0–16	Silt loam	ML, CL, or CL–ML	A–4
			16–25	Loam	ML	A–4
			25–34	Silty clay	CL	A–6
			34–60	Shale and sandstone	CL	A–7
Withee: WeA, WeB	>5	1–3	0–18	Silt loam	ML, CL, or CL–ML	A–4
			18–40	Loam	CL	A–6
			40–60	Loam	CL	A–6

[1] For a detailed description of the soil series, see the section "Descriptions of the Soils."

[2] NP = nonplastic.

shrink-swell potential indicates a hazard to maintenance of structures built in, on, or of material having this rating.

Corrosivity, as used in table 9, pertains to potential soil-induced chemical action that dissolves or weakens uncoated steel or concrete. Rate of corrosion of uncoated steel is related to soil properties such 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 of the soils

The interpretations in tables 10 and 11 are based on the estimated engineering properties of soils shown in table 9, 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 Wood County. In table 10, ratings are given to summarize limitation or suitability of the soils for all listed uses other than for pond reservoir areas; embankments, dikes, and levees; drainage for crops and pasture; irrigation; and terraces and diversions. For these particular uses, table 11 lists those soil features not to be overlooked in planning, installation, and maintenance.

Soil limitations are indicated by the ratings slight, moderate, and severe. *Slight* means that soil properties are generally favorable for the rated use, or in other words, limitations are minor and easily overcome. *Moderate* means that some soil properties are unfavorable but can be overcome or modified by special planning and design. *Severe* means that 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 that one or more soil properties are so unfavorable for a particular use that overcoming the limitations is most difficult and costly and commonly is not practical for the rated use.

Soil suitability is rated by the terms *good, fair,* and *poor,* which have, respectively, meanings approximately parallel to the terms slight, moderate, and severe.

Following are explanations of some of the columns in table 10.

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 6 feet is evaluated. The soil properties considered are those that affect both absorption or 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 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 content, and slope. If the floor needs to be leveled, depth to bedrock is important. The soil properties that affect the embankment are the engineering properties of the embankment material, as interpreted from the Unified soil classification, and the amounts of stones, if any, that influence the ease of excavation and compaction of the embankment material.

significant in engineering—Continued

Percentage less than 3 inches passing sieve—				Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Shrink-swell potential	Corrosivity to—	
No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)							Uncoated steel	Concrete
				Pct		*In per hr*	*In per in of soil*	*pH*			
100	95–100	90–100	85–95	25–35	5–10	0.63–2.0	0.22–0.24	5.1–6.0	Low.		
100	95–100	80–90	50–60	10–20	2–4	0.63–2.0	0.17–0.19	5.1–5.5	Low	Low	Low.
100	95–100	85–95	85–95	30–40	20–30	0.20–0.63	0.18–0.20	4.5–5.5	Moderate	High	High.
100	95–100	85–95	70–85	40–50	25–35	0.06–0.20	0.10–0.12	4.5–5.5	Moderate	High	High.
95–100	90–95	85–95	80–90	20–30	1–10	0.63–2.0	0.12–0.14	4.5–6.5	Low.		
100	90–100	65–75	60–75	30–40	20–30	0.20–0.63	0.17–0.19	4.5–5.5	Moderate	High	High.
100	95–100	80–95	60–70	30–40	20–30	0.20–0.63	0.17–0.19	4.5–5.5	Moderate	High	High.

[3] 2 to 10 percent, by weight, of coarse fragments are larger than 3 inches in diameter.

Shallow excavations require digging or trenching to a depth of less than 6 feet, as for example, excavations for pipelines, sewerlines, phone 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 10, 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 vehicular traffic. Some soil properties that affect suitability for landfill are ease of excavation, hazard of polluting ground water, and trafficability. The best soils have moderately 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 6 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 or 15 feet, but regardless of that, every site should be investigated before it is selected.

Local roads and streets, as rated in table 10, have an all-weather surface expected to carry automobile traffic all year. They have a subgrade of underlying soil material; a base of gravel, crushed rock, or soil material stabilized with lime or cement; and a flexible or rigid surface, commonly of 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 AASHTO 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.

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 10 provide guidance about where to look for probable sources of sand. In general, the soils of Wood County have a very low content of gravel and no ratings have been made for it. A soil rated as a *good* or *fair* source of sand generally has a layer 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 the materials, nor 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 response of plants on the soil when fertilizer is applied; and absence of substances toxic to plants. Texture of the soil material and its content of stone fragments affect suitability, but also considered in the ratings is damage that will result in the area from which topsoil is taken.

TABLE 10.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—			
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with and without basements [1]
Alluvial land: Aa, Ab. No interpretations; material too variable.				
Altdorf: Af	Very severe: slow permeability; seasonal high water table.	Moderate: runoff; seasonal high water table.	Severe: seasonal high water table; clay subsoil.	Severe: poorly drained; high shrink-swell potential.
Antigo: AnA	Moderate: hazard of contaminating ground water.	Severe: rapidly permeable substratum.	Moderate: poor sidewall stability in substratum.	Slight
Au Gres: Au	Severe: seasonal high water table; hazard of contaminating ground water.	Severe: rapid permeability; seasonal high water table.	Severe: seasonal high water table; poor sidewall stability.	Severe with basements, moderate without basements: seasonal high water table.
Cathro: Ca	Very severe: seasonal high water table.	Very severe: seasonal high water table.	Very severe: seasonal high water table; poor sidewall stability.	Very severe: seasonal high water table; low bearing capacity in organic material.
Croswell: CrA	Moderate: seasonal high water table; hazard of contaminating ground water.	Severe: rapid permeability.	Severe: poor sidewall stability.	Slight without basements. Moderate with basements: seasonal high water table.
Dancy: Da	Very severe: seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table; permeable substratum.	Severe: poorly drained; moderate shrink-swell potential.
Dawson: Db, Dc	Very severe: seasonal high water table.	Very severe: seasonal high water table; rapidly permeable substratum.	Very severe: seasonal high water table; poor sidewall stability.	Very severe: seasonal high water table; low bearing capacity in organic material.
Dolph: Do	Severe: seasonal high water table; slowly permeable subsoil.	Moderate: moderately permeable substratum; bedrock restricts use in places.	Severe: seasonal high water table; clay subsoil.	Severe: high shrink-swell potential; low bearing capacity; somewhat poorly drained.
Dunnville: DvA, DwA	Moderate: hazard of contaminating ground water.	Severe: rapidly permeable substratum.	Slight	Slight
Eaupleine:				
EaB	Moderate: moderately slowly permeable substratum.	Moderate: slope; bedrock restricts use in places.	Slight	Moderate: moderate shrink-swell potential; moderate frost-heave potential.
EaC	Moderate: moderately slowly permeable substratum.	Severe: slope; bedrock restricts use in places.	Moderate: bedrock hinders excavation in places.	Moderate: moderate shrink-swell potential; moderate frost-heave potential.

interpretations for specified uses

Degree and kind of limitation for—Continued		Suitability as a source of—		
Sanitary landfill [3]	Local roads and streets [3]	Road fill [1]	Sand	Topsoil
Severe: seasonal high water table; clay subsoil.	Severe: seasonal high water table; high shrink-swell potential; subject to frost heave.	Poor: clay subsoil; high shrink-swell potential; subject to frost heave; unstable.	Unsuitable; clay subsoil and substratum.	Fair in surface layer. Poor in subsoil: clay; medium fertility.
Severe: rapidly permeable substratum; slight amelioration of leachate.	Moderate: unstable when wet; subject to frost heave.	Good: sandy substratum.	Fair: poorly graded sand in substratum.	Good in surface layer. Fair in subsoil: medium fertility; erodible.
Severe: rapid permeability; slight amelioration of leachate; seasonal high water table.	Moderate: seasonal high water table.	Good: in places, a seasonal high water table affects borrow pits.	Good: in places, a seasonal high water table affects availability.	Poor: droughty; erodible; sandy; thin.
Very severe: seasonal high water table; poor trafficability.	Very severe: seasonal high water table; low bearing capacity in organic material.	Poor: seasonal high water table; low bearing capacity in organic material.	Unsuitable: organic material over loamy mineral substratum.	Poor: organic; oxidizes rapidly.
Severe: rapid permeability; slight amelioration of leachate.	Slight	Good: sandy substratum.	Good	Poor: sandy; droughty; erodible.
Severe: seasonal high water table.	Severe: seasonal high water table.	Poor: poorly drained; moderate bearing capacity in subsoil.	Poor: poorly graded sand over clayey subsoil.	Fair: sandy.
Very severe: seasonal high water table; trafficability.	Very severe: seasonal high water table; low bearing capacity in organic material.	Unsuitable above substratum: low bearing capacity. Fair in substratum: low stability.	Fair: poorly graded sand substratum.	Poor: organic; oxidizes rapidly.
Severe: somewhat poorly drained; difficult to work when wet.	Severe: clay subsoil; high shrink-swell potential; low bearing capacity; subject to frost heave.	Poor in subsoil: high shrink-swell potential; low bearing capacity. Fair in substratum: moderate stability.	Unsuitable: clay subsoil.	Good.
Severe: little amelioration of leachate.	Slight	Good	Fair: poorly graded sand in substratum.	Fair to good: sandy to loamy.
Slight	Moderate: moderate bearing capacity; moderate shrink-swell potential; moderate frost-heave potential.	Fair: moderate bearing capacity; moderate frost-heave potential.	Unsuitable: silty material over bedrock.	Good: thin.
Slight	Moderate: moderate bearing capacity; moderate shrink-swell potential; moderate frost-heave potential.	Fair: moderate bearing capacity; moderate frost-heave potential.	Unsuitable: silty material over bedrock.	Good: thin.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Degree and kind of limitation for—			
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with and without basements [1]
Eaupleine, clayey subsoil variant: EdB, EdC.	Severe: slowly permeable subsoil and substratum.	Moderate where slopes are 0 to 6 percent, severe where slopes are more than 6 percent: bedrock restricts use in places.	Severe: clay subsoil and substratum.	Severe: high shrink-swell potential; subject to frost heave.
Eaupleine, sandy subsoil variant: EbB.	Moderate: moderately slowly permeable substratum.	Moderate slope; bedrock restricts use in places.	Slight	Moderate: moderate shrink-swell potential; moderate frost-heave potential.
Eaupleine, silty subsoil variant: EcB.	Slight	Moderate: moderately permeable.	Slight	Moderate: moderate shrink-swell potential; moderate frost-heave potential.
Eleva: EeB, EeC	Moderate: hazard of contaminating ground water.	Severe: rapidly permeable substratum.	Severe: rippable sandstone at a depth of 20 to 40 inches.	Slight without basements. Moderate with basements; rippable sandstone at a depth of 20 to 40 inches.
Elkmound: EkB, EkC, EkD2.	Severe: bedrock at a depth of less than 20 inches.	Severe: bedrock at a depth of less than 20 inches.	Moderate: rippable bedrock at a depth of less than 20 inches.	Severe: rippable bedrock at a depth of less than 20 inches.
Elm Lake: Em	Very severe: seasonal high water table; slowly permeable subsoil and substratum.	Severe: seasonal high water table; sandstone bedrock at a depth of less than 40 inches.	Severe: seasonal high water table; rippable sandstone bedrock at a depth of less than 40 inches.	Severe: poorly drained; high shrink-swell potential in subsoil; subject to frost heave.
Fenwood: FeB, FfB	Moderate: bedrock restricts use in places.	Moderate: bedrock restricts use in places.	Moderate: bedrock at a depth of 40 to 60 inches.	Slight without basements. Moderate with basements: bedrock at a depth of 40 to 60 inches.
FeC, FfC	Moderate: bedrock restricts use in places.	Severe: slope	Moderate: bedrock at a depth of 40 to 60 inches.	Moderate: bedrock at a depth of 40 to 60 inches.
FeD, FfD	Severe: slope	Severe: slope	Severe: slope	Severe: slope
Friendship: FrA	Moderate: seasonal high water table; hazard of contaminating ground water.	Severe: rapid permeability.	Severe: poor sidewall stability; seasonal high water table.	Slight without basements. Moderate with basements: seasonal high water table.
Gale: GaB, GaC	Severe: sandstone bedrock at a depth of 24 to 48 inches; hazard of contaminating ground water.	Severe: permeable sandstone at a depth of 24 to 48 inches.	Moderate: rippable sandstone at a depth of less than 40 inches.	Slight without basements. Moderate with basements: rippable sandstone at a depth of 24 to 48 inches.
Greenwood: Gr	Very severe: seasonal high water table.	Very severe: seasonal high water table; moderately rapid permeability.	Very severe: seasonal high water table.	Very severe: organic material; seasonal high water table; low bearing capacity.

