SOIL SURVEY OF

Dewey County, South Dakota

United States Department of Agriculture
Soil Conservation Service
and
United States Department of the Interior
Bureau of Indian Affairs
in cooperation with
South Dakota Agricultural Experiment Station

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 1964–71. Soil names and descriptions were approved in 1972. 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, the Bureau of Indian Affairs, and the South Dakota Agricultural Experiment Station. It is part of the technical assistance furnished to the Dewey County Conservation District and the Cheyenne Sioux Tribe.

HOW TO USE THIS SOIL SURVEY

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

Locating Soils

All the soils of Dewey 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 of 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 and each capability unit and range site is described.

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 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 limitations 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.

Ranchers and others can find, under "Range," groupings of the soils according to their suitability for range and the names of many of the plants that grow on each range site.

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 range sites, the capability units, the pasture groups, and the windbreak groups.

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

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

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

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 to Dewey County may be especially interested in the section "General Soil Map," where broad patterns of soils are described. They also may be interested in the general information about the county given in the section "General Nature of the County."

Cover: **View from the top of Dog Butte in the Vebar-Flasher association.**

Contents

Issued July 1979

Index to Mapping Units

Summary of Tables

SOIL SURVEY OF DEWEY COUNTY, SOUTH DAKOTA

BY JOHN KALVELS AND PAUL M. BODEN, SOIL CONSERVATION SERVICE [1]

UNITED STATES DEPARTMENT OF AGRICULTURE, SOIL CONSERVATION SERVICE, AND UNITED STATES DEPARTMENT OF THE INTERIOR, BUREAU OF INDIAN AFFAIRS, IN COOPERATION WITH THE SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION

DEWEY COUNTY is in the north-central part of South Dakota (fig. 1). The total area is about 244 square miles, or 1,559,680 acres, of which 55,104 acres is inland water, mainly Lake Oahe. Timber Lake is the county seat and the largest town in the county. All of Dewey County but the northern and southwestern parts is in the Cheyenne River Indian Reservation.

The landscape is a broad plain interrupted by deeply entrenched streams and drainageways and by buttes that rise 100 feet or more above the plain. The relief is nearly level to sloping in the northwestern and southwestern parts of the county and is sloping to steep in much of the rest. The elevation above sea level ranges from 2,460 feet at the northwest corner to about 1,610 feet along Lake Oahe. All the northern part of the county but the extreme northwest corner is drained by the Moreau River, which flows from west to east into Lake Oahe. The eastern and southern parts of the county are drained by tributaries that flow into Lake Oahe, which covers the Cheyenne River and Missouri River Valleys.

About 88 percent of the land area is in nativ grass and is used for range. About 12 percent is cropped. Corn, winter wheat, spring wheat, oats, and alfalfa are the principal crops. Much of the grain and alfalfa is fed to livestock, but about 40 percent of the farm and ranch income in the county is from the sale of crops, mainly wheat. The main concerns in managing cultivated soils are conserving moisture, controlling erosion and soil blowing, and maintaining fertility.

How This Survey Was Made

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

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

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

Soils of one series can differ in texture of the surface layer and in slope, stoniness, or some other characteristic that affects use of the soils by man. On the basis

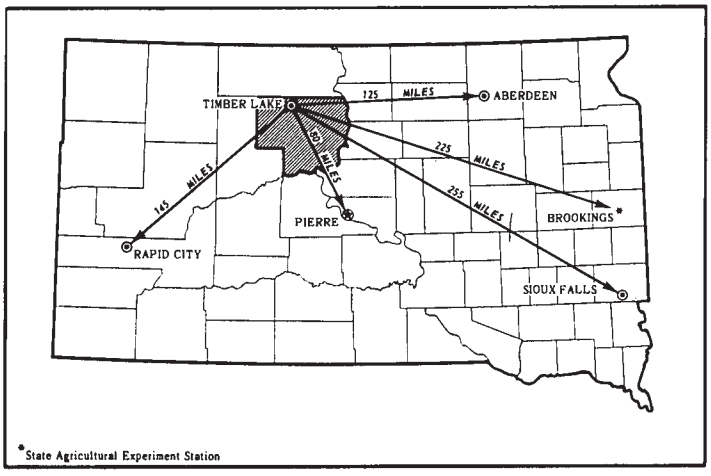

Figure 1.—Location of Dewey County in South Dakota.

[1] Others who assisted in this survey were EARL G. CHAMBERLIN, WILLIAM R. GLOVER, KENNETH J. HEIL, LAURENCE L. KOBRIGER, FRANCISCO MATANZO, DALE A. MELIUS, Soil Conservation Service; E. A. NIESCHMIDT, JUAN P. ORTEGA, and RONALD F. PETERSON, Bureau of Indian Affairs (Missouri River Basin Investigations); and JACK SAFFORD, Bureau of Indian Affairs.

of such differences, a soil series is divided into phases. The name of a soil phase indicates a feature that affects management. For example, Reeder loam, 0 to 2 percent slopes, is one of three phases within the Reeder 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 drainage, 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 the aerial photographs.

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

Some mapping units are made up of soils of different series, or of different phases within one series. Two such kinds of mapping units are shown on the soil map of Dewey County, soil complexes and undifferentiated groups.

A soil complex consists of areas of two or more soils, so intricately mixed or so small in size that they cannot be shown separately on the soil map. Each area of a complex contains some of each of the two or more dominant soils, and the pattern and relative proportions are about the same in all areas. Generally, the name of a soil complex consists of the names of the dominant soils, joined by a hyphen. Flasher-Vebar complex, 6 to 15 percent slopes, is an example.

An undifferentiated group is made up of two or more soils that could be delineated individually but are shown as one unit because, for the purpose of the soil survey, there is little value in separating them. The pattern and proportion of soils are not uniform. An area shown on the map may be made up of only one of the dominant soils, or of two or more. If there are two or more dominant series represented in the group, the name of the group ordinarily consists of the names of the dominant soils, joined by "and." Lohler and Havrelon soils is an undifferentiated group in Dewey County.

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

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 the soils.

Soil scientists observe how soils behave when used as a growing place for native and cultivated plants, and as material for structures, foundations for structures, or covering for structures. They relate this behavior to properties of the soils. For example, they observe that filter fields for onsite disposal of sewage fail 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 consultation. Thus, the groups that are finally evolved reflect up-to-date knowledge of the soils and their behavior under current methods of use and management.

General Soil Map

The general soil map at the back of this survey shows, in color, the soil associations in Dewey 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 10 soil associations in this survey have been grouped into three general kinds of landscapes for broad interpretative purposes. Each of the broad groups and each soil association are described on the following pages.

Moderately Well Drained to Excessively Drained Soils Formed in Material Weathered from Sandstone, Siltstone, and Shale; on Uplands

This group of soil associations consists mainly of nearly level to sloping, deep and moderately deep loamy and silty soils on a broad upland plain. Also in this group are shallow sandy to clayey soils. Slopes are mostly long and smooth. The more sloping soils are on the sides of buttes, ridges, and entrenched drainageways. More than 30 percent of the acreage is cultivated. The rest is in native grass and is used for range.

1. Rhoades-Ekalaka association

Deep, moderately well drained and well drained, nearly level to sloping loamy soils that have a claypan subsoil

This association is on uplands. It is mostly gently sloping, but some parts are nearly level and others are sloping. Slopes are long. In much of the association the surface is uneven. Small, low mounds rise several inches above intervening low spots.

This association makes up slightly less than 4 percent of the land area in the county. It is about 35 percent Rhoades soils, 15 percent Ekalaka soils, and 50 percent minor soils.

The gently sloping Rhoades soils have an uneven surface and are moderately well drained. They have a thin surface layer of grayish-brown loam and a claypan subsoil of grayish-brown silty clay. The underlying material is grayish-brown silty clay loam and light brownish-gray silty clay. The lower part of the subsoil and the underlying material are calcareous and commonly contain salts.

The well-drained Ekalaka soils are nearly level to sloping and have a smoother surface than Rhoades soils. They have a thick surface layer of grayish-brown fine sandy loam and a thin subsurface layer of light-gray loamy fine sand. The claypan subsoil is light brownish-gray fine sandy loam or loamy fine sand. The underlying material is light brownish-gray fine sandy loam. The lower part of the subsoil and the underlying material are calcareous and contain salts.

Absher and Archin soils are the most common of the minor soils. Absher soils are on some of the flats and fans, and Archin soils are near Ekalaka soils. Less extensive soils are Belfield and Daglum soils in some of the swales, Tally soils near areas of Ekalaka soils, and Slickspots in some low spots that have little or no plant cover. Mine pits and dumps also are in this association.

Most of the soils in this association have a claypan subsoil that limits their use for crops. The claypan takes in water very slowly or slowly and restricts plant roots. In addition, the Ekalaka soil blows easily. Runoff is medium or slow. Improving tilth and water intake and controlling soil blowing are the main concerns in cultivated areas.

Most of this association is in native grass and is used for range. Small areas, mainly the Ekalaka soil and some of the minor soils, are cultivated. Small grain and alfalfa are the main crops. Livestock ranching is the main enterprise. Lignite coal has been strip mined at several locations on this association. Most mines have been abandoned.

2. Belfield-Daglum association

Deep, well drained and moderately well drained, nearly level to gently sloping loamy and silty soils that have a clayey or claypan subsoil

This association is on flats, in swales, and on low ridges on uplands. The long slopes are mostly nearly level to gently sloping, but some of the ridges are undulating. The surface is uneven in the nearly level parts. Low mounds rise several inches above the intervening low spots.

This association makes up slightly less than 4 percent of the land area in the county. It is about 40 percent Belfield soils, 35 percent Daglum soils, and 25 percent minor soils (fig. 2).

Belfield soils, in swales and along the sides of low ridges, are mostly nearly level to gently sloping and are well drained. They have a surface layer of grayish-brown loam and a thin transitional layer of grayish-brown heavy loam. The subsoil is grayish-brown clay loam and silty clay in the upper part and light brownish-gray clay loam in the lower part. The underlying material is light brownish-gray clay loam. The lower part of the subsoil and the underlying material are calcareous and have spots and streaks of soft lime.