for specified uses—Continued

Degree and kind of limitation for—Continued		Suitability as a source of—		
Sanitary landfill [2]	Local roads and streets [1]	Road fill [1]	Sand	Topsoil
Severe: clay subsoil and substratum; difficult to work when wet.	Severe: low bearing capacity; high shrink-swell potential; high frost-heave potential.	Poor: low bearing capacity; high shrink-swell potential.	Unsuitable: silty material over bedrock.	Good: thin.
Slight	Moderate: moderate bearing capacity; moderate shrink-swell potential; moderate frost-heave potential.	Fair: moderate bearing capacity; moderate frost-heave potential.	Unsuitable: silty material over bedrock.	Good: thin.
Slight	Moderate: moderate bearing capacity; moderate shrink-swell potential; moderate frost-heave potential.	Fair: moderate bearing capacity; moderate frost-heave potential.	Unsuitable: silty material over bedrock.	Good: thin.
Severe: little amelioration of leachate.	Slight: rippable sandstone.	Good: sandy material and rippable stone.	Good	Fair: sandy loam.
Severe: rippable bedrock at a depth of less than 20 inches.	Moderate: rippable bedrock at a depth of less than 20 inches.	Fair: sandstone generally is rippable.	Poor: platy sandstone bedrock.	Good in surface layer: thin.
Severe: seasonal high water table; rippable sandstone bedrock at a depth of less than 60 inches.	Severe: poorly drained; high shrink-swell potential; subject to frost heave.	Poor: high shrink-swell potential; moderate stability.	Poor: poorly graded sandstone and layers of shale in substratum.	Fair: thin; sandy; low fertility.
Moderate: rippable bedrock at a depth of 40 to 60 inches.	Moderate: moderate shrink-swell potential.	Fair: moderate bearing capacity; moderate stability.	Unsuitable: silty soil over shattered granite bedrock.	Good: thin.
Moderate: rippable bedrock at a depth of 40 to 60 inches.	Moderate: moderate shrink-swell potential.	Fair: moderate bearing capacity; moderate stability.	Unsuitable: silty soil over shattered granite bedrock.	Good: thin.
Severe: rippable bedrock at a depth of 40 to 60 inches.	Severe: slope	Fair: slope	Unsuitable: silty soil over shattered granite bedrock.	Good: thin.
Severe: seasonal high water table; rapid permeability.	Slight	Good	Good	Poor: sandy; droughty; erodible.
Severe: sandstone bedrock at a depth of less than 60 inches.	Slight	Good	Poor: platy sandstone bedrock.	Good: thin.
Very severe: seasonal high water table.	Very severe: organic material; seasonal high water table.	Unsuitable: organic material.	Unsuitable: organic material.	Poor: erodible; oxidizes rapidly.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Degree and kind of limitation for—			
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with and without basements [1]
Guenther: GuB	Moderate: lower end of permeability.	Moderate: moderately permeable substratum.	Moderate: poor sidewall stability in subsoil.	Moderate: moderate shrink-swell potential.
Hiles: HsB, HsC	Severe: slow permeability in substratum.	Moderate: slope	Slight: rippable sandstone at a depth of 40 to 60 inches.	Moderate: moderate shrink-swell potential in substratum; and moderate bearing capacity.
Humbird: HuB, HwB	Severe: slow permeability in lower part of subsoil.	Moderate: seasonal high water table; rapidly permeable subsoil.	Moderate: rippable sandstone at a depth of less than 60 inches.	Moderate: moderate shrink-swell potential; moderate bearing capacity.
Kert: KeA	Severe: slow permeability in substratum; seasonal high water table.	Moderate: sandstone allows lateral seepage in places.	Severe: seasonal high water table; rippable sandstone and shale in substratum.	Severe with basements, moderate without basements: somewhat poorly drained; moderate shrink-swell potential; moderate bearing capacity.
Mann: Ma	Very severe: seasonal high water table.	Severe: moderately rapid permeability in substratum; seasonal high water table.	Severe: seasonal high water table.	Severe: seasonal high water table.
Marathon: MbB	Moderate: hazard of contaminating ground water.	Severe: rapid permeability in substratum.	Moderate: gravelly substratum.	Slight
Markey: Mc	Very severe: seasonal high water table.	Very severe: seasonal high water table; rapid permeability in substratum.	Very severe: organic material; seasonal high water table.	Severe: organic material; seasonal high water table; low bearing capacity in organic material.
Marsh: Md. No interpretations; material too variable.				
Marshfield: Mf	Severe: seasonal high water table; moderately slow permeability.	Severe: seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained; seasonal high water table.
Meehan: Mh	Severe: seasonal high water table; hazard of contaminating ground water.	Severe: rapid permeability.	Severe: poor sidewall stability.	Severe with basements, moderate without basements: seasonal high water table.
Merrillan: MpA	Severe: seasonal high water table; moderately slow permeability in substratum.	Severe: seasonal high water table; rippable sandstone and shale at a depth of less than 40 inches.	Moderate: seasonal high water table; rippable sandstone and shale at a depth of less than 40 inches.	Severe with basements, moderate without basements: seasonal high water table.
Milladore: Mr	Severe: seasonal high water table; moderately slow permeability in substratum.	Moderate: seasonal high water table; bedrock restricts use in places.	Moderate: somewhat poorly drained.	Moderate without basements, severe with basements: moderate bearing capacity; somewhat poorly drained.
Mosinee: MsB	Moderate: bedrock at a depth of 4 to 8 feet; hazard of contaminating ground water.	Severe: moderately rapid permeability in substratum.	Moderate: bedrock at a depth of 4 to 8 feet.	Slight

for specified uses—Continued

Degree and kind of limitation for—Continued		Suitability as a source of—		
Sanitary landfill [2]	Local roads and streets [1]	Road fill [1]	Sand	Topsoil
Moderate: poor trafficability.	Moderate: moderate shrink-swell potential in substratum.	Good	Poor: poorly graded sand over loam.	Poor: sandy.
Moderate: rippable sandstone at a depth of 40 to 60 inches.	Slight	Fair: moderate	Poor: sandstone and shale in substratum.	Good: thin.
Moderate: rippable sandstone at a depth of less than 60 inches.	Slight	Good: moderately stable.	Poor: sandstone and layers of shale in substratum.	Fair: thin; sandy.
Severe: seasonal high water table; rippable sandstone at a depth of less than 72 inches.	Moderate: somewhat poorly drained; rippable sandstone at a depth of less than 72 inches.	Fair: shale and sandstone bedrock.	Poor: sandstone and layers of shale in substratum.	Good: thin.
Severe: seasonal high water table.	Severe: seasonal high water table; subject to frost heave.	Poor: seasonal high water table; fair to good stability.	Unsuitable: high content of fines.	Good.
Severe: rapid permeability in substratum.	Slight	Good	Unsuitable: little or no sand present.	Good: thin.
Very severe: organic material; seasonal high water table.	Very severe: organic material; seasonal high water table.	Poor in organic layer: seasonal high water table. Fair in substratum: low stability.	Fair: poorly graded sand in substratum.	Poor: erodible; oxidizes rapidly.
Severe: poorly drained; seasonal high water table.	Severe: poorly drained; moderate frost-heave potential.	Poor: poorly drained; moderate shrink-swell potential and bearing capacity.	Unsuitable: small amount of sand.	Good.
Severe: rapid permeability; seasonal high water table.	Moderate: seasonal high water table.	Fair: seasonal high water table.	Good	Poor: sandy.
Severe: seasonal high water table.	Moderate: somewhat poorly drained; moderate shrink-swell potential.	Fair: shale and sandstone bedrock.	Poor: shale and layers of sandstone in substratum.	Fair: thin; droughty.
Severe: seasonal high water table.	Moderate: somewhat poorly drained; moderate frost-heave potential; moderate shrink-swell potential.	Fair: moderate bearing capacity and shrink-swell potential.	Unsuitable: silty soil over loamy residuum.	Good: thin.
Severe: moderately rapid permeability in substratum.	Slight	Good	Unsuitable: loamy soil over granitic bedrock.	Good.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Degree and kind of limitation for—			
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with and without basements [1]
Newson: Ne	Very severe: seasonal high water table; hazard of contaminating ground water.	Severe: rapid permeability.	Severe: seasonal high water table; poor sidewall stability.	Severe: seasonal high water table.
Norgo: NoB, NoC2, NoD2.	Severe: hazard of contaminating ground water; sandstone bedrock at a depth of less than 20 inches.	Severe: shallow to permeable sandstone bedrock.	Severe: rippable sandstone bedrock at a depth of less than 20 inches.	Severe: sandstone bedrock at a depth of less than 20 inches.
Nymore: NyA, NzA, NzB	Moderate: hazard of contaminating ground water.	Severe: rapid permeability in substratum.	Severe: poor sidewall stability.	Slight
Onamia: OnA	Moderate: hazard of contaminating ground water.	Severe: rapid permeability in substratum.	Severe: poor sidewall stability.	Slight
Plainbo: PbB	Severe: bedrock at a depth of less than 40 inches.	Severe: rippable sandstone bedrock at a depth of less than 40 inches.	Moderate: rippable sandstone bedrock at a depth of less than 40 inches.	Slight without basements where slope is 0 to 6 percent. Moderate without basements where slope is 6 to 12 percent. Moderate with basements: rippable sandstone bedrock at a depth of less than 40 inches.
PbD	Severe: slopes are 12 to 30 percent.	Severe: rippable sandstone bedrock at a depth of less than 40 inches.	Severe: slopes are 12 to 30 percent.	Severe: slopes are 12 to 30 percent.
Plainfield: PfA, PfB, PfC, PgA, PgB.	Moderate: hazard of contaminating ground water.	Severe: rapid permeability.	Severe: poor sidewall stability.	Slight
PfE	Severe: slopes are 12 to 35 percent.	Severe: rapid permeability.	Severe: poor sidewall stability.	Severe: slopes are 12 to 35 percent.
Point: PoB	Severe: seasonal high water table; moderately slow permeability.	Moderate: moderately slow permeability; slopes are 2 to 6 percent.	Moderate: seasonal high water table.	Moderate without basements, severe with basements: seasonal high water table.
Poskin: Ps	Severe: seasonal high water table; hazard of contaminating ground water.	Severe: rapid permeability in substratum; seasonal high water table.	Severe: seasonal high water table; poor sidewall stability.	Moderate without basements, severe with basements; seasonal high water table.
Rib: Rb	Very severe: seasonal high water table; hazard of contaminating ground water.	Severe: rapid permeability in substratum; seasonal high water table.	Severe: seasonal high water table; poor sidewall stability.	Severe: seasonal high water table.
Rietbrock: ReB, ReC	Severe: seasonal high water table; moderate permeability.	Severe: bedrock at a depth of 3 to 5 feet; seasonal high water table.	Severe: seasonal high water table; shattered granite at a depth of 3 to 5 feet.	Moderate without basements, severe with basements: seasonal high water table.