Daglum soils, on flats and in swales, are mostly nearly level and are moderately well drained. They have a surface layer of grayish-brown silt loam and a subsurface layer of light brownish-gray silty clay loam. The claypan subsoil is grayish-brown and light brownish-gray silty clay. The underlying material is light olive-gray silty clay. The lower part of the subsoil and the underlying material are calcareous and contain salts.

Minor soils in this association are Absher and Rhoades soils and Slickspots on some of the upland flats, Cabba and Lantry soils on the sides of entrenched drainageways, Havrelon and Lohler soils on bottom land, Morton and Reeder soils on low ridges, and a few areas of Regent and Ridgeview soils.

The major soils in this association take in water slowly or very slowly. The Daglum soil has poor tilth, and its claypan subsoil restricts roots. Runoff is slow or medium. The Daglum soil has a low potential for crops, but the Belfield soil is moderately well suited to dryfarmed crops. Conserving moisture, controlling erosion, and improving tilth and water intake are concerns in management.

This association is used for range and for crops, mainly small grain and alfalfa. Some corn is grown on the Belfield soil and on some of the minor soils. Livestock ranching is the main enterprise. Some wheat is grown for cash income.

3. Vebar-Flasher association

Moderately deep and shallow, well-drained and somewhat excessively drained, nearly level to rolling loamy and sandy soils

This association is an upland plain. It is mostly gently undulating to rolling, but is nearly level in places and is hilly to steep on the sides of a few scattered buttes (fig. 3). Several Intermittent lakes are in this association.

This association makes up about 8 percent of the land area in the county. It is about 55 percent Vebar soils, 20 percent Flasher soils, and 25 percent other soils (fig. 4).

The moderately deep Vebar soils are mostly nearly level to undulating and are well drained. They have a surface layer of dark grayish-brown fine sandy loam and a subsoil of grayish-brown and brown fine sandy loam. The underlying material is light-gray and light-brown loamy fine sand. Light-gray soft sandstone is at a depth of 32 inches.

The shallow Flasher soils are mostly gently undulating to rolling and are somewhat excessively drained. They have a surface layer of grayish-brown loamy

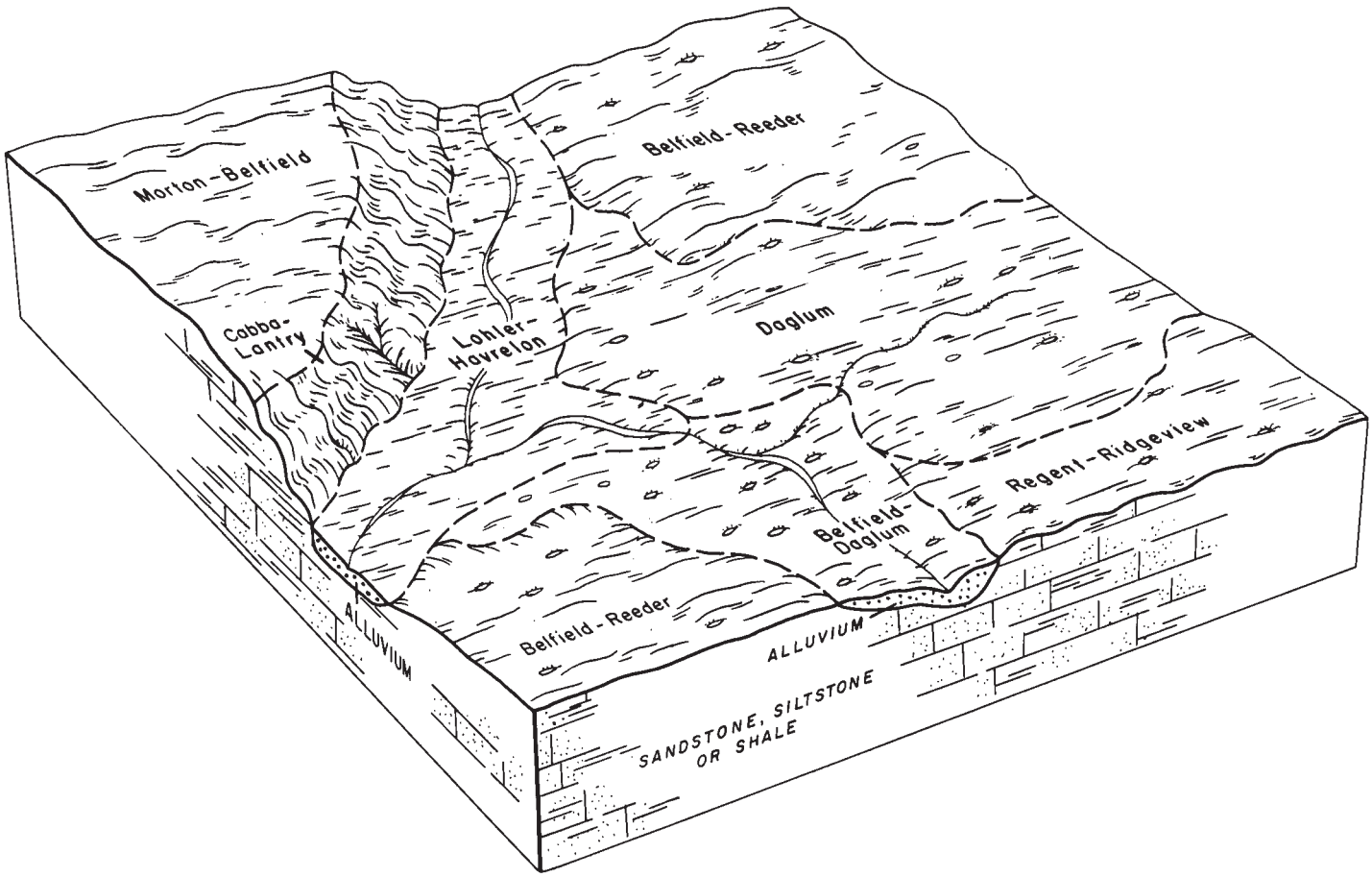

Figure 2.—**Pattern of soils and underlying material in association 2.**

fine sand and underlying material of brown calcareous loamy fine sand. Calcareous soft sandstone is at a depth of 11 inches.

Less extensive in this association are Glenross and Regan soils in low areas near Intermittent lakes, Heil soils and Intermittent lakes in depressions, Parshall soils in swales, and Reeder and Tally soils on the sides of some of the low ridges.

The major soils in this association take in water readily, but they are droughty and blow easily. Runoff is slow on much of the area, but is medium in the more sloping parts. The Flasher soil is not suitable for farming. Controlling soil blowing and conserving moisture are the main concerns of management in the cultivated areas.

This association is used both for range and for crops. Most cropped areas are the dominant Vebar soils and the less extensive Parshall and Reeder soils. Small grain, corn, and alfalfa are the main crops. Livestock farms and livestock ranching are the main enterprises on this association.

4. Morton-Reeder association

Moderately deep, well-drained, nearly level to sloping and undulating silty and loamy soils

This association is an upland plain of ridges, swales, and closed depressions. For the most part, it is gently sloping and slopes are long and smooth. The relief is undulating along some of the ridges where slopes are short and convex. The steeper parts are on the sides of drainageways that cut back into the association.

This association makes up about 9 percent of the land area in the county. It is about 45 percent Morton soils, 20 percent Reeder soils, and 35 percent other soils.

Morton soils are nearly level to sloping. Slopes are long and smooth. The surface layer is dark grayish-brown silt loam, and the subsoil is grayish-brown and light brownish-gray loam. The underlying material is pale-yellow, calcareous loam. Light brownish-gray soft sandstone is at a depth of 37 inches.

Reeder soils are nearly level to undulating. Some slopes are short and convex. The surface layer is dark grayish-brown loam, and the subsoil is dark-brown and brown loam. The underlying material is light olive-brown, calcareous fine sandy loam. Light olive-brown soft sandstone is at a depth of 36 inches.

Minor soils in this association are Belfield soils intermingled with both the Morton and Reeder soils in some areas, Cabba soils on ridgetops, Daglum soils on low flats, Farland soils on flats and in shallow swales, Havrelon and Lohler soils on bottom land along creeks, Heil soils in closed depressions, and Lantry soils on the sides of ridges and entrenched drainageways.