for specified uses—Continued

Degree and kind of limitation for—Continued		Suitability as a source of—		
Sanitary landfill [2]	Local roads and streets [1]	Road fill [1]	Sand	Topsoil
Severe: seasonal high water table.	Severe: seasonal high water table.	Fair: seasonal high water table; low stability.	Fair: poorly graded sand substratum.	Poor: sandy; droughty.
Severe: shallow to permeable sandstone bedrock.	Moderate: sandstone bedrock at a depth of less than 20 inches.	Fair: sandstone bedrock substratum.	Poor: platy sandstone bedrock substratum.	Good.
Severe: rapid permeability in substratum.	Slight	Good	Good	Poor: sandy.
Severe: rapid permeability in substratum.	Slight	Good	Good	Good.
Severe: rapid permeability in substratum.	Slight where slope is 0 to 6 percent. Moderate where slope is 6 to 12 percent.	Good	Good: sandstone bedrock at a depth of less than 40 inches.	Poor: sandy.
Severe: rapid permeability in substratum.	Severe: slopes are 12 to 35 percent.	Fair: slopes are 12 to 35 percent.	Good: sandstone bedrock at a depth of less than 40 inches.	Poor: sandy.
Severe: rapid permeability.	Slight	Good	Good	Poor: sandy.
Severe: rapid permeability.	Severe: slopes are 12 to 35 percent.	Fair: slopes are 12 to 35 percent.	Good	Poor: sandy.
Severe: seasonal high water table.	Moderate: somewhat poorly drained; moderate shrink-swell potential; moderate frost-heave potential.	Fair: moderate shrink-swell potential and moderate frost-heave potential.	Poor: poorly graded sand over loam.	Fair: sandy.
Severe: seasonal high water table.	Moderate: somewhat poorly drained; moderate shrink-swell potential and frost-heave potential in subsoil.	Fair: moderate shrink-swell potential and moderate frost-heave potential.	Fair: poorly graded sand in substratum.	Good.
Severe: seasonal high water table.	Severe: poorly drained; high frost-heave potential.	Fair: sand and gravel in substratum; poorly drained.	Fair: poorly graded sand and gravel in substratum.	Good.
Severe: seasonal high water table; bedrock at a depth of 3 to 5 feet.	Moderate: somewhat poorly drained; bedrock at a depth of 3 to 5 feet.	Fair: somewhat poorly drained; bedrock at a depth of 3 to 5 feet.	Unsuitable: loamy soil over granitic bedrock.	Good.

TABLE 10.—*Engineering interpretations*

Soil series and map symbols	Degree and kind of limitation for—			
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with and without basements [1]
Rifle: Rf, Rg	Very severe: seasonal high water table.	Very severe: seasonal high water table; moderately rapid permeability.	Very severe: seasonal high water table; organic material.	Very severe: organic material; seasonal high water table; low bearing capacity.
Santiago: SaB, SaC	Slight	Moderate where slopes are 2 to 6 percent, severe where slopes are 6 to 12 percent; moderate permeability.	Slight	Slight
SaD2	Severe: slopes are 12 to 20 percent.	Severe: slopes are 12 to 20 percent.	Severe: slopes are 12 to 20 percent.	Severe: slopes are 12 to 20 percent.
SbB	Moderate: slow permeability in substratum.	Moderate: moderate permeability in subsoil; slow permeability in substratum.	Slight	Moderate: moderate bearing capacity; moderate shrink-swell potential.
Sherry: Sh	Very severe: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table; moderately slow permeability in substratum.	Severe: poorly drained.	Severe: poorly drained.
Ss	Very severe: seasonal high water table.	Severe: seasonal high water table; stony.	Severe: poorly drained; stony.	Severe: poorly drained.
Veedum: Ve	Very severe: seasonal high water table.	Severe: seasonal high water table.	Severe: very poorly drained; seasonal high water table.	Severe: very poorly drained.
Vesper: Vs	Very severe: seasonal high water table; slow permeability in substratum.	Severe: seasonal high water table.	Severe: poorly drained; seasonal high water table.	Severe: poorly drained.
Withee: WeA, WeB	Severe: seasonal high water table; moderately slow permeability.	Moderate: seasonal high water table.	Moderate: somewhat poorly drained.	Moderate without basements. Severe with basements: somewhat poorly drained; moderate shrink-swell potential and bearing capacity.

[1] Engineers and others should not apply specific value to estimates of bearing capacity given in the columns headed "Dwellings with and without basements," "Local roads and streets," and "Road fill."

Following are explanations of some of the columns in table 11.

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-swell potential, shear strength, and compactibility. Presence of stones or organic material in a soil is unfavorable.

Drainage for 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;

for specified uses—Continued

Degree and kind of limitation for—Continued		Suitability as a source of—		
Sanitary landfill [2]	Local roads and streets [1]	Road fill [1]	Sand	Topsoil
Very severe: seasonal high water table; moderately rapid permeability.	Very severe: seasonal high water table; low bearing capacity; subject to frost heave.	Unsuitable: organic material; low bearing capacity.	Unsuitable: organic material.	Poor: erodible; oxidizes rapidly.
Slight	Moderate: moderate shrink-swell potential and moderate frost-heave potential in subsoil.	Fair: moderate shrink-swell potential; moderate frost-heave potential.	Poor: sandy loam substratum.	Good.
Moderate: slopes are 12 to 20 percent.	Severe: slopes are 12 to 20 percent.	Fair: moderate shrink-swell potential; moderate frost-heave potential.	Poor: sandy loam substratum.	Poor: slopes are 12 to 20 percent.
Moderate: rippable sandstone and shale at a depth of less than 60 inches.	Moderate: moderate shrink-swell potential and moderate frost-heave potential in substratum.	Fair: moderate shrink-swell potential; moderate frost-heave potential.	Poor: sandstone and layers of shale in substratum.	Good.
Severe: seasonal high water table.	Severe: poorly drained.	Poor: poorly drained; moderate shrink-swell potential; moderate frost-heave potential.	Unsuitable: loamy soil over bedrock residuum.	Fair: poorly drained.
Severe: seasonal high water table.	Severe: poorly drained; stony.	Poor: poorly drained; moderate shrink-swell potential; moderate frost-heave potential.	Unsuitable: loamy soil over bedrock residuum.	Fair: poorly drained; stony.
Severe: seasonal high water table.	Severe: very poorly drained; low bearing capacity.	Poor: very poorly drained; moderate shrink-swell potential; moderate frost-heave potential.	Poor: sandstone and layers of shale in substratum.	Fair: very poorly drained.
Severe: seasonal high water table.	Severe: poorly drained; low bearing capacity.	Poor: poorly drained; moderate shrink-swell potential; moderate frost-heave potential.	Poor: sandstone and layers of shale in substratum.	Fair: poorly drained.
Moderate: somewhat poorly drained.	Moderate: somewhat poorly drained; moderate shrink-swell potential; moderate frost-heave potential.	Fair: moderate shrink-swell potential; somewhat poorly drained.	Unsuitable: silty over loam glacial till.	Good.

[2] Onsite studies of the underlying strata, water table, and hazards of aquifer pollution and drainage into ground water should be made for landfill deeper than 5 or 6 feet.

slope; stability in ditchbanks; susceptibility to stream overflow; salinity or alkalinity; and availability of outlets for drainage.

Irrigation of a soil is affected by such features as slope; susceptibility to stream overflow, water erosion, or soil blowing; texture; content of stones; accumulations of salts and alkali; 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

TABLE 11.—*Engineering interpretations for farm uses*

Soil series and map symbols	Soil features affecting—				
	Pond reservoir areas	Embankments, dikes, and levees	Drainage for crops and pasture	Irrigation	Terraces and diversions
Alluvial land: Aa, Ab. No interpretations; material too variable.					
Altdorf: Af	Seasonal high water table; slow permeability in upper part of substratum.	Fair to poor stability and compaction; slow permeability.	Slow permeability; surface drainage feasible.	Poorly drained; medium available water capacity; slow intake rate; slow permeability.	Nearly level: seasonal high water table.
Antigo: AnA	Permeability moderate in subsoil and rapid in substratum.	Fair to good stability and compaction; pervious substratum.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; moderate permeability.	Sand at a depth of 20 to 40 inches.
Au Gres: Au	Rapid permeability; seasonal high water table; dugout ponds feasible in places.	Poor stability; fair compaction; pervious; erodible.	Seasonal high water table; rapid permeability; surface drainage feasible.	Seasonal high water table; low available water capacity; rapid permeability; rapid intake rate.	Seasonal high water table; sandy.
Cathro: Ca	Seasonal high water table; dugout ponds feasible.	Organic material not suitable; fair to poor stability and compaction in substratum.	Moderately rapid permeability; open-ditch drainage feasible if outlets available.	Seasonal high water table; very high available water capacity; rapid intake rate; moderately rapid permeability.	Seasonal high water table; practice not applicable.
Croswell: CrA	Rapid permeability	Poor stability and compaction; pervious.	Rapid permeability; drainage generally not needed.	Low available water capacity; rapid intake rate; hazard of soil blowing; rapid permeability.	Sandy; difficult to vegetate; practice generally not applicable.
Dancy: Da	Moderately rapid permeability in substratum; seasonal high water table.	Fair to good stability and compaction; semipervious.	Seasonal high water table; surface drainage feasible.	Medium available water capacity; rapid intake rate; poorly drained; moderately slow permeability.	Seasonal high water table; practice generally not applicable.
Dawson: Db, Dc	Seasonal high water table; dugout ponds feasible.	Organic material not suitable; poor stability in substratum; pervious.	Moderately rapid permeability; open-ditch drainage feasible if outlets available.	Seasonal high water table; high available water capacity; rapid intake rate; moderately rapid permeability.	Seasonal high water table; practice not applicable.
Dolph: Do	Slowly permeable subsoil; seasonal high water table; bedrock at a depth of 4 to 8 feet.	Fair to good compaction and stability; semipervious.	Seasonal high water table; surface drainage feasible.	Medium available water capacity; moderate intake rate; slow permeability.	Seasonal high water table; clayey subsoil.
Dunnville: DvA, DwA.	Rapidly permeable substratum.	Fair stability and compaction in subsoil; poor stability in substratum; pervious.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; moderate permeability.	Sand at a depth of 20 to 40 inches; highly erodible.