The dominant Morton and Reeder soils are moder-

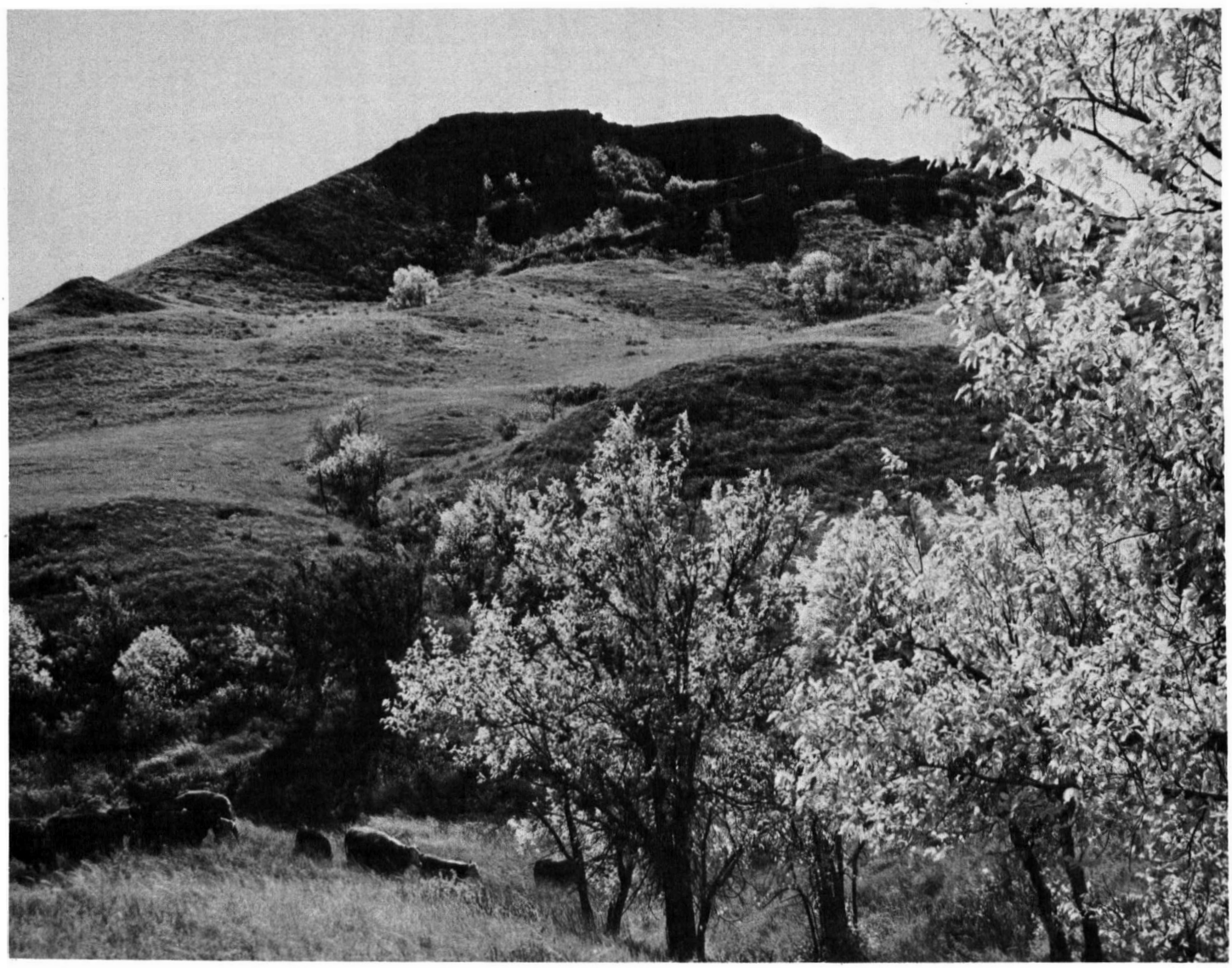

Figure 3.—**Castle Butte is a prominent feature in the Vebar-Flasher association.**

ately permeable and are suitable for dryfarming. Runoff is medium on much of the association, but is slow on the nearly level soils. Controlling erosion and soil blowing and conserving moisture are the main concerns in cultivated areas.

Some areas are in native grass and are used for range, but many are cultivated. Small grain, corn, and alfalfa are the main crops. Wheat farming and livestock ranching are the main enterprises on this association.

5. *Wayden-Cabba association*

Shallow, well-drained to excessively drained, rolling to steep clayey and silty soils

This association is mainly on the upper part of breaks on both sides of the Moreau River. It is mainly hilly to steep. The less steep parts are on drainage divides that finger into the association. Many small draws flow into the larger, more deeply entrenched drainageways.

This association makes up about 6 percent of the land area in the county. It is about 35 percent Wayden soils, 20 percent Cabba soils, and 45 percent minor soils (fig. 5).

Wayden soils have short, strongly convex slopes. They are excessively drained. The surface layer is grayish-brown silty clay. The underlying material is grayish-brown clay and light brownish-gray shaly clay. Light brownish-gray soft shale is at a depth of 16 inches.

Cabba soils are well drained to somewhat excessively drained. Commonly they are above the Wayden soils on the higher parts of the association. They have a very thin surface layer of dark grayish-brown silt loam and a transitional layer of grayish-brown silt loam. The underlying material is light brownish-gray, calcareous very fine sandy loam. Light brownish-gray, soft sandstone is at a depth of 17 inches.

Minor soils in this association are Havrelon and Lohler soils on bottom land, Lantry soils on the sides

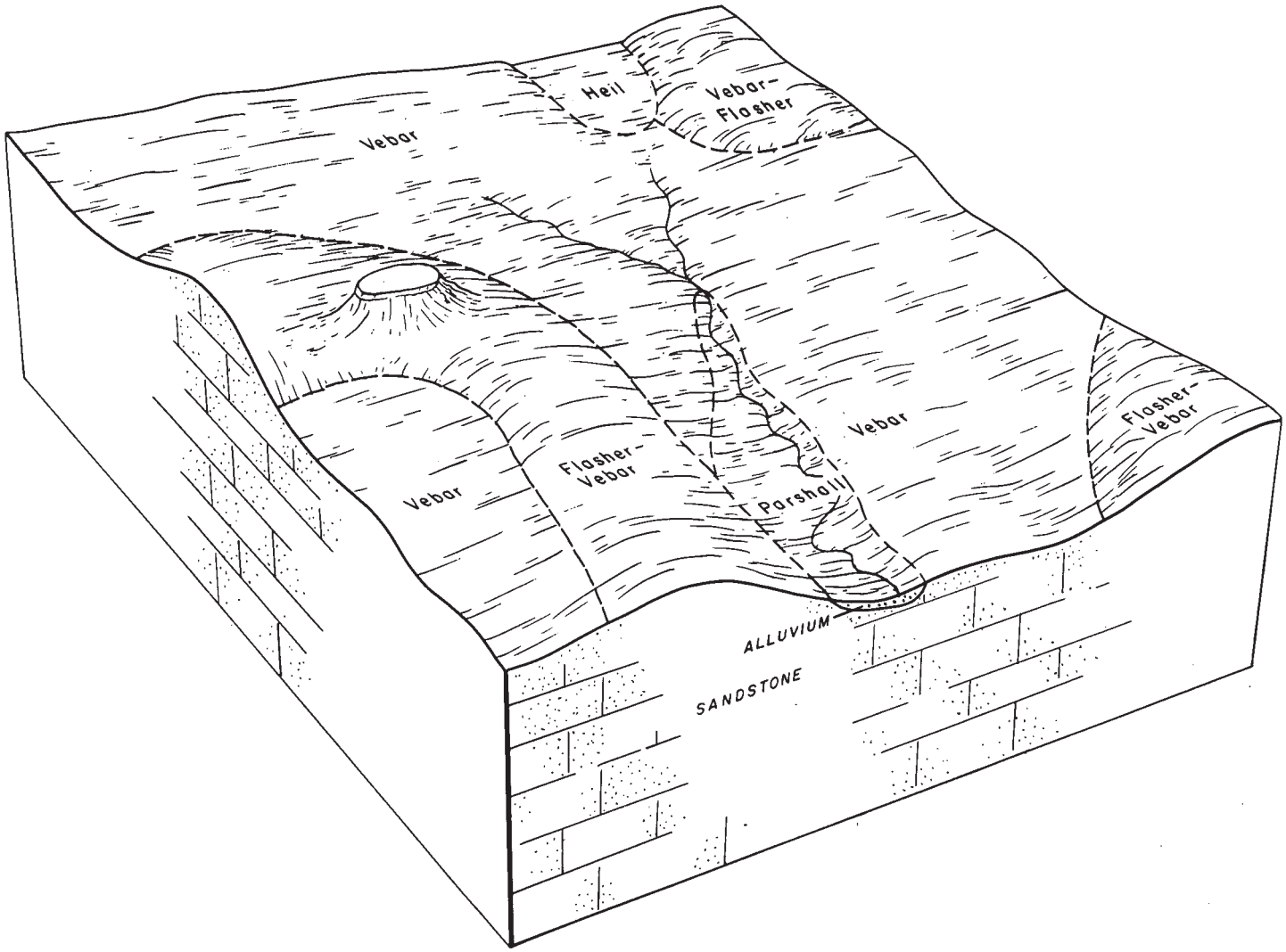

Figure 4.—**Pattern of soils and underlying material in association 3.**

of ridges below Cabba soils, Moreau soils intermingled with Wayden soils, and Morton and Regent soils on drainage divides above the Cabba and Wayden soils.

The dominant soils in this association are low in fertility. They have rapid runoff and very low or low available water capacity. They are highly susceptible to erosion and are too steep for cultivation.

Almost all of this association is in native grass and is used for range. Livestock ranching is the main enterprise.

6. Regent-Ridgeview association

Moderately deep and deep, well-drained, nearly level to sloping silty soils

This association is a drainage divide in the central part of the county. It is mostly gently sloping. Slopes are long and smooth.

This association makes up slightly more than 3 percent of the land area in the county. It is about 50 percent Regent soils, 40 percent Ridgeview soils, and 10 percent minor soils.

Regent soils have a surface layer of grayish-brown silty clay loam and a subsoil of grayish-brown and light brownish-gray silty clay. At a depth of 38 inches is grayish-brown shale.

Ridgeview soils are on the lower parts of the same landscape. They have a surface layer of dark-gray silty clay loam and a subsoil of grayish-brown and light brownish-gray silty clay and clay. The underlying material is grayish-brown, calcareous clay.

Minor soils in this association are Belfield and Daglum soils in swales and on low flats, Heil soils in closed depressions, Moreau soils on ridges and knolls, Morton soils in places where the underlying shale is silty, and Promise soils on the lower parts of the landscape, especially in the eastern and southern parts of the association.

The dominant Regent and Ridgeview soils are slowly permeable and release moisture slowly to plants. Runoff is medium over much of the area. Controlling erosion and soil blowing are the main concerns in cultivated areas.