TABLE 11.—*Engineering interpretations for farm uses*—Continued

Soil series and map symbols	Soil features affecting—				
	Pond reservoir areas	Embankments, dikes, and levees	Drainage for crops and pasture	Irrigation	Terraces and diversions
Eaupleine:					
EaB	Moderately slow permeability in substratum; bedrock restricts use in places.	Fair to good stability and compaction; semipervious.	Natural drainage adequate.	High available water capacity; moderate intake rate; moderately slow permeability.	Moderately slow permeability; good stability.
EaC	Moderately slow permeability in substratum; bedrock restricts use in places.	Fair to good stability and compaction; semipervious.	Natural drainage adequate.	High available water capacity; moderate intake rate; moderately slow permeability; slopes restrict use of equipment in places.	Moderately slow permeability; good stability.
Eaupleine, clayey subsoil variant: EdB, EdC.	Slow permeability in subsoil and substratum; bedrock restricts use in places.	Fair to poor stability and compaction; semipervious.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; slow permeability.	Dense clayey subsoil; construction and vegetating difficult; slow permeability.
Eaupleine, sandy subsoil variant: EbB.	Moderately slow permeability in substratum; bedrock restricts use in places.	Fair to good stability and compaction; semipervious.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; moderately slow permeability.	Moderately slow permeability; good stability.
Eaupleine, silty subsoil variant: EcB.	Moderately slow permeability in substratum; bedrock restricts use in places.	Fair to good stability and compaction; semipervious.	Natural drainage adequate.	High available water capacity; moderate intake rate; moderately slow permeability.	Moderately slow permeability; good stability.
Eleva: EeB, EeC	Moderately rapid permeability in substratum.	Fair stability and fair to good compaction; semipervious.	Natural drainage adequate.	Low available water capacity; moderately rapid intake rate; moderately rapid permeability.	Sandy; bedrock at a depth of 2 to 4 feet.
Elkmound: EkB, EkC, EkD2.	Pervious sandstone bedrock at a depth of less than 20 inches.	Poor stability and compaction; pervious; sandstone bedrock at a depth of 1 to 2 feet.	Natural drainage adequate.	Very low available water capacity; moderate intake rate; moderately rapid permeability.	Sandstone bedrock at a depth of 1 to 2 feet.
Elm Lake: Em	Rapid permeability in sandstone; dugout ponds feasible.	Fair stability and compaction; semipervious.	Slowly permeable subsoil; surface drainage feasible.	Poorly drained; rapid intake rate; very low available water capacity; rapid permeability.	Practices generally not applicable; clayey subsoil.
Fenwood: FeB, FeC, FeD, FfB, FfC, FfD.	Moderately permeable subsoil; shattered granite substratum.	Fair to good compaction and stability in subsoil; subsoil semipervious.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; moderate permeability.	Bedrock at a depth of 3 to 5 feet.
Friendship: FrA	Rapid permeability	Poor stability and fair compaction; pervious.	Natural drainage generally adequate.	Low available water capacity; rapid intake rate; rapid permeability.	Sandy; difficult to vegetate.
Gale: GaB, GaC	Rapid permeability in substratum.	Fair to good stability and compaction in subsoil; sandstone substratum pervious.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; moderate permeability.	Sandstone bedrock at a depth of 2 to 4 feet.

TABLE 11.—*Engineering interpretations for farm uses*—Continued

Soil series and map symbols	Soil features affecting—				
	Pond reservoir areas	Embankments, dikes, and levees	Drainage for crops and pasture	Irrigation	Terraces and diversions
Greenwood: Gr	Dugout ponds feasible.	Organic material not suitable.	Moderately rapid permeability; subsurface drainage feasible.	Very high available water capacity; rapid intake rate; seasonal high water table; moderately rapid permeability.	Seasonal high water table; practices not applicable.
Guenther: GuB	Moderate permeability in subsoil; moderately slow permeability in substratum.	Fair to good stability and compaction.	Natural drainage adequate.	Medium available water capacity; rapid intake rate; moderate permeability.	Sandy; difficult to vegetate.
Hiles: HsB, HsC	Moderately permeable subsoil; slowly permeable substratum.	Fair to good stability and compaction in subsoil; sandstone and shale substratum.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; slow permeability.	Sandstone and shale bedrock at a depth of 2 to 6 feet.
Humbird: HuB, HwB	Rapidly permeable subsoil; slowly permeable substratum.	Fair to good stability and compaction in subsoil; sandstone and shale substratum.	Natural drainage adequate.	Medium available water capacity; rapid intake rate; slow permeability.	Sandy; difficult to vegetate.
Kert: KeA	Sandstone allows lateral seepage in places; dugout ponds feasible.	Fair stability and compaction.	Slow permeability; surface drainage feasible.	Medium available water capacity; moderate intake rate; somewhat poorly drained; slow permeability.	Sandstone and shale at a depth of 20 to 40 inches.
Mann: Ma	Moderately rapid permeability in substratum; dugout ponds feasible.	Fair to good stability and compaction.	Moderately slow permeability; surface drainage feasible.	Very poorly drained; moderately slow permeability; high available water capacity; moderate intake rate.	Practices not applicable.
Marathon: MbB	Rapid permeability in substratum.	Disintegrated granite bedrock substratum.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; moderate permeability.	Gravelly substratum at a depth of 20 to 40 inches.
Markey: Mc	Seasonal high water table; dugout ponds feasible.	Organic material not suitable; pervious sand substratum.	Moderately rapid permeability; subsurface drainage feasible.	Very high available water capacity; rapid intake rate; seasonal high water table; moderately rapid permeability.	Practices not applicable.
Marsh: Md. No interpretations; material too variable.					
Marshfield: Mf	Moderately slow permeability; dugout ponds feasible.	Fair to good stability and compaction.	Moderately slow permeability; surface drainage feasible.	High available water capacity; slow intake rate; poorly drained; moderately slow permeability.	Wetness hinders construction.

TABLE 11.—*Engineering interpretations for farm uses*—Continued

Soil series and map symbols	Soil features affecting—				
	Pond reservoir areas	Embankments, dikes, and levees	Drainage for crops and pasture	Irrigation	Terraces and diversions
Meehan: Mh	Rapid permeability; seasonal high water table; dugout ponds feasible.	Pervious; fair stability and compaction.	Rapid permeability; surface drainage feasible.	Low available water capacity; rapid intake rate; somewhat poorly drained; rapid permeability.	Practices generally not applicable.
Merrillan: MpA	Moderately slow permeability in substratum.	Fair stability and compaction.	Seasonal high water table; surface drainage feasible.	Low available water capacity; rapid intake rate; somewhat poorly drained; moderately slow permeability.	Sandy; sandstone and shale at a depth of 20 to 40 inches.
Milladore: Mr	Moderately slow permeability in substratum; bedrock restricts use in places.	Fair to good stability and compaction; semipervious.	Moderately slow permeability; surface drainage feasible.	High available water capacity; moderate intake rate; somewhat poorly drained; moderately slow permeability.	Seasonal high water table.
Mosinee: MsB	Moderately rapid permeability in substratum; bedrock restricts use in places.	Good stability and compaction.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; moderate permeability.	Gently sloping; gravelly loam subsoil.
Newson: Ne	Rapid permeability; dugout ponds feasible.	Poor stability and compaction; pervious.	Rapid permeability; open-ditch drainage feasible.	Low available water capacity; rapid intake rate; poorly drained; rapid permeability.	Practices not applicable.
Norgo: NoB, NoC2, NoD2.	Permeable sandstone at a depth of less than 20 inches.	Fair to good stability and compaction; sandstone substratum.	Natural drainage adequate.	Low available water capacity; moderate intake rate; shallow soil; moderate permeability.	Sandstone bedrock at a depth of less than 20 inches.
Nymore: NyA, NzA, NzB.	Rapid permeability in substratum.	Poor stability and compaction; pervious.	Natural drainage adequate.	Low available water capacity; rapid intake rate; rapid permeability; erodible.	Sandy soil; difficult to vegetate.
Onamia: OnA	Rapid permeability in substratum.	Fair to good stability and compaction; pervious.	Natural drainage adequate.	Medium available water capacity; moderate intake rate; moderate permeability.	Sand at a depth of 20 to 40 inches.
Plainbo: PbB, PbD	Rapid permeability; sandstone at a depth of 2 to 4 feet.	Poor stability; fair compaction; pervious.	Natural drainage excessive.	Very low available water capacity; shallow soil; rapid permeability; rapid intake rate.	Sandy; difficult to vegetate.
Plainfield: PfA, PfB, PfC, PfE, PgA, PgB.	Rapid permeability	Poor stability; fair compaction; pervious.	Natural drainage excessive.	Low available water capacity; rapid intake rate; rapid permeability.	Sandy; difficult to vegetate; erodible.
Point: PoB	Moderately slow permeability in subsoil and substratum.	Fair to good stability and compaction; semipervious.	Moderately slow permeability; surface drainage feasible.	Medium available water capacity; rapid intake rate; somewhat poorly drained; moderately slow permeability.	Sandy; difficult to vegetate.

TABLE 11.—*Engineering interpretations for farm uses*—Continued

Soil series and map symbols	Soil features affecting—				
	Pond reservoir areas	Embankments, dikes, and levees	Drainage for crops and pasture	Irrigation	Terraces and diversions
Poskin: Ps	Rapid permeability in substratum; seasonal high water table.	Fair to good stability and compaction; semipervious.	Moderate permeability; surface and open-ditch drainage feasible.	Medium available water capacity; somewhat poorly drained; moderate intake rate; moderate permeability.	Sand at a depth of 20 to 40 inches.
Rib: Rb	Rapid permeability in substratum; seasonal high water table; dugout ponds feasible.	Fair to good stability and compaction; semipervious.	Moderate permeability; surface and open-ditch drainage feasible.	Medium available water capacity; poorly drained; moderate intake rate; moderate permeability.	Practices not applicable.
Rietbrock: ReB, ReC	Moderate permeability; bedrock at a depth of 3 to 5 feet; seasonal high water table; dugout ponds feasible.	Fair to good stability and compaction; semipervious.	Moderate permeability; surface drainage feasible.	Medium available water capacity; somewhat poorly drained; moderate intake rate; moderate permeability.	Granitic bedrock at a depth of 3 to 5 feet.
Rifle: Rf, Rg	Seasonal high water table; dugout ponds feasible.	Organic material; unstable; pervious.	Moderately rapid permeability; seasonal high water table; open-ditch drainage feasible.	Very high available water capacity; seasonal high water table; rapid intake rate; moderately rapid permeability.	Practices not applicable.
Santiago:					
SaB, SaC	Moderate permeability.	Fair to good stability and compaction; semipervious.	Natural drainage adequate.	High available water capacity; moderate intake rate; moderate permeability.	Subsoil erodible.
SaD2	12 to 20 percent slopes.	Fair to good stability and compaction; semipervious.	Natural drainage adequate.	12 to 20 percent slopes.	12 to 20 percent slopes.
SbB	Slow permeability in substratum.	Fair to good stability and compaction; semipervious.	Natural drainage adequate.	High available water capacity; moderate intake rate; slow permeability.	Subsoil erodible.
Sherry:					
Sh	Moderately slow permeability in substratum; seasonal high water table; dugout ponds feasible.	Fair to good stability and compaction; semipervious.	Moderately slow permeability; surface drainage feasible.	High available water capacity; slow intake rate; poorly drained; moderately slow permeability.	Practices generally not applicable.
Ss	Moderately slow permeability in substratum; seasonal high water table; dugout ponds feasible; stony.	Fair to good stability and compaction; semipervious; stony.	Stony	Stony	Stony.
Veedum: Ve	Slow permeability; seasonal high water table; dugout ponds feasible.	Fair to good stability and compaction; semipervious.	Slow permeability; seasonal high water table; surface drainage feasible.	Medium available water capacity; slow intake rate; very poorly drained; slow permeability.	Practices not applicable.

TABLE 11.—*Engineering interpretations for farm uses*—Continued

Soil series and map symbols	Soil features affecting—				
	Pond reservoir areas	Embankments, dikes, and levees	Drainage for crops and pasture	Irrigation	Terraces and diversions
Vesper: Vs	Slow permeability; seasonal high water table; dug-out ponds feasible.	Fair to good stability and compaction; semipervious.	Slow permeability; seasonal high water table; surface drainage feasible.	Medium available water capacity; slow intake rate; poorly drained; slow permeability.	Practices not applicable.
Withee: WeA, WeB	Moderately slow permeability; somewhat poorly drained.	Fair to good stability and compaction; semipervious.	Moderately slow permeability; somewhat poorly drained; surface drainage feasible.	High available water capacity; slow intake rate; somewhat poorly drained; moderately slow permeability.	Wetness hinders construction.

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. The soil features that apply to the construction of terraces and diversions also apply to the construction of grassed waterways. No separate ratings are made for grassed waterways in table 11.

Test data

Table 12 contains engineering test data for some of the major soils in Wood County. These tests were made to help to 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 anlayses 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 liquid limit and plastic limit measure the effect of water on the consistence of soil material, as has been explained for table 9.

Formation and Classification of the Soils

In this section the factors that affect the formation and the morphology of the soils in Wood County are discussed. Then the current system of soil classification is explained and the soils are placed in higher categories of the system.

Factors of Soil Formation

Soil is produced by soil-forming processes acting on materials deposited or accumulated by geologic agencies. The characteristics of the soil at any given point are determined by (1) the physical and mineralogical composition of the parent material, (2) the climate under which the soil material has accumulated and existed since accumulation, (3) the plant and animal life on and in the soil, (4) the relief, or lay of the land, and (5) the length of time the forces of soil formation have acted on the soil material.

Climate, animals, and especially plants are active factors in soil formation. They act on the parent material that has accumulated through the weathering of rocks and slowly change it to a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. The parent material also affects the kind of soil that forms and, in extreme cases, determines it almost entirely. Finally, time is needed for the parent material to change into a soil profile. It may be much or little, but some time is always required for differentiation of soil horizons. Usually, a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effect of any one factor unless conditions are specified for the other four. The relative importance of each factor may vary from time to time, but all of the factors operate to some degree at all times. Many of the processes of soil development are unknown.

Parent material

The soils in the northern two-thirds of Wood County formed in "two-storied" parent material. That is, the

TABLE 12.—*Engineering*

[Tests performed by the State Highway Commission of Wisconsin in cooperation with the U.S. Department of Commerce, Bureau Officials

Soil name and location	Parent material	Depth from surface	Moisture density [1]		Mechanical analysis [2]		
			Maximum dry density	Optimum moisture	Percentage less than 3 inches passing sieve—		
					¾ in	⅜ in	No. 4 (4.7 mm)
		In	*Lb per cu ft*	*Pct*			
Altdorf silt loam: NW¼SE¼SW¼NE¼ sec. 23, T. 23 N., R. 5 E. (Modal)	Loamy sediment over clayey residuum.	22–38	102.5	22.5			
		76–93	113.8	14.8			
Dancy sandy loam: NE¼NW¼NW¼NE¼ sec. 25, T. 25 N., R. 5 E. (Modal)	Loamy sediment over loamy residuum.	24–32			100	97	94
		40–60	126	9	[3] 99	95	88
Dolph silt loam: NW¼SE¼SW¼NE¼ sec. 23, T. 23 N., R. 5 E. (Modal)	Loamy sediment with clayey subsoil over loamy residuum.	19–36	101.8	22			
		36–57					
Kert silt loam: NW¼SE¼SW¼SE¼ sec. 19, T. 24 N., R. 3 E. (Modal)	Loamy sediment over sandstone and shale residuum.	14–22					
		40–52	106.6	19.5			
Vesper silt loam: NE¼NE¼NW¼NW¼ sec. 25, T. 23 N., R. 3 E. (Modal)	Loamy sediment over sandstone and shale residuum.	18–28	126	11			
		28–48	118	11			
Withee silt loam: NW¼NE¼NW¼NW¼ sec. 22, T. 25 N., R. 3 E. (C horizon has more clay than modal.)	Loamy drift over clay loam till.	23–30					
		37–60					

[1] Based on AASHTO Designation T 99–57, Method A (*1*).

[2] Mechanical analysis according to AASHTO Designation T 88–57 (*1*). Results by this procedure may differ somewhat from results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHTO 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 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 in diameter is excluded from calculations of grain-size fractions. The mechanical analysis data in this table are not suitable for naming textural classes for soils.

upper 20 to 36 inches of the soils formed in silty wind-laid material, and the lower part of the soils formed either in glacial till or in residuum weathered from the underlying bedrock.

If a line were drawn east and west approximately through Wisconsin Rapids, it would roughly separate the loamy soils north of the line from the sandy soils south of the line. The loamy soils have a cap of wind-laid silty material that averages about 24 inches in thickness.

In the northwestern part of the county, the soils formed partly in the underlying loamy glacial till. These are soils of the Withee, Marshfield, Santiago, and Mann series.

In the northeastern part of the county, the material below the silty cap is loam residuum weathered from the underlying gneissic rock. Milladore, Eaupleine, and Sherry soils formed in this silt and residuum.

An area north of Powers Bluff in Richfield and Arpin Townships and areas in Sigel, Sherry, and Rudolph Townships have soils that formed partly in underlying clayey residuum weathered from schistose bedrock. These are soils of the Dolph and Altdorf series.

A broad belt across the middle of the county is soils that formed in the silty cap and underlying layers of residuum from weakly cemented sandstone and acid silty clay shale. These are soils of the Kert, Vesper, Hiles, and Veedum series.

Most of the soils in the southern part of the county formed in sandy material deposited by glacial meltwaters along the Wisconsin River or in Glacial Lake Wisconsin. Soils of the Nymore, Plainfield, Friendship, Meehan, and Newson series formed in these materials.

Some small areas in the southern part of the county

test data

of Public Roads (BPR), according to standard procedures of the American Association of State Highway and Transportation (AASHTO)]

Mechanical analysis [2]—continued							Liquid limit	Plasticity index	Classification	
Percentage less than 3 inches passing sieve—continued			Percentage smaller than—						AASHTO	Unified [3]
No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 (0.074 mm)	0.05 mm	0.02 mm	0.005 mm	0.002 mm				
							Pct			
100	96	85	84	76	62	55	67.0	38.0	A–7–6(20)	CH
100	76	40	36	28	17	13	37.6	13.6	A–6(2)	SC
91	72	23	20	14	8	6	----------	[4] NP	A–2–4(0)	SM
81	64	37	34	22	11	7	----------	NP	A–4(0)	SM
100	95	83	81	72	55	47	57.1	33.2	A–7–6(19)	CH
100	90	52	38	18	10	8	----------	NP	A–4(3)	ML
100	98	29	27	20	12	9	----------	NP	A–2–4(0)	SM
100	98	92	91	84	64	50	55.4	30.2	A–7–6(19)	CH
100	81	57	52	31	15	12	24.0	8.0	A–4(4)	CL
100	73	10	9	7	5	4	----------	NP	A–3(0)	SP–SM
100	93	67	63	46	27	23	32.0	16.0	A–6(8)	CL
100	91	63	60	50	36	32	39.0	25.0	A–6(12)	CL

[3] SCS and BPR have agreed to consider that all soils having plasticity indexes within two points of A-line are to be given a borderline classification. Examples of borderline classifications obtained by this use are SP–SM and CL–ML.

[4] NP=Nonplastic.

[5] 100 percent of the material passes the 1-inch sieve.

are soils that formed in residuum weathered from sandstone. These are soils of the Plainbo, Eleva, and Elkmound series.

Some soils in Wood County formed in organic material that accumulated in depressions. Markey, Cathro, Rifle, Dawson, and Greenwood soils formed in this kind of material.

Climate

In general, climate affects soil formation through the heat and moisture it contributes to the environment. Wood County has a humid-temperate, continental climate that is favorable to the growth of trees and to the development of soils that have a light-colored surface layer and a subsoil in which clay has accumulated. The excess of precipitation over evaporation is sufficient to cause a continuing of the leaching process so that the eluvial horizon of many soils extends downward into the horizon of clay accumulation (illuvial horizon) in the form of tongues.