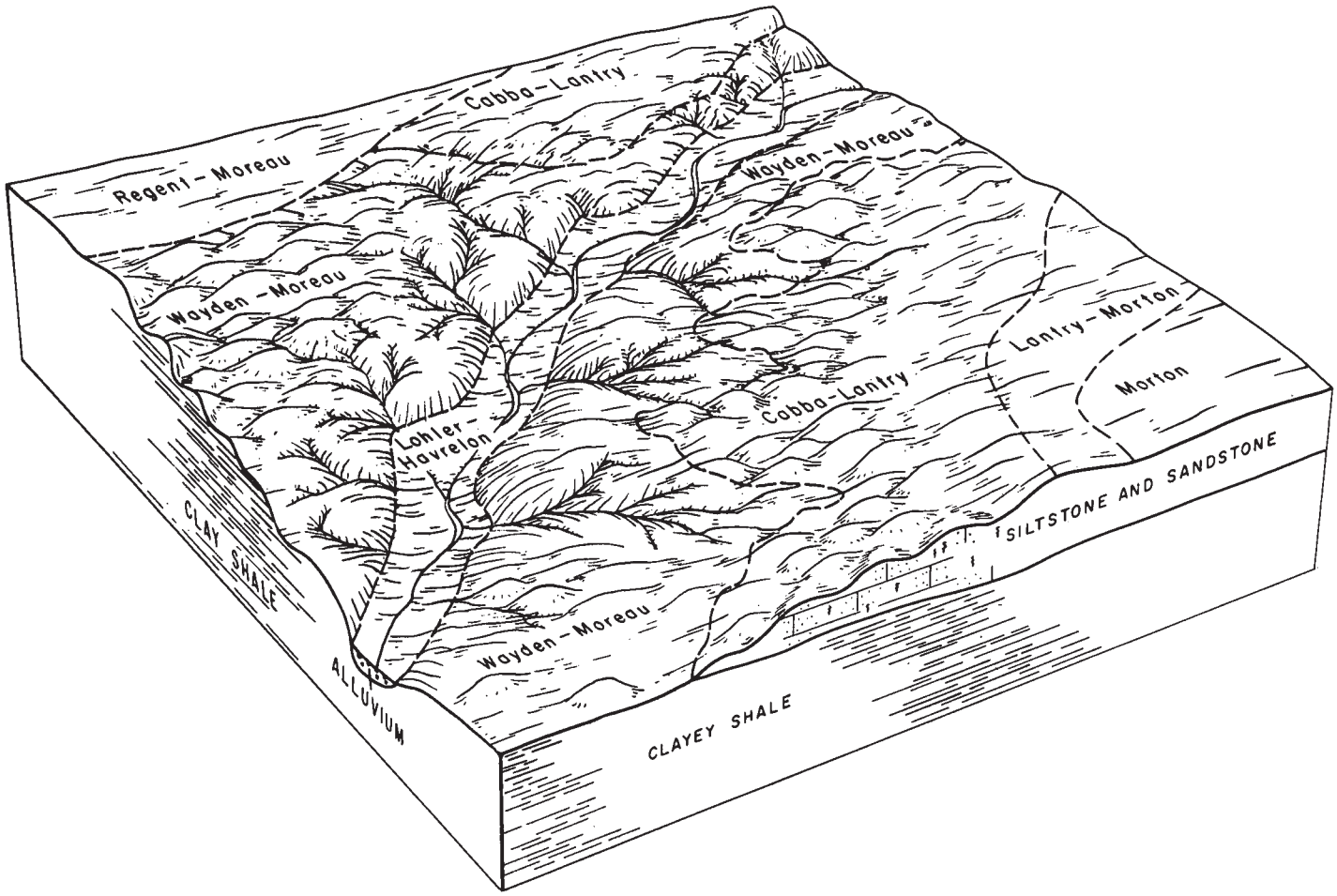

Figure 5.—**Pattern of soils and underlying material in association 5.**

Some areas are in native grass and are used for range. Many areas are cultivated. Wheat, oats, and alfalfa are the main crops. These soils are well suited to winter wheat following a year of fallow. Wheat farming and livestock ranching are the main enterprises on this association.

Well-Drained Soils Formed in Material Weathered From Clay Shale; on Uplands

This group consists of shallow to deep clayey soils on uplands. These soils are mostly gently sloping to moderately steep, but are nearly level on isolated flats and are steep or very steep near Lake Oahe. Many draws and deeply entrenched drainageways dissect the landscape. About 1 percent of the acreage is cultivated. The rest is in native grass and is used for range.

7. *Opal-Sansarc-Promise association*

Shallow to deep, well-drained, nearly level to moderately steep clayey soils

This association is a shale plain on uplands. It is mostly gently sloping, but is steeper on the sides of some ridges and on the sides of entrenched drainageways. Slopes are long and smooth.

This association makes up about 24 percent of the land area in the county. It is about 40 percent Opal soils, 20 percent Sansarc soils, 15 percent Promise soils, and 25 percent minor soils.

The mostly gently sloping to strongly sloping Opal soils are moderately deep over shale. They have a surface layer and subsoil of grayish-brown clay. The underlying material is light yellowish-brown clay and pale-olive shaly clay. Light olive-gray and very dark gray shale is at a depth of 33 inches.

The sloping to moderately steep Sansarc soils are shallow over shale. Slopes generally are short and convex. Sansarc soils have a thin surface layer of grayish-brown clay and underlying material of light brownish-gray clay and shaly clay. Light brownish-gray shale is at a depth of 17 inches.

The deep Promise soils are nearly level to gently sloping. Slopes are long and smooth. The surface layer is dark grayish-brown clay and the subsoil is dark grayish-brown and grayish-brown clay. The underlying material is light brownish-gray silty clay.

Minor soils in this association are Agar and Reliance soils on smooth tableland near Lake Oahe, Chantier and Swanboy soils on fans, Dupree soils intermingled with Opal and Sansarc soils, and Hurley

soils and Slickspots in drainage sags and on upland flats.

These soils are difficult to work and are very slowly or slowly permeable. Available water capacity ranges from very low to moderate. Runoff is medium on much of the association, but is rapid on the steeper soils. Controlling erosion and soil blowing and conserving moisture are the main concerns in management.

Many areas are in native grass and are used for range. Most of the farming is on Agar, Promise, and Reliance soils. Some areas of the Opal soils are cropped. Wheat, oats, and alfalfa are the main crops. Some corn is grown. Livestock ranching and wheat farming are the main enterprises.

8. Sansarc-Opal association

Shallow and moderately deep, well-drained, gently sloping to steep clayey soils

This association is a dissected shale plain adjacent to the larger streams in the county. It is dominantly strongly sloping to moderately steep. Slopes in much of the association are short and convex. The less sloping parts are the sides of the drainage divides, and the steeper parts are the sides of entrenched drainageways. Many small draws flow into the entrenched drainageways (fig. 6). In some areas the draws and drainageways are gullied.

This association makes up about 36 percent of the land area in the county. It is about 30 percent Sansarc soils, 28 percent Opal soils, and 42 percent minor soils.

The shallow Sansarc soils are mostly moderately steep and have short, convex slopes. They have a thin surface layer of grayish-brown clay and underlying material of light brownish-gray clay and shaly clay. Light brownish-gray shale is at a depth of 17 inches.

The moderately deep Opal soils are gently sloping to moderately steep. They have a surface layer and subsoil of grayish-brown clay. The underlying material is light yellowish-brown clay and pale-olive shaly clay underlain by shale at a depth of 33 inches.

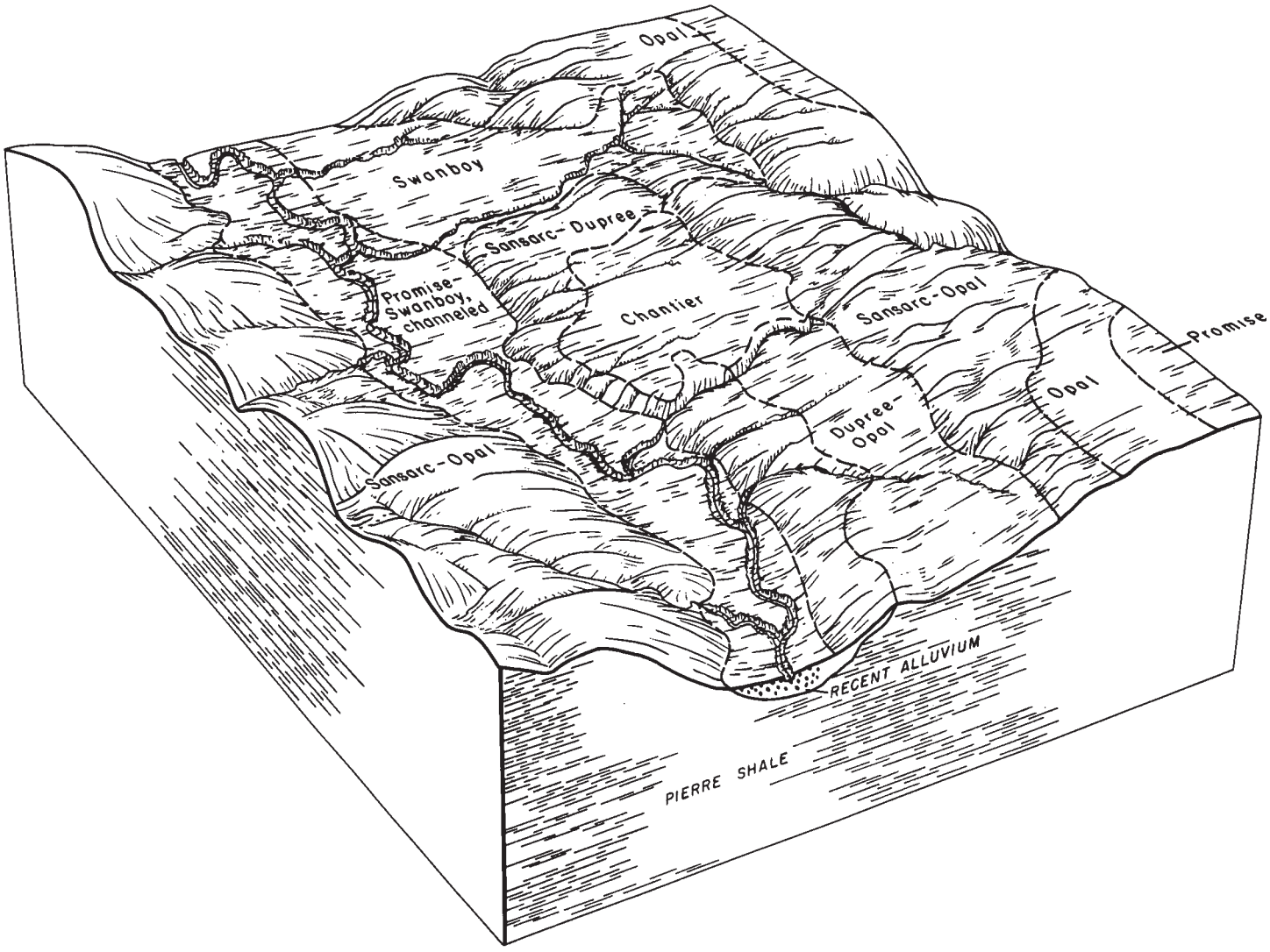

Figure 6.—**Pattern of soils and underlying material in association 8.**

Minor soils in this association are Agar, Canning, and Reliance soils on isolated high terraces near Lake Oahe, Chantier and Swanboy soils on fans below steeper soils, Hurley soils and Slickspots in shallow drainage sags, and Promise soils on nearly level drainage divides and also near Swanboy soils on low terraces and fans along the larger drainageways. Also in this association are small areas of Shale land on the sides and around the heads of some drainageways.