Plants and animals

Plants have been the principal biological factor in the formation of soils in this county, but bacteria, fungi, earthworms, insects, and rodents have also had an effect. Plant and animal life affects soil formation through the addition and decomposition of organic matter and through the process of bringing plant nutrients from the lower horizons to the upper horizons. Deep-rooted trees, for instance, bring from deep in the soil nutrients that are later returned to the soil surface when the leaves fall. Bacteria and fungi help to decompose the organic matter, and earthworms, insects, and rodents mix it into the soil.

Differences in the amounts of organic matter, nitrogen, and plant nutrients in the upper soil layers and

differences in soil structure and porosity are among the effects of plants and animals. Most of the soils in the county formed under forest vegetation and are light colored and relatively low in organic matter. Some soils, such as those of the Mann series, were too wet for most trees and instead formed under a cover of mostly reeds, sedges, and grasses. As a result of this kind of vegetation and the fact that wetness slows decomposition of plant residue, these soils have a very dark surface layer that is relatively high in organic matter.

Relief

Relief influences the formation of soils by controlling drainage, runoff, and erosion. Soils that formed in the same parent material but that have different characteristics because of differences in degree of wetness, which is caused by differences in relief, make up a drainage sequence. For example, Eaupleine, Milladore, and Sherry soils are members of a drainage sequence. The well-drained Eaupleine soils are on the higher lying parts of broad ridges and are gently sloping or sloping. The somewhat poorly drained Milladore soils are on nearly level parts of the ridges; these soils have grayish mottles in the upper part of the subsoil, which indicates poor aeration and excess moisture for part of the year. The poorly drained Sherry soils are nearly level and lie in depressions and drainageways. In these soils the water table is near the surface for part of the year.

Time

Time affects the development of soils by controlling the duration of the influence of the other soil-forming factors, except parent material. The effect of the soil-forming factors is cumulative: the longer they operate, the greater is their total effect on the soil. Alluvial land, for instance, has not been in place long enough for the factors of soil formation, other than parent material, to affect the development of the profile. The characteristics of Alluvial land, except for drainage, are controlled by the characteristics of the parent material.

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.

Thus, in classification soils are placed in narrow categories that are used in detailed soil surveys so that knowledge about the soils can be organized and used in managing farms, fields, and woodland; 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 currently used was adopted for general use by the National Cooperative Soil Survey in 1965. This system is under continual study; therefore, readers interested in developments of the system should search the latest literature available (*16*). In table 13, the soil series of Wood County are placed in some categories of the current system.

The current system of classification has six categories. Beginning with the broadest, these categories are order, suborder, great group, subgroup, family, and series. In this system 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 together. Most of the classes of the current system are briefly defined in the following paragraphs.

ORDER: Ten soil orders are recognized. They are Entisols, Vertisols, Inceptisols, Aridisols, Mollisols, Spodosols, Alfisols, Ultisols, Oxisols, and Histosols. The properties used to differentiate these 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 kinds of climate. The six soil orders in Wood County are Entisols, Mollisols, Alfisols, Spodosols, Inceptisols, and Histosols.

Entisols are light-colored soils that do not have natural genetic horizons or that have only weakly expressed beginnings of such horizons. These soils do not have traits that reflect soil mixing caused by shrinking and swelling.

Mollisols formed under grass and have a thick, dark-colored surface layer containing colloids dominated by bivalent cations. The soil material in these soils has not been mixed by shrinking and swelling.

Alfisols are mineral soils that contain horizons of clay accumulation. Unlike the Mollisols, they lack a thick, dark-colored surface layer that contains colloids dominated by bivalent cations, but the base status of the lower horizons is not extremely low.

Spodosols are mineral soils that have a horizon, below the surface layer, in which iron, aluminum, and organic matter have accumulated.

Inceptisols are mineral soils in which horizons have definitely started to develop. They generally are on young, but not recent, land surfaces.

Histosols formed in organic material that has accumulated in depressions and have a water table at or near the surface.

SUBORDER: Each order is divided into suborders, primarily on the basis of the characteristics that seemed to produce classes that have 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 of which indicates the order. An example is Boralf (*Bor,* meaning cool, and *alf,* from Alfisol).

GREAT GROUPS: Each suborder is divided 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 (1) those in which clay, iron, or humus have accumulated, (2) those that have pans that interfere with the growth of

TABLE 13.—*Classification of the soil series*

Series	Family	Subgroup	Order
Altdorf	Fine, mixed, frigid	Aeric Glossaqualfs	Alfisols.
Antigo	Fine-silty over sandy or sandy-skeletal, mixed	Typic Glossoboralfs	Alfisols.
Au Gres	Sandy, mixed, frigid	Entic Haplaquods	Spodosols.
Cathro	Loamy, mixed, euic	Terric Borosaprists	Histosols.
Croswell	Sandy, mixed, frigid	Entic Haplorthods	Spodosols.
Dancy	Fine-loamy, mixed, frigid	Aeric Glossaqualfs	Alfisols.
Dawson	Sandy or sandy-skeletal, mixed, dysic	Terric Borosaprists	Histosols.
Dolph	Fine, mixed	Aquic Glossoboralfs	Alfisols.
Dunnville	Coarse-loamy, mixed	Udic Haploborolls	Mollisols.
Eaupleine	Coarse-loamy, mixed	Typic Glossoboralfs	Alfisols.
Eaupleine, clayey subsoil variant	Fine-mixed	Typic Glossoboralfs	Alfisols.
Eaupleine, sandy subsoil variant	Coarse-loamy, mixed	Typic Glossoboralfs	Alfisols.
Eaupleine, silty subsoil variant	Fine-loamy, mixed	Typic Glossoboralfs	Alfisols.
Eleva [1]	Coarse-loamy, mixed, mesic	Typic Hapludalfs	Alfisols.
Elkmound [1]	Loamy, mixed, mesic	Lithic Dystrochrepts	Inceptisols.
Elm Lake	Sandy over loamy, mixed, acid, frigid	Typic Haplaquents	Entisols.
Fenwood	Fine-loamy, mixed	Typic Glossoboralfs	Alfisols.
Friendship	Mixed, frigid	Typic Udipsamments	Entisols.
Gale [1]	Fine-silty over sandy or sandy-skeletal, mixed, mesic	Typic Hapludalfs	Alfisols.
Greenwood	Dysic	Typic Borohemists	Histosols.
Guenther	Sandy over loamy, mixed, frigid	Alfic Haplorthods	Spodosols.
Hiles	Fine-loamy, mixed	Typic Glossoboralfs	Alfisols.
Humbird	Coarse-loamy over clayey, mixed, frigid	Alfic Haplorthods	Spodosols.
Kert	Fine-loamy, mixed	Aquic Glossoboralfs	Alfisols.
Mann	Fine-loamy, mixed, frigid	Typic Haplaquolls	Mollisols.
Marathon	Coarse-loamy, mixed	Typic Glossoboralfs	Alfisols.
Markey	Sandy or sandy-skeletal, mixed, euic	Terric Borosaprists	Histosols.
Marshfield	Fine-loamy, mixed, frigid	Typic Ochraqualfs	Alfisols.
Meehan	Mixed, frigid	Aquic Udipsamments	Entisols.
Merrillan	Coarse-loamy over clayey, mixed, frigid	Aqualfic Haplorthods	Spodosols.
Milladore	Coarse-loamy, mixed	Aquic Glossoboralfs	Alfisols.
Mosinee	Coarse-loamy, mixed, frigid	Typic Dystrochrepts	Inceptisols.
Newson	Mixed, frigid	Humaqueptic Psammaquents	Entisols.
Norgo	Loamy, mixed	Lithic Glossoboralfs	Alfisols.
Nymore	Mixed, frigid	Typic Udipsamments	Entisols.
Onamia	Fine-loamy over sandy or sandy-skeletal, mixed	Typic Eutroboralfs	Alfisols.
Plainbo	Mixed, frigid	Typic Udipsamments	Entisols.
Plainfield [1]	Mixed, mesic	Typic Udipsamments	Entisols.
Point	Fine-loamy, mixed	Aquic Glossoboralfs	Alfisols.
Poskin	Fine-silty over sandy or sandy-skeletal, mixed	Aquic Glossoboralfs	Alfisols.
Rib	Fine-silty over sandy or sandy-skeletal, mixed, non-acid, frigid	Mollic Haplaquepts	Inceptisols.
Rietbrock	Fine-loamy, mixed	Aquic Glossoboralfs	Alfisols.
Rifle	Euic	Typic Borohemists	Histosols.
Santiago	Fine-loamy, mixed	Typic Glossoboralfs	Alfisols.
Sherry	Fine-loamy, mixed, frigid	Udollic Ochraqualfs	Alfisols.
Veedum	Fine-loamy over sandy or sandy-skeletal, mixed, acid, frigid	Typic Humaquepts	Inceptisols.
Vesper	Fine-loamy over sandy or sandy-skeletal, mixed, acid, frigid	Humic Haplaquepts	Inceptisols.
Withee	Fine-loamy, mixed, frigid	Aeric Glossaqualfs	Alfisols.

[1] These soils, as mapped in Wood County, are frigid taxadjuncts to the named series.

roots or movement of water, and (3) thick, dark-colored surface layers. The features used are the self-mulching properties of clays, soil temperature, major differences in chemical composition (mainly calcium, magnesium, sodium, and potassium), and the like. Names of the great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Glossoboralf (*Gloss*, meaning tongued, and *boralf*). The great group is the last word in the name of the subgroup.

SUBGROUP: Each great group is divided 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 if 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 Glossoboralfs.

FAMILY: Each subgroup is divided into families primarily on the basis of properties important to the growth of plants or behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, thickness of horizons, and consistence. The name of a family consists of a series of adjectives that precede the name of a subgroup. The adjectives used are the class names for soil texture, mineralogy, climatic zone, and the like. An example is the coarse-

TABLE 14.—*Temperature and precipitation data*

[Data from Marshfield]

Month	Temperature				Precipitation				
	Average daily high	Average daily low	Average monthly high	Average monthly low	Average	One year in 10 will have—		Days with snow cover of 1 inch or more	Average depth of snow on days with snow cover
						Less than—	More than—		
	°F	°F	°F	°F	In	In	In		In
January	23	5	40	−23	1.1	0.4	2.0	28	8.0
February	26	7	42	−15	1.0	.3	2.0	24	9.7
March	36	18	58	−5	1.6	.7	2.9	17	8.2
April	54	32	75	17	2.7	1.5	4.1	2	1.0
May	68	43	84	27	3.7	1.8	5.7	(1)	0
June	76	53	88	37	4.9	2.4	6.4	0	0
July	81	58	89	44	3.3	1.9	4.9	0	0
August	80	55	90	42	3.9	1.9	5.4	0	0
September	71	47	86	29	3.6	1.3	6.9	0	0
October	59	37	77	21	2.4	.6	4.3	(1)	0
November	40	23	61	3	2.0	.7	2.9	8	3.0
December	27	11	45	−14	1.1	.4	2.4	23	6.1
Year	53	33	[2] 92	[3] −24	31.3	24.6	40.1	102	7.6

[1] Less than one-half day. [2] Average annual highest temperature. [3] Average annual lowest temperature.

TABLE 15.—*Probabilities of last freezing temperatures in spring and first in fall*

[Data from Marshfield]

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 14	April 25	May 6	May 19	June 2
2 years in 10 later than	April 8	April 19	May 1	May 13	May 27
5 years in 10 later than	March 28	April 9	April 20	May 3	May 17
Fall:					
1 year in 10 earlier than	October 24	October 15	October 2	September 19	September 12
2 years in 10 earlier than	October 30	October 20	October 7	September 25	September 17
5 years in 10 earlier than	November 10	November 1	October 19	October 6	September 27

loamy, mixed family of Typic Glossoboralfs. In this example, the climatic zone is not included, because it is inherent in the name of the subgroup.

Additional Information About the County

This section gives some facts about the climate of Wood County. It also discusses physiography, geology, and drainage. The last part of this section gives a brief history of Wood County.

Climate [6]

The climate of Wood County is typical of that of the center of a continent in the middle latitudes. Winters are long, cold, and snowy; summers are warm and occasionally humid; and spring and fall are sometimes short and are mixtures of summer and winter. Spring often lingers into June, but the change from summer to fall is usually abrupt. The seasons vary widely from year to year. All seasons are marked by storms that accompany changes from one airmass to another, particularly from late in fall through mid-spring, when changes occur every 2 or 3 days.

Data in tables 14 and 15 are fairly representative of the climate of the county. The weather station from which most of these data were obtained is located at the University of Wisconsin Experimental Farm at Marshfield, in the northwestern corner of Wood County. The daily and annual temperature ranges tend to decrease at higher elevations, whereas the ranges tend to increase at lower elevations and in the large expanses of marshlands because of cold air pooling.

An average of 9 days a year have temperatures of 90° F or higher. The number has ranged from 30 in 1936 to 0 in 1950, 1951, 1954, 1960, and 1962. An average of 32 days a year have temperatures of 0° or lower. This number has ranged from 52 in 1963 to 7

[6] By HANS E. ROSENDAL, climatologist for Wisconsin, National Weather Service, U.S. Department of Commerce.

in 1931. Heat growth units during the growing season, above a 50° threshold, average 2,240.

Approximately 60 percent of the annual precipitation falls in May through September. Soil moisture generally is adequate for the first part of the growing season. After June, crops depend on rain, which falls mainly during thunderstorms and tends to be erratic and variable. The chances of 1 inch or more of rain in a 7-day period are greater in the second week of June and less in the last part of August than in any other period in summer; the respective probabilities are 5 in 10 and 2 in 10. The probability of no rain (a trace or less) in a 7-day period in summer is higher in the last half of August than in any other period in summer; the probabilities are 2 in 10. Precipitation intensities of 1.3 inches in 1 hour, 2.1 inches in 6 hours, and 2.8 inches in 24 hours can be expected about 1 year in 2.

Annual snowfall averages 50 inches but has ranged from 22 inches in 1958 to 81 inches in 1956. The average date of the first snowfall of 1 inch or more is November 22. The frequency of this snowfall by October 25 is 1 year in 10, and by December 20 it is 9 years in 10. The possibility of snow cover increases until the middle of February and then decreases rapidly.

Thunderstorms occur on an average of 35 days a year, and the frequency ranges from 19 to 45 days. Hail falls on an average of 2 days a year but ranges from 0 to 8 days. The greatest number of thunderstorms is usually in June, and the greatest number of hailstorms is in May. During May, hailstones are usually small and do little damage. The most probable time for severe hailstorms is between 2 p.m. and 7 p.m. near the middle of July. Since 1916, eight tornadoes have been confirmed in the county.

Wind and sunshine records are not available for Marshfield, but the following data from Wausau reflect conditions in Wood County.

Prevailing winds are from the west and northwest in winter and from southerly directions in summer. Annually, prevailing directions have averaged northwest about 20 percent of the time. Windspeed averages less than 4 miles per hour about 7 percent of the time, 4 to 15 miles per hour 67 percent, 16 to 31 miles per hour 25 percent, and greater than 31 miles per hour less than 1 percent. The direction of the highest speed winds is usually between the southwest and the northwest.

Possible sunshine averages approximately 40 percent of the daylight hours in October through December, 45 percent in January, 50 percent in February and March, and 60 percent or greater in April through September.

The average date of the last 32° freeze in spring is May 17, and of the first in fall, September 27. The growing season, defined as the number of days between the last 32° freeze in spring and the first in fall, averages 133 days. Table 15 gives the dates for given probabilities and temperatures.

Physiography, Geology, and Drainage

Wood County lies in two geographic provinces of Wisconsin. The northern one-third is part of the Northern Highland, and the rest of the county is part of the Central Plain (*13*).

In general, the Northern Highland portion has long, gentle slopes. The underlying bedrock consists of Precambrian igneous and metamorphic rocks. The western half of the Northern Highland has a mantle of heavy loam glacial till over the bedrock. The rest of this area has, over the bedrock, a layer which varies in thickness; this layer is loamy residuum weathered from the Precambrian rock. Stream valleys in the glaciated part of the area are broad and shallow, and those in the residual part tend to be narrow and steep sided. The entire area was covered by a layer, about 2 feet thick, of wind-deposited silt during the Wisconsin Glaciation. The soils formed partly in the silt and partly in the underlying till or residuum.

The Central Plain consists of nearly level to gently sloping uplands associated with occasional low ridges and hills of sandstone, and of broad areas of sandy outwash plains and lake plains. The bedrock in this area consists of Cambrian sandstone interbedded with varying amounts of shale. The shale layers are generally thin or absent in parts of Siegel and Hansen Townships but are thick and very prominent in the western part of the county. Glacial till covers the sandstone and shale in the northwestern part of the county and on a few broad, low ridges south of Powers Bluff, but the rest of the Central Plain in Wood County is residual. One to two feet of loess covers all of the area except the lake plain and outwash parts.

Earlier geologists considered the central part of Wood County to be mantled with what was called "older till," to differentiate it from the Wisconsin till to the north. Except for the broad ridges mentioned, it seems likely that the subsoil material in this part of the county is residual, either from sandstone and shale or, in some places, from Precambrian metamorphic and igneous rocks. The Cambrian sandstone is relatively thin over most of this area. In places, which probably were low hills on the old Precambrian erosional surface, the sandstone has been eroded away and the loamy residuum from Precambrian rocks is the subsoil material. Where the sandstone has been penetrated, it is underlain by Precambrian residuum. The old metamorphic and igneous rocks are exposed in streambeds at elevations only a few feet lower than the soil surface.

Powers Bluff, the highest elevation in the county, is a mass of Precambrian rock capped by extremely resistant quartzite. Cary Bluff and a somewhat smaller hill in the Sandhill Crane Wildlife Area in Remington Township, although on the Central Plain and surrounded by Cambrian sandstone, are Precambrian rock that lacks the quartzite cap of Powers Bluff.

The outwash plains consist of nearly level, deep, sandy soils along both sides of the Wisconsin River. East of the river they are dissected by a series of small streams in well-defined, steep-sided valleys. These streams have their headwaters in the Buena Vista Marsh in adjoining Portage County. West of the river, the outwash plains occupy a strip a mile or two wide along the river and south of Wisconsin Rapids. At the western edge of this strip they merge into the lake plains, which have nearly level, deep, sandy soils that have a high water table. Drainage is poorly developed, and broad areas consist of shallow organic soils 1 foot to 6 feet or more deep over sand. These are the cranberry bog areas of Wood County.

A relatively small area of recent flood plain deposits lies along the west side of the Wisconsin River south of Wisconsin Rapids. These soils are no longer subject to flooding, because of flood control systems on the river. They are separated from the adjoining outwash plains by a steep escarpment 70 to 80 feet high.

Wood County is drained by four primary drainage systems. The Wisconsin River flows through the southeastern quarter of the county and intercepts a number of small creeks that drain the eastern part of the county. Mill Creek flows eastward from Marshfield, draining part of northern Wood County. The Yellow River and Hemlock Creek system, which flows southward, drains the central and largest part of the county. The extreme western part of the county is drained by the westward-flowing East Fork of the Black River. A few small creeks in the extreme northern part of the county flow northward into the Little Eaupleine River in adjoining Marathon County. The watershed divides are generally low and ill-defined, as is characteristic of an area of low relief and somewhat poorly drained or poorly drained soils.

History

The earliest settlement of Wood County began soon after what is now Wisconsin came under the authority of the United States in 1815. Daniel Whitney, with others, erected a sawmill at what is now Nekoosa in 1831 (*18*).

The vast stands of quality timber, especially white pine, attracted lumbermen, and the lumber industry grew rapidly. The sandy parts of the county were logged first because the trees there were almost entirely pine, which was the only timber cut by the early lumbermen. Settlers followed the lumbermen, but because the sandy areas were poorly suited to farming, the settlers soon moved to the northern part of the county, where the soils are finer textured. They frequently burned the hardwood timber to clear the land for farming.

Wood County was created in 1856 from a part of Portage County. Several boundary changes followed until 1872, when the present boundaries were established.

Wheat and rye were the principal crops at first, but about the turn of the century dairying began to increase in importance. Butter was the main dairy product, but cheese soon became more important. In 1925, more than 12 million pounds of cheese was produced in Wood County.

The culture of cranberries began in the early 1870's, and today Wood County is the leading cranberry-producing county in Wisconsin, which is the second leading cranberry-producing state in the United States.

Paper mills replaced the sawmills as the era of lumbering drew to a close. Numerous sites on the Wisconsin River between Nekoosa and Biron provide waterpower to operate the paper mills. The river supplies the vast quantities of water needed in making paper and carries away much of the waste from the process. Because of the tremendous loads of waste from the mills in Wood County and upstream and waste from other sources, the quality of the river water has been markedly lowered. Paper is now the principal industrial product in Wood County.

The census of 1860, the first to include Wood County, showed a population of 2,425 people. By 1900 the population was 25,865, of which about one-third was in urban areas. In 1950, 50,000 people lived in the county, and slightly more than half were classed as urban residents.

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Glossary

Acidity. See Reaction, soil.

Alkalinity. See Reaction, soil.

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 water in a soil at field capacity and the amount in the same soil at the permanent wilting point of plants. The descriptive terms used in this report refer to the total available water in the soil to a depth of 60 inches: Very low, 0 to 3 inches; low, 3 to 6 inches; medium, 6 to 9 inches; and high, 9 to 12 inches.