The dominant Sansarc and Opal soils are slowly or very slowly permeable and have very low or low available water capacity. Runoff is rapid over much of the area. The Sansarc soil is not suitable for cultivation, and most of the Opal soil in this association is too steep for cultivation.

Most of this association is in native grass and is used for range. Small areas of the Opal soil and some minor soils are used for small grain and alfalfa. The small areas of the Canning soil are a potential source of limited amounts of sand and gravel. Livestock ranching is the main enterprise on this association.

9. Sansarc-Dupree association

Shallow, well-drained, strongly sloping to very steep clayey soils

This association is mainly river breaks adjacent to Lake Oahe in the southern part of the county. It is mostly hilly to steep. Slopes are short and convex. Many gullied draws and drainageways dissect the landscape.

This association makes up about 4 percent of the land area in the county. It is about 45 percent Sansarc soils, 35 percent Dupree soils, and 20 percent minor soils.

Sansarc soils have a thin surface layer of grayish-brown clay and underlying material of light brownish-gray, calcareous clay and shaly clay. Light brownish-gray shale is at a depth of 17 inches.

Dupree soils have a thin surface layer of grayish-brown clay and a subsoil of grayish-brown and light brownish-gray, acid clay. They are underlain by gray and olive-gray shale at a depth of 16 inches. Dupree soils are more acid and firmer than Sansarc soils.

Shale land is the most extensive of the minor soils. Other soils in this association are Chantier and Swanboy soils on flats and fans below steeper soils, Farland and Reliance soils on terraces near Lake Oahe, Opal soils intermingled with Sansarc and Dupree soils, and Schamber soils on terrace fronts.

The dominant Sansarc and Dupree soils are slowly or very slowly permeable and have very low available water capacity. Runoff is rapid to very rapid. These soils are not suitable for cultivated crops.

Almost all of this association is in native grass and is used for range. The Schamber soil is a potential source of sand and gravel, but the amount is limited and in many areas the material is poorly graded. Livestock ranching is the main enterprise.

Well Drained and Moderately Well Drained Soils Formed in Alluvium; on Bottom Land and Low Terraces

Only the Trembles-Havrelon association is in this group. The soils formed in stratified alluvium. They are subject to flooding in some years, but generally the extra moisture is beneficial. About 25 percent of the acreage is cultivated. The rest is in native vegetation and is used for range, hay, and wildlife.

10. Trembles-Havrelon association

Deep, well drained and moderately well drained, nearly level loamy soils

This association makes up about 2 percent of the along the Moreau River. It is nearly level or level, but in places is broken by low hummocks and partly filled, secondary flood channels.

This association is on bottom land and low terraces land area in the county. It is about 35 percent Trembles soils, 15 percent Havrelon soils, and 50 percent minor soils.

Trembles soils are well drained and in places are hummocky. They have a thin surface layer of grayish-brown fine sandy loam. The underlying material is light brownish-gray, calcareous fine sandy loam.

Havrelon soils are moderately well drained and well drained. They have a smoother surface than Trembles soils. The surface layer is grayish-brown loam, and the underlying material is grayish-brown, calcareous loam and clay loam stratified with layers of very fine sand.

Banks and Lohler soils are the most extensive of the minor soils. Banks soils commonly are near the stream channels. Lohler soils are in some of the low areas. Other soils in this association are Farland, Shambo, and Tally soils on valley terraces and Promise and Swanboy soils on fans and on low terraces.

The dominant Trembles and Havrelon soils are moderately and moderately rapidly permeable and have moderate or high available water capacity. The lower areas are subject to flooding, but damage usually is minor. Conserving moisture and controlling soil blowing are the main concerns in management.

Much of this association is in native grass and is used for range and hay. Spring wheat, oats, corn, and alfalfa are the main crops. These soils have a potential for irrigation. Native trees and shrubs near the stream channels provide winter protection for livestock and for wildlife. Livestock ranching is the main enterprise. Several ranch headquarters are located on this association.

Descriptions of the Soils

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

An important part of the description of each soil series is the soil profile, that is, the sequence of layers from the surface downward to rock or other 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. Color terms are for dry soil unless otherwise stated. The profile described in the series is representative for mapping units in that series. If the profile of a given mapping unit differs from the one described for the series, the differences are stated in describing the mapping unit, or they are apparent in the name of the mapping unit.

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

Preceding the name of each mapping unit is a symbol. This symbol identifies the mapping unit on the detailed soil map. Listed at the end of each description of a mapping unit is the capability unit, range site, and windbreak group to which the mapping unit has been assigned. The page on which each mapping unit, capability unit, and range site is described can be found by referring to the "Guide to Mapping Units" at the back of this survey.

The acreage and proportionate extent of each mapping unit are shown on table 1. Many of the terms used in describing soils can be found in the Glossary at the end of this survey, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*5*).[2]

Absher Series

The Absher series consists of deep, well-drained, nearly level soils that have a claypan subsoil. These soils formed in alluvium and are on terraces and uplands. The native vegetation is mainly mid and short grasses and some forbs.

In a representative profile the surface layer is light brownish-gray silt loam about 1 inch thick. The subsoil, about 20 inches thick, is grayish-brown silty clay. The upper part is very hard when dry and firm when moist; the lower part is calcareous. The underlying material is grayish-brown, calcareous clay.

Absher soils are low in fertility and have a moderately low content of organic matter. Runoff is medium, and permeability is very slow. Available water capacity is low or moderate.

Almost all areas are in native grass and are used for range.

Representative profile of Absher silt loam, 0 to 2 percent slopes, in native grass, 600 feet south and 700 feet east of the northwest corner of sec. 19, T. 17 N., R. 24 E.

A2—0 to 1 inch, light brownish-gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak platy structure; slightly hard, very friable, sticky; few roots; slightly acid; abrupt, wavy boundary.

B2t—1 to 11 inches, grayish-brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate, medium, columnar structure parting to moderate, medium, blocky; very hard, firm, sticky; few roots; mildly alkaline; gradual, wavy boundary.

B3cacs—11 to 21 inches, grayish-brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak, medium, prismatic structure parting to moderate, medium, blocky; extremely hard, very firm, sticky; many segregations of gypsum; few segregations of lime; slight effervescence; mildly alkaline; gradual, wavy boundary.

C1cs—21 to 41 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky; few segregations of gypsum; slight effervescence; mildly alkaline; diffuse, wavy boundary.

C2cs—41 to 60 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, sticky; many segregations of gypsum and other salts; slight effervescence; mildly alkaline.

Depth to lime and gypsum ranges from 10 to 22 inches. Depth to shale commonly is more than 60 inches, but in places it is at a depth ranging from 40 to 60 inches. In places the soil has a thin A1 horizon. The A2 horizon ranges from grayish brown to light yellowish brown in hue of 2.5Y or 10YR. It is silt loam or silty clay loam and ranges from 1 to 4 inches in thickness. The B2t horizon ranges from grayish brown to light yellowish brown in hue of 2.5Y or 10YR. It is silty clay or clay. It has columnar structure that is moderate or strong and ranges from medium to very coarse. It is mildly alkaline to very strongly alkaline. In places the lower part is calcareous. This horizon ranges from 9 to 16 inches in thickness. The B3 horizon is light brownish gray in places. It is clay loam, clay, or silty clay and ranges from 6 to 12 inches thick. In some places the C horizon is stratified with lenses of silt loam. It is mildly alkaline to strongly alkaline.

Absher soils are near Archin, Daglum, and Rhoades soils. They contain more clay in the B horizon than Archin soils. They have a thinner A horizon than Daglum and Rhoades soils. When moist, their A horizon is lighter colored than that of Rhoades soils.

AbA—Absher silt loam, 0 to 2 percent slopes. This nearly level soil is on terraces and broad upland flats and fans. Most areas are irregular in shape and range from 10 to 400 acres in size. In some the surface is uneven because small mounds rise several inches above the intervening low areas. This soil has the profile described as representative of the series, but in places soil blowing has removed the surface layer.

Included with this soil in mapping were small areas of Daglum and Rhoades soils and Slickspots. Of these, Slickspots, which are in some of the low spots, are the most common. Daglum and Rhoades soils are on some of the mounds. Also included in some areas is a soil that is similar to this Absher soil, but is less than 40 inches deep over shale. The included soils make up as much as 25 percent of some areas.

This Absher soil has poor tilth and takes in water very slowly. It is not suitable for cultivation.

[2] Italic numbers in parentheses refer to Literature Cited, page 107.

TABLE 1.—*Acreage and proportionate extent of the soils*

Soil	Area	Extent
	Acres	*Percent*
Absher silt loam, 0 to 2 percent slopes	12,900	0.9
Absher-Slickspots complex, 0 to 2 percent slopes	1,360	.1
Agar silt loam, 2 to 6 percent slopes	5,200	.3
Archin-Slickspots complex, 2 to 9 percent slopes	5,200	.3
Arvada-Slickspots complex, 0 to 3 percent slopes	7,300	.5
Belfield-Daglum silt loams, 0 to 2 percent slopes	8,100	.5
Belfield-Reeder loams, 0 to 2 percent slopes	4,850	.3
Belfield-Reeder loams, 2 to 6 percent slopes	24,000	1.6
Belfield-Reeder loams, 6 to 9 percent slopes	5,700	.4
Cabba-Lantry silt loams, 15 to 25 percent slopes	7,500	.5
Cabba-Lantry silt loams, 25 to 40 percent slopes	27,000	1.8
Canning loam, 0 to 2 percent slopes	3,200	.2
Chantier clay, 2 to 9 percent slopes	33,250	2.2
Chantier-Shale land complex, 3 to 15 percent slopes	17,100	1.1
Daglum silt loam, 0 to 2 percent slopes	10,800	.7
Dupree-Opal clays, 2 to 9 percent slopes	63,500	4.2
Dupree-Sansarc clays, 9 to 25 percent slopes	70,100	4.7
Ekalaka fine sandy loam, 0 to 6 percent slopes	5,800	.4
Ekalaka fine sandy loam, 6 to 9 percent slopes	860	.1
Farland silt loam, 0 to 2 percent slopes	2,150	.1
Farland silt loam, 2 to 6 percent slopes	1,160	.1
Flasher loamy fine sand, 25 to 40 percent slopes	720	(1)
Flasher-Vebar complex, 6 to 15 percent slopes	8,500	.6
Flasher-Vebar complex, 15 to 25 percent slopes	2,850	.2
Glenross fine sandy loam	6,400	.4
Glenross-Regan fine sandy loams	2,500	.2
Heil soils	12,300	.8
Hurley-Slickspots complex, 2 to 9 percent slopes	25,500	1.7
Intermittent lakes	910	.1
Lantry-Morton silt loams, 6 to 15 percent slopes	14,600	1.0
Lohler silty clay	3,250	.2
Lohler and Havrelon soils	7,000	.5
Lowry silt loam, 0 to 2 percent slopes	990	.1
Lowry silt loam, 2 to 6 percent slopes	970	.1
Mine pits and dumps	790	.1
Moreau-Wayden silty clays, 9 to 25 percent slopes	26,250	1.7
Morton silt loam, 2 to 6 percent slopes	44,100	2.9
Morton-Belfield complex, 0 to 2 percent slopes	3,200	.2
Morton-Belfield complex, 2 to 6 percent slopes	6,000	.4
Morton-Farland silt loams, 0 to 2 percent slopes	4,400	.3
Morton-Lantry silt loams, 2 to 9 percent slopes	24,500	1.6
Natriborolls, channeled	670	(1)
Opal clay, 2 to 9 percent slopes	87,000	5.8
Opal-Hurley complex, 0 to 9 percent slopes	34,750	2.3
Opal-Promise clays, 1 to 4 percent slopes	3,050	.2
Opal-Sansarc clays, 6 to 15 percent slopes	84,500	5.6
Opal-Slickspots complex, 2 to 6 percent slopes	6,100	.4
Parshall fine sandy loam	4,400	.3
Parshall-Ekalaka fine sandy loams	2,100	.1
Promise clay, 0 to 2 percent slopes	17,100	1.1
Promise clay, 2 to 6 percent slopes	18,400	1.2
Promise-Slickspots complex, 0 to 2 percent slopes	2,600	.2
Promise-Swanboy clays, channeled	20,500	1.4
Reeder loam, 0 to 2 percent slopes	2,150	.1
Reeder loam, 2 to 6 percent slopes	12,500	.8
Reeder loam, 6 to 9 percent slopes	1,150	.1
Regent silty clay loam, 6 to 9 percent slopes	4,150	.3
Regent-Moreau complex, 2 to 9 percent slopes	11,600	.8
Regent-Ridgeview silty clay loams, 0 to 2 percent slopes	2,150	.1
Regent-Ridgeview silty clay loams, 2 to 6 percent slopes	33,700	2.2
Reliance silty clay loam, 0 to 2 percent slopes	1,540	.1
Reliance silty clay loam, 2 to 6 percent slopes	1,300	.1
Rhoades-Daglum complex, 2 to 6 percent slopes	42,500	2.8
Ridgeview silty clay loam, 0 to 2 percent slopes	4,370	.3
Sansarc-Dupree clays, 9 to 45 percent slopes	40,750	2.7
Sansarc-Opal clays, 6 to 15 percent slopes	76,500	5.1
Sansarc-Opal clays, 15 to 25 percent slopes	279,500	18.6
Sansarc-Shale land complex, 15 to 45 percent slopes	12,400	.8
Schamber gravelly sandy loam, 3 to 15 percent slopes	2,900	.2
Schamber-Sansarc complex, 15 to 40 percent slopes	12,600	.8
Shale land	17,100	1.1
Shambo loam	1,170	.1
Swanboy clay	14,400	1.0
Swanboy-Slickspots complex	14,900	1.0
Tally fine sandy loam	616	(1)
Trembles-Havrelon complex	4,100	.3
Trembles and Banks soils	10,300	.7
Vebar fine sandy loam, 0 to 6 percent slopes	55,500	3.7
Vebar-Flasher complex, 2 to 9 percent slopes	14,400	1.0
Wayden-Moreau silty clays, 25 to 40 percent slopes	34,000	2.3
Water (area less than 40 acres in size)	2,400	.2
Total land area	1,504,576	100.0
Water (area more than 40 acres in size)	55,104	
Total area	1,559,680	

[1] Less than 0.05 percent.

Most areas are in native grass and are used for range. Thin Claypan range site; capability unit VIs–1; windbreak group 10.

AcA—Absher-Slickspots complex, 0 to 2 percent slopes. This mapping unit is about 50 percent Absher soil, 40 percent Slickspots, and 10 percent other soils. Areas are irregular in shape and range from 10 to 300 acres in size. Slopes are mostly less than 2 percent, but in small included areas they are as much as 6 percent. The surface is uneven because many low mounds rise several inches above the low spots. The Absher soil is on the mounds, and Slickspots are in the low spots. The surface layer of the Absher soil is silt loam. In places it has been removed by soil blowing. Slickspots have a puddled or "slicked-over" surface and commonly have salts within a few inches of the surface.

Included with these soils in mapping were small areas of Daglum and Rhoades soils, both of which are on mounds.

These soils have poor tilth and take in water very slowly. Runoff typically ponds on the Slickspots and remains until the water evaporates. These soils are not suitable for cultivation. All areas are in native grass and are used for range. Little or no vegetation grows on Slickspots. Absher soil in Thin Claypan range site, capability unit VIs–1, windbreak group 10; Slickspots in capability unit VIIIs–3, not assigned to a range site or windbreak group.

Agar Series

The Agar series consists of deep, well-drained, gently sloping silty soils on uplands. These soils formed in silty loess. The native vegetation was mainly mid and short grasses.

In a representative profile the surface layer is dark grayish-brown silt loam about 6 inches thick. The subsoil, about 15 inches thick, is dark grayish-brown silty clay loam in the upper 2 inches, brown silty clay loam in the next 8 inches, and brown silt loam in the lower 5 inches. The upper part is very hard when dry and friable when moist. The underlying material is calcareous, light brownish-gray silt loam.

Agar soils are medium in fertility and moderate in content of organic matter. Runoff is medium, and permeability is moderate. Available water capacity is high.

Many areas are cultivated. Others are in native grass and are used for range and hay.

Representative profile of Agar silt loam, 2 to 6 percent slopes, in native grass, 200 feet east and 200 feet north of the southwest corner of sec. 24, T. 16 N., R. 30 E.

A1—0 to 6 inches, dark grayish-brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak, very fine, granular structure; soft, very friable, slightly sticky; many roots; neutral; clear, irregular boundary.

B21t—6 to 8 inches, dark grayish-brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky; very hard, friable, sticky; many roots; thin patchy clay films on faces of peds; neutral; gradual, wavy boundary.

B22t—8 to 16 inches, brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; moderate, medium and coarse, prismatic structure parting to moderate, fine and medium, subangular blocky; very hard, friable, sticky; many roots; thin continuous clay films on faces of peds; neutral; gradual, wavy boundary.

B3—16 to 21 inches, brown (10YR 5/3) silt loam, dark grayish brown (10YR 4/2) moist; weak, medium and coarse, prismatic structure parting to weak, medium, subangular blocky; hard, very friable, sticky; many roots; neutral; clear, smooth boundary.

C1ca—21 to 44 inches, light brownish-gray (2.5Y 6/2) silt loam, olive brown (2.5Y 4/3) moist; weak, medium, prismatic structure; hard, very friable, sticky; few roots; common fine segregations of lime; violent effervescence; mildly alkaline; clear, smooth boundary.

C2—44 to 60 inches, light brownish-gray (2.5Y 6/2) silt loam, olive brown (2.5Y 4/3) moist; massive, some vertical cleavage; slightly hard, very friable, sticky; few fine segregations of lime; violent effervescence; moderately alkaline.

Depth to free carbonates ranges from 16 to 26 inches. Depth to bedded shale or siltstone commonly is more than 60 inches, but in places soft shale or siltstone is at a depth of 40 to 60 inches. The A horizon is dark grayish brown or grayish brown and is 4 to 8 inches thick. The B2t horizon is silty clay loam or heavy silt loam having an average clay content of 25 to 35 percent. It ranges from 8 to 18 inches in thickness. In places the soil has a B3ca horizon. The C horizon is light brownish gray or pale brown in hue of 2.5Y or 10YR. It is silt loam or silty clay loam.

Agar soils are similar to Farland and Morton soils and are near Lowry and Reliance soils. They have a more silty C horizon than Farland soils and are deeper over bedrock than Morton soils. They contain more clay in the B horizon than Lowry soils and less clay than Reliance soils.

AgB—Agar silt loam, 2 to 6 percent slopes. This soil is on uplands and high terraces near Lake Oahe. It is dominantly gently sloping. Slopes are long and smooth. Areas are irregular in shape and range from 10 to 300 acres in size.

Included with this soil in mapping were small areas of Reliance soils on the lower parts of the landscape. Also included are small closed depressions less than 3 acres in size, which are identified by wet spot symbols on the soil map. These inclusions make up no more than 20 percent of any given area.

This Agar soil is easy to work and has high available water capacity. Controlling water erosion is the main concern in management.

About half the acreage is cultivated. Wheat, alfalfa, and corn are the main crops. Other areas are in native grass and are used for range and hay. Silty range site; capability unit IIe–1; windbreak group 3.

Archin Series

The Archin series consists of deep, well-drained, gently undulating to undulating loamy soils that have a claypan subsoil. These soils formed in alluvium and are on terraces and uplands. The native vegetation is mainly mid and short grasses and sedges and some forbs.

In a representative profile the surface layer is grayish-brown fine sandy loam about 4 inches thick. The subsurface layer is light brownish-gray fine sandy loam about 4 inches thick. The subsoil, about 14 inches thick, is grayish-brown sandy clay loam. The upper part is extremely hard when dry and firm when moist. The lower part is calcareous and has spots and streaks of lime and gypsum that extend into the underlying material. The underlying material is grayish-brown, calcareous fine sandy loam.

Archin soils are low in fertility and are moderately low in content of organic matter. Runoff is slow to medium, and permeability is slow. Available water capacity is moderate.