Bottom land. Low land formed by alluvial deposits along a river.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of clay on the surface of a soil aggregate. Synonyms: clay coat, clay skin.

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.

Contour stripcropping. Growing crops in strips that follow the contour or are parallel to terraces or diversions. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

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.

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.

Erosion. The wearing away of the land surface by wind (sandblast), running water, and other geological agents.

Flood plain. Nearly level land, consisting of stream sediments, that borders a stream and is subject to flooding unless protected artificially.

Glacial till (geology). Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

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 residues.

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 from which the overlying horizons were 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.

Humus. The well-decomposed, more or less stable part of the organic matter in mineral soils.

Loam. Soil material that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand.

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.

Muck. An organic soil consisting of fairly well decomposed organic material that is relatively high in mineral content, finely divided, and dark in color.

Outwash plain (geology). Plain constructed of detrital material swept out of the melting glacier by meltwater streams.

Peat. Unconsolidated soil material, largely undecomposed organic matter, that has accumulated where there has been excess moisture.

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	Mildly alkaline	7.4 to 7.8
Very strongly acid	4.5 to 5.0	Moderately alkaline	7.9 to 8.4
Strongly acid	5.1 to 5.5	Strongly alkaline	8.5 to 9.0
Medium acid	5.6 to 6.0	Very strongly alkaline	9.1 and higher
Slightly acid	6.1 to 6.5		
Neutral	6.6 to 7.3		

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum. Unconsolidated, partly weathered mineral material that accumulates over disintegrating solid rock. Residual material is not soil but is frequently the material in which a soil has formed.

Row crops. A crop planted in rows, generally 2 to 4 feet apart, so as to allow cultivation between rows during the growing season.

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.

Shrink-swell potential (engineering). Amount that a soil will expand when wet or contract when dry. Indicates kinds of clay in soil.

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 principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grain* (each grain by itself, as in dune sand) or *massive* (the particles adhering 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.

Substratum. Technically, the part of the soil below the solum.

Surface layer. A term used in nontechnical soil descriptions for one or more layers above the subsoil. Generally, the A horizon or one or more O layers.

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, 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.

Upland (geology). Land consisting of material unworked by water in recent geologic time and lying, in general, at a higher elevation than the alluvial plain or stream terrace. Land above the lowlands along rivers.

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.

Weathering. All physical and chemical changes produced in rocks at or near the earth's surface by atmospheric agents. These changes result in more or less complete disintegration and decomposition of the rock.

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, a woodland group, or any other 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, page 10.
Predicted average yields, table 2, page 58.
Woodland groups, table 3, page 60.
Tree planting guide, table 4, page 62.
Shrub and vine planting guide, table 5, page 64.
Wildlife, tables 6 and 7, pages 66 through 68.
Recreation groups, table 8, page 69.
Engineering uses of the soils, tables 9, 10, 11, and 12, pages 72 through 97.

Map symbol	Mapping unit	Page	Capability unit		Woodland group
			Symbol	Page	Symbol
Aa	Alluvial land	9	IIw-13	53	3o1
Ab	Alluvial land, wet	9	Vw-14	56	4w5
Af	Altdorf silt loam	11	IIIw-3	54	2o1
AnA	Antigo silt loam, 1 to 3 percent slopes	12	IIs-1	53	2o1
Au	Au Gres loamy sand	13	IVw-5	55	3w4
Ca	Cathro mucky peat	13	IVw-9	56	---
CrA	Croswell loamy sand, 0 to 3 percent slopes	14	IVs-3	56	3s1
Da	Dancy sandy loam	15	IVw-3	55	3w4
Db	Dawson peat	15	IVw-9	56	6w6
Dc	Dawson mucky peat	15	IVw-9	56	6w6
Do	Dolph silt loam	16	IIw-3	53	3o1
DvA	Dunnville sandy loam, 0 to 3 percent slopes	17	IIIs-4	55	3o1
DwA	Dunnville loam, 0 to 3 percent slopes	17	IIs-1	53	3o1
EaB	Eaupleine silt loam, 2 to 6 percent slopes	18	IIe-1	52	2o1
EaC	Eaupleine silt loam, 6 to 12 percent slopes	18	IIIe-1	53	2o1
EbB	Eaupleine fine sandy loam, sandy subsoil variant, 2 to 6 percent slopes	19	IIe-7	52	2o1
EcB	Eaupleine silt loam, silty subsoil variant, 2 to 6 percent slopes	20	IIe-1	52	2o1
EdB	Eaupleine silt loam, clayey subsoil variant, 2 to 6 percent slopes	19	IIe-6	52	2o1
EdC	Eaupleine silt loam, clayey subsoil variant, 6 to 12 percent slopes	19	IIIe-6	54	2o1
EeB	Eleva sandy loam, 2 to 6 percent slopes	21	IIIs-4	55	3o1
EeC	Eleva sandy loam, 6 to 12 percent slopes	21	IIIs-4	55	3o1
EkB	Elkmound sandy loam, 2 to 6 percent slopes	22	IIIe-3	54	3d1
EkC	Elkmound sandy loam, 6 to 12 percent slopes	22	IVe-3	55	3d1
EkD2	Elkmound sandy loam, 12 to 20 percent slopes, eroded	22	VIe-3	56	3d2
Em	Elm Lake loamy sand	23	IVw-5	55	4w4
FeB	Fenwood silt loam, 2 to 6 percent slopes	24	IIe-2	52	2o1
FeC	Fenwood silt loam, 6 to 12 percent slopes	24	IIIe-2	54	2o1
FeD	Fenwood silt loam, 12 to 20 percent slopes	24	IVe-1	55	2r2
FfB	Fenwood stony silt loam, 2 to 6 percent slopes	24	VIs-6	56	2o1
FfC	Fenwood stony silt loam, 6 to 12 percent slopes	24	VIs-6	56	2o1
FfD	Fenwood stony silt loam, 12 to 20 percent slopes	24	VIs-6	56	2r2
FrA	Friendship loamy sand, 1 to 3 percent slopes	25	IVs-3	56	3s1
GaB	Gale silt loam, 2 to 6 percent slopes	25	IIe-2	52	2o1
GaC	Gale silt loam, 6 to 12 percent slopes	26	IIIe-2	54	2o1
Gr	Greenwood peat	26	VIIw-10	57	6w6
GuB	Guenther loamy sand, 2 to 6 percent slopes	27	IIIe-4	54	1s1
HsB	Hiles silt loam, 2 to 6 percent slopes	28	IIe-6	52	2o1
HsC	Hiles silt loam, 6 to 12 percent slopes	28	IIIe-6	54	2o1
HuB	Humbird loamy sand, 2 to 6 percent slopes	29	IIIe-4	54	3d1
HwB	Humbird sandy loam, 2 to 6 percent slopes	29	IIIe-4	54	3d1
KeA	Kert silt loam, 0 to 3 percent slopes	30	IIw-3	53	2o1
Ma	Mann silt loam	31	IVw-3	55	5w5
MbB	Marathon silt loam, 2 to 6 percent slopes	32	IIe-2	52	2o1
Mc	Markey mucky peat	33	IVw-9	56	---
Md	Marsh	33	VIIIw-15	57	6w5
Mf	Marshfield silt loam	34	IIIw-3	54	3w5
Mh	Meehan loamy sand	35	IVw-5	55	3w4

Map symbol	Mapping unit	Page	Capability unit Symbol	Capability unit Page	Woodland group Symbol
MpA	Merrillan sandy loam, 1 to 3 percent slopes	36	IIIw-6	55	3o1
Mr	Milladore silt loam	36	IIw-4	53	3o1
MsB	Mosinee loam, 2 to 6 percent slopes	37	IIe-2	52	3d1
Ne	Newson loamy sand	38	IVw-5	55	4w4
NoB	Norgo silt loam, 2 to 6 percent slopes	38	IIIe-3	54	3d1
NoC2	Norgo silt loam, 6 to 12 percent slopes, eroded	38	IVe-3	55	3d1
NoD2	Norgo silt loam, 12 to 20 percent slopes, eroded	38	VIe-3	56	3d2
NyA	Nymore loamy sand, 0 to 2 percent slopes	39	IVs-3	56	3s1
NzA	Nymore loamy sand, red subsoil, 0 to 2 percent slopes	39	IVs-3	56	3s1
NzB	Nymore loamy sand, red subsoil, 2 to 6 percent slopes	39	IVs-3	56	3s1
OnA	Onamia loam, 1 to 3 percent slopes	40	IIs-1	53	2o1
PbB	Plainbo sand, 2 to 12 percent slopes	40	VIs-9	57	4s1
PbD	Plainbo sand, 12 to 30 percent slopes	41	VIs-9	57	4s2
PfA	Plainfield sand, 0 to 2 percent slopes	41	VIs-9	57	4s1
PfB	Plainfield sand, 2 to 6 percent slopes	42	VIs-9	57	4s1
PfC	Plainfield sand, 6 to 12 percent slopes	42	VIs-9	57	4s1
PfE	Plainfield sand, 12 to 35 percent slopes	42	VIs-9	57	4s2
PgA	Plainfield loamy sand, 0 to 2 percent slopes	41	IVs-3	56	3s1
PgB	Plainfield loamy sand, 2 to 6 percent slopes	41	IVs-3	56	3s1
PoB	Point loamy sand, 2 to 6 percent slopes	43	IIIw-6	55	3o1
Ps	Poskin silt loam	43	IIw-5	53	2o1
Rb	Rib silt loam	44	IIw-5	53	3w5
ReB	Rietbrock silt loam, 2 to 6 percent slopes	45	IIw-3	53	3o1
ReC	Rietbrock silt loam, 6 to 12 percent slopes	45	IIIe-8	54	3o1
Rf	Rifle mucky peat	46	IVw-9	56	---
Rg	Rifle peat	46	IVw-9	56	---
SaB	Santiago silt loam, 2 to 6 percent slopes	47	IIe-1	52	1o1
SaC	Santiago silt loam, 6 to 12 percent slopes	47	IIIe-1	53	1o1
SaD2	Santiago silt loam, 12 to 20 percent slopes, eroded	47	IVe-1	55	1r2
SbB	Santiago silt loam, clayey substratum, 2 to 6 percent slopes	47	IIe-1	52	1o1
Sh	Sherry silt loam	48	IIIw-3	54	3w5
Ss	Sherry stony silt loam	48	Vw-16	56	3w5
Ve	Veedum silt loam	49	IVw-3	55	5w5
Vs	Vesper silt loam	49	IIIw-3	54	5w5
WeA	Withee silt loam, 0 to 2 percent slopes	50	IIw-4	53	1o1
WeB	Withee silt loam, 2 to 6 percent slopes	50	IIw-4	53	1o1

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