Almost all areas are in native grass and are used for range.

Representative profile of Archin fine sandy loam, in an area of Archin-Slickspots complex, 2 to 9 percent slopes, in native grass, 2,120 feet south and 100 feet west of the northeast corner of sec. 17, T. 17 N., R. 22 E.

A1—0 to 4 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, very friable, slightly sticky; common roots; strongly acid; clear, smooth boundary.

A2—4 to 8 inches, light brownish-gray (10YR 6/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, very coarse, prismatic structure parting to weak, medium and thick, platy; soft, very friable; common roots; neutral; abrupt, wavy boundary.

B21t—8 to 11 inches, grayish-brown (10YR 5/2) sandy clay loam, dark grayish brown (10YR 4/2) moist; strong, medium and coarse, columnar structure parting to moderate, medium, blocky; extremely hard, firm, sticky; few roots; tops and sides of columns coated with bleached sand grains; mildly alkaline; clear, wavy boundary.

B22t—11 to 14 inches, grayish-brown (2.5Y 5/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; moderate, very coarse, prismatic structure parting to moderate, coarse, blocky; very hard, firm, sticky; few roots; peds coated with masses of lime and gypsum; slight effervescence; moderately alkaline; gradual, wavy boundary.

B3cacs—14 to 22 inches, grayish-brown (2.5Y 5/2) sandy clay loam, dark grayish brown (2.5Y 4/2) moist; weak, very coarse, prismatic structure parting to weak subangular blocky; hard, firm, sticky; few roots; many medium and coarse segregations of lime and gypsum; strong effervescence; mildly alkaline; gradual, wavy boundary.

C1—22 to 37 inches, grayish-brown (2.5Y 5/2) heavy fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, sticky; few fine and medium segregations of lime and gypsum; slight effervescence; moderately alkaline; clear, wavy boundary.

C2—37 to 60 inches, grayish-brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, sticky; few fine segregations of lime; slight effervescence; mildly alkaline.

Depth to bedrock commonly is more than 60 inches, but in some places sandstone or shale is at a depth of 40 to 60 inches. The total thickness of horizons that have visible salt accumulations ranges from 10 to 28 inches. In places the soil does not have an A1 horizon. The A horizon ranges from 8 to 12 inches in thickness. The B2t horizon ranges from grayish brown to light yellowish brown in hue of 10YR or 2.5Y. It is sandy clay loam or loam.

Archin soils are near Daglum, Ekalaka, and Rhoades soils. They contain less clay in the B horizon than Daglum and Rhoades soils. They have a thinner A horizon and more clay in the B horizon than Ekalaka soils.

ArB—Archin-Slickspots complex, 2 to 9 percent slopes. This mapping unit is about 60 percent Archin soil, 25 percent Slickspots, and 15 percent other soils. Areas are irregular in shape and range from 20 to several hundred acres in size. Slopes are mostly convex and in small areas range up to 15 percent. The surface is uneven because low mounds rise several inches above the many low spots. The Archin soil is on the mounds. Slickspots are in the small low spots, which range up to 25 feet in diameter. They have salts at or near the surface.

Included with these soils in mapping were small areas of Absher and Ekalaka soils. Absher soils are intermingled with Archin soils. Slopes of the Ekalaka soil commonly face southeast. These included soils range up to 20 acres in size in some areas.

These soils have poor tilth and take in water slowly. Runoff is slow to medium and commonly ponds on the low areas of Slickspots until the water evaporates. Disturbed areas of the Archin soil are subject to soil blowing and water erosion. These soils are not suitable for cultivation.

Almost all areas are in native grass and are used for range. Slickspots are bare or nearly bare of vegetation. Archin soil in Claypan range site, capability unit VIe–9, windbreak group 10; Slickspots in capability unit VIIIs–3, not assigned to a range site or windbreak group.

Arvada Series

The Arvada series consists of deep, well-drained, nearly level silty soils that have a claypan subsoil. The soils formed in clayey alluvium and are on uplands and terraces. The native vegetation is mainly short

and mid grasses and some forbs.

In a representative profile the surface layer is light brownish-gray silt loam about 2 inches thick. The subsoil, about 15 inches thick, is grayish-brown clay. The upper part is very hard when dry and firm when moist. The lower part is calcareous. The underlying material is gray calcareous clay.

Arvada soils are low in fertility and moderately low in content of organic matter. Runoff is medium, and permeability is very slow. Available water capacity is low or moderate.

Almost all areas are in native grass and are used for range.

Representative profile of Arvada silt loam, in an area of Arvada-Slickspots complex, 0 to 3 percent slopes, in native grass, 2,640 feet south and 2,140 feet west of the northeast corner of sec. 6, T. 11 N., R. 25 E.

A2—0 to 2 inches, light brownish-gray (10YR 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak platy structure; slightly hard, friable, slightly sticky; many roots; neutral; abrupt, wavy boundary.

B2t—2 to 10 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, very coarse, columnar structure parting to weak, medium, subangular blocky; very hard, firm, sticky; few roots; neutral; gradual, wavy boundary.

B3—10 to 17 inches, grayish-brown (2.5Y 5/2) clay, dark gray (2.5Y 4/1) moist; weak, fine and medium, subangular blocky structure; extremely hard, very firm, sticky; few roots; slight effervescence; neutral; gradual, wavy boundary.

C1ca—17 to 32 inches, gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; massive; very hard, firm, sticky; many segregations of gypsum and salts; slight effervescence; mildly alkaline; gradual, smooth boundary.

C2cs—32 to 60 inches, gray (5Y 5/1) clay stratified with light olive-gray (5Y 6/2) silt loam, dark gray (5Y 4/1) and olive gray (5Y 5/2) moist; massive; very hard, firm, sticky; many segregations of gypsum and salts; slight effervescence; mildly alkaline.

Free carbonates are within a depth of 12 inches. The underlying material below a depth of 40 inches commonly is stratified alluvium, but in places it is friable shale. In places the soil has an A1 horizon. The A2 horizon ranges from grayish brown to light yellowish brown. The B2t horizon has hue of 2.5Y or 10YR and, when dry, is very hard or extremely hard. It ranges from neutral to very strongly alkaline in reaction and from 8 to 14 inches in thickness. The C horizon ranges from mildly alkaline to strongly alkaline.

In contrast with the nearby Swanboy soils, Arvada soils have an A2 horizon. Their B horizon is less clayey than that of Swanboy soils, but contains more sodium.

AsA—Arvada-Slickspots complex, 0 to 3 percent slopes. This mapping unit is on terraces and upland flats. It is about 50 percent Arvada soil, 40 percent Slickspots, and 10 percent less extensive soils. Areas are irregular in shape and range from 20 to 500 acres in size. The Arvada soil, on very slight rises, is closely intermingled with Slickspots, which are in slightly depressed spots ranging up to 50 feet in diameter. The Arvada soil has a very thin surface layer of silt loam. Slickspots have a puddled or "slicked-over" surface and have salts within a few inches of the surface.

Included with these soils in mapping were small areas of Hurley and Swanboy soils, both of which are on slight rises.

The soils in this unit are not suitable for cultivation. They have very poor tilth and take in water very slowly. Runoff is medium and ponds on Slickspots until the water evaporates.

Almost all areas are in native grass and are used for range. Slickspots are bare or nearly bare of vegetation. Arvada soil in Thin Claypan range site, capability unit VIs–1, windbreak group 10; Slickspots in capability unit VIIIs–3, not assigned to a range site or windbreak group.

Banks Series

The Banks series consists of deep, somewhat excessively drained, nearly level sandy soils on low terraces and bottom lands. These soils formed in sandy alluvium. The native vegetation is mainly tall and mid grasses.

In a representative profile the surface layer is grayish-brown loamy fine sand about 5 inches thick. The underlying material is light brownish-gray, calcareous fine sand and sand.

Banks soils are low in fertility and in content of organic matter. Runoff is slow, and permeability is rapid. Available water capacity is low. The lower areas are subject to flooding in some years.

The Banks soils in Dewey County are mapped only with Trembles soils.

Almost all areas are in native grass and are used for range.

Representative profile of Banks loamy fine sand, in an area of Trembles and Banks soils, in native grass, 1,480 feet east and 1,580 feet south of the northwest corner of sec. 23, T. 14 N., R. 23 E.

A1—0 to 5 inches, grayish-brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; very weak, medium, granular structure; soft, very friable; many roots; neutral; clear, smooth boundary.

C1—5 to 30 inches, light brownish-gray (10YR 6/2) fine sand, grayish brown (10YR 5/2) moist; single grained; loose; few roots; slight effervescence; neutral; gradual boundary.

C2—30 to 60 inches, light brownish-gray (10YR 6/2) sand, grayish brown (10YR 5/2) moist; single grained; loose; slight effervescence; neutral.

The A1 horizon ranges from dark grayish brown to light brownish gray. It is fine sandy loam, loamy fine sand, or fine sand and ranges from 3 to 6 inches

in thickness. The C horizon commonly is stratified with thin lenses of finer or coarser textured material. In places thin strata of gravel are at depths below 30 inches.

Banks soils are more sandy than the nearby Havrelon and Trembles soils.

Belfield Series

The Belfield series consists of deep, well-drained, nearly level to undulating loamy soils on uplands. These soils formed in material weathered from siltstone and soft shale. The native vegetation was mainly mid and short grasses.

In a representative profile (fig. 7) the surface layer is grayish-brown loam about 8 inches thick. The next layer is about 3 inches of grayish-brown heavy loam. The subsoil is about 19 inches thick. The upper 3 inches is grayish-brown clay loam, the next 8 inches is grayish-brown silty clay, and the lower 8 inches is calcareous, light brownish-gray clay loam. The upper 11 inches is very hard when dry and firm or very firm when moist. The lower 8 inches has many streaks and spots of lime extending into the underlying material. The underlying material is calcareous, light brownish-gray clay loam.

Belfield soils are medium in fertility and moderate in organic-matter content. Runoff is slow or medium, and permeability is slow. Available water capacity is moderate.

Many areas are cultivated. Others are in native grass and are used for range.

Representative profile of Belfield loam in an area of Belfield-Reeder loam, 2 to 6 percent slopes, in native grass, 1,300 feet west and 600 feet north of the southeast corner of sec. 24, T. 17 N., R. 23 E.

A1—0 to 8 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak, fine, subangular blocky structure parting to weak, fine, granular; slightly hard, very friable, sticky; many roots; slightly acid; clear, wavy boundary.

B&A—8 to 11 inches, grayish-brown (10YR 5/2) heavy loam (B), dark grayish brown (10YR 4/2) moist, and light brownish-gray (10YR 6/2), clean, uncoated sand grains (A) on surfaces of peds; moderate, coarse, prismatic structure parting to weak, fine, subangular blocky; hard, friable, sticky; common roots; slightly acid; clear, wavy boundary.

B21t—11 to 14 inches, grayish-brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate, coarse, prismatic structure parting to strong, fine, blocky; very hard, firm, sticky; common roots; thin continuous clay films on faces of blocks; neutral; clear, wavy boundary.

B22t—14 to 22 inches, grayish-brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong, coarse, prismatic structure parting to strong, medium and fine, blocky; very hard, very firm, very sticky; few roots; thin continuous clay films; neutral; clear, wavy boundary.

Figure 7.—**Profile of Belfield loam in an area of Belfield-Reeder loams, 0 to 2 percent slopes. Numbers on tape are in feet.**

B3ca—22 to 30 inches, light brownish-gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; weak, very coarse, prismatic structure parting to weak, coarse, subangular blocky; hard, firm, very sticky; few roots; many fine segregations of lime; slight effervescence; mildly alkaline; gradual, wavy boundary.

C1ca—30 to 41 inches, light brownish-gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y

4/2) moist; massive; hard, firm, very sticky; few roots; many fine segregations of lime; strong effervescence; mildly alkaline; clear boundary.

C2—41 to 60 inches, light brownish-gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky; few fine segregations of lime; strong effervescence; mildly alkaline.

Depth to carbonates ranges from 20 to 35 inches. The A1 horizon is grayish-brown or dark grayish-brown loam or silt loam. It ranges from 6 to 10 inches in thickness. The B&A horizon is gray to light brownish-gray heavy loam or clay loam 2 to 4 inches thick. The B2t horizon is dark grayish brown or grayish brown. It ranges from neutral to moderately alkaline in reaction and from 10 to 20 inches in thickness. Average clay content is 35 to 45 percent. Segregations of lime in the B3 horizon range from few to many. The B3ca and C horizons range from mildly alkaline to strongly alkaline.

Belfield soils are mapped with Daglum, Morton, and Reeder soils and are near Ridgeview soils. They have a thicker A horizon than Ridgeview soils and differ from those soils in having a B&A horizon. They have a more clayey B horizon than Morton and Reeder soils. They differ from Daglum soils in not having columnar structure.

BdA—Belfield-Daglum silt loams, 0 to 2 percent slopes. This mapping unit is on uplands in swales that range from 10 to 150 acres in size. It is about 60 percent Belfield soil, 20 percent Daglum soil, and 20 percent other soils. The Belfield soil is on slight rises. The Daglum soil is on the lower flatter parts of the landscape. The Belfield soil has a surface layer of silt loam, but otherwise has a profile similar to the one described as representative of the series. Included with these soils in mapping, in narrow bands at the edge of swales, were small areas of Farland, Morton, and Reeder soils.

Runoff is slow, and most areas receive extra moisture in the form of runoff from adjacent soils. Moisture penetrates the clayey subsoil in both soils slowly. In addition, the clayey subsoil of the Daglum soil restricts roots. Improving water intake and maintaining tilth are the main concerns in management.

Many areas are cultivated. Wheat, other small grain, and alfalfa are the main crops. Some areas are in native grass and are used for range and hay. Capability unit IIIs–1; Belfield soil in Clayey range site, windbreak group 4; Daglum soil in Claypan range site, windbreak group 9.

BrA—Belfield-Reeder loams, 0 to 2 percent slopes. This mapping unit is in irregularly shaped areas that range from 10 to 150 acres in size. It is about 50 percent Belfield soil, 30 percent Reeder soil, and 20 percent other soils. The Belfield soil has smooth slopes and is in the more nearly level parts of the landscape. The Reeder soil is on very slight convex rises. It has a clay loam subsoil, but otherwise has a profile similar to the one described as representative of the series.

Included with these soils in mapping were small areas of Absher, Daglum, Heil, and Morton soils. Of these, Daglum soils are the most common and are in low areas, as are Absher soils. Heil soils are in small, closed depressions, which are identified on the soil map by a wet spot symbol. Morton soils are on some of the slight rises.

Runoff is slow. The clayey subsoil of the Belfield soil takes in water slowly and releases it slowly to plants. Improving water intake and conserving moisture are the main concerns in farming.

Many areas of this unit are cultivated. Wheat, other small grain, and alfalfa are the main crops. Some corn is grown for silage. Other areas remain in native grass and are used for range and hay. Capability unit IIIs–1; Belfield soil in Clayey range site, windbreak group 4; Reeder soil in Silty range site, windbreak group 3.

BrB—Belfield-Reeder loams, 2 to 6 percent slopes. This mapping unit is about 45 percent Belfield soil, 40 percent Reeder soil, and 15 percent other soils. It is in irregularly shaped areas that range from 10 to several hundred acres in size. The Belfield soil is in the mid and lower parts of the landscape and has long, smooth slopes. Its profile is the one described as representative of the series. The Reeder soil, on the higher parts of the landscape, has shorter, more convex slopes. It has a clay loam subsoil, but otherwise has a profile similar to the one described as representative of the series.

Included with these soils in mapping were small areas of Absher, Daglum, Heil, and Morton soils. Absher and Daglum soils are mostly on the lower parts of the landscape along drainageways. Heil soils are in small, closed depressions, which are identified on the soil map by wet spot symbols. In some areas Morton soils are on the higher parts of the landscape.

The clayey subsoil of the Belfield soil takes in water slowly and releases it slowly to plants. Runoff is medium. Controlling erosion and improving water intake are the main concerns in management.

Many areas are cultivated. Wheat, other small grain, and alfalfa are the main crops. Some corn is grown for silage. Other areas are in native grass and are used for range and hay. Capability unit IIIe–3; Belfield soil in Clayey range site, windbreak group 4; Reeder soil in Silty range site, windbreak group 3.

BrC—Belfield-Reeder loams, 6 to 9 percent slopes. This mapping unit is about 45 percent Belfield soil, 40 percent Reeder soil, and 15 percent other soils. It is in irregularly shaped areas that range from 10 to 100 acres in size. Slopes commonly are short and convex. The Belfield soil is on the lower sides of the ridges and knolls. The Reeder soil is on the higher parts of the landscape. Both soils have a thinner surface layer and subsoil than in the profiles described as representative of their respective series.

Included with these soils in mapping were small areas of Absher, Daglum, Morton, and Rhoades soils. Absher, Daglum, and Rhoades soils are on the lower parts of the landscape and along small drainageways. Morton soils are intermingled with Reeder soils.

The clayey subsoil of the Belfield soil takes in water slowly and releases it slowly to plants. Runoff is medium, and the erosion hazard is severe. Controlling erosion and improving water intake are the main concerns in management.

Some areas are cultivated. Small grain and alfalfa are the main crops. Many areas are in native grass and are used for range. Capability unit IVe–7; Belfield

soil in Clayey range site, windbreak group 4; Reeder soil in Silty range site, windbreak group 3.

Cabba Series

The Cabba series consists of shallow, well-drained to somewhat excessively drained, moderately steep to steep silty soils on uplands. These soils formed in material weathered from soft sandstone and siltstone. The native vegetation is mainly short and mid grasses.

In a representative profile the surface layer is dark grayish-brown silt loam about 2 inches thick. Next is a transitional layer of about 5 inches of grayish-brown silt loam. The underlying material to a depth of 17 inches is calcareous, light brownish-gray very fine sandy loam. Below this is light brownish-gray sandstone.

Cabba soils are low in fertility and in content of organic matter. Runoff is rapid, and permeability is moderate. Available water capacity is very low or low.

All areas are in native grass and are used for range.

Representative profile of Cabba silt loam, in an area of Cabba-Lantry silt loams, 15 to 25 percent slopes, in native grass, 10 feet south and 2,500 feet east of the northwest corner of sec. 24, T. 13 N., R. 23 E.

A1—0 to 2 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, very fine, granular structure; slightly hard, very friable, slightly sticky; many roots; neutral; abrupt, smooth boundary.

AC—2 to 7 inches, grayish-brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; weak, medium, prismatic structure parting to moderate, medium and fine, granular; slightly hard, very friable, slightly sticky; many roots; neutral; clear, smooth boundary.

C1ca—7 to 17 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam, grayish brown (2.5Y 5/2) moist; weak, medium, prismatic structure parting to weak, medium, subangular blocky; slightly hard, very friable, slightly sticky; few roots; few fine segregations of lime; violent effervescence; mildly alkaline; clear smooth boundary.

C2ca—17 to 23 inches, light brownish-gray (2.5Y soft sandstone, dark grayish brown (2.5Y 4/2) moist; massive, crushes easily; many fine segregations of lime; strong effervescence; mildly alkaline; gradual, smooth boundary.

C3—23 to 60 inches, light brownish-gray (2.5Y 6/2) soft sandstone, grayish brown (2.5Y 5/2) moist; slight effervescence; mildly alkaline.

Depth to sandstone or siltstone ranges from 10 to 20 inches. Texture commonly is silt loam or very fine sandy loam, but in places it is loam. The A1 horizon ranges from dark grayish brown to brown and is 2 to 4 inches thick. The AC horizon ranges from grayish brown to light yellowish brown in hue of 10YR or 2.5Y. It is 4 to 7 inches thick. The soft sandstone in the C horizon has indistinct to very distinct bedding planes.

Cabba soils are mapped with Lantry soils and are near Flasher, Morton, and Wayden soils. They are less sandy than Flasher soils. They are shallower over bedrock than Lantry and Morton soils. They contain less clay than Wayden soils.

CbE—Cabba-Lantry silt loams, 15 to 25 percent slopes. This mapping unit is on upland ridges and the sides of entrenched drainageways. It is about 50 percent Cabba soil, 35 percent Lantry soil, and 15 percent less extensive soils. Areas are irregular in shape and range from 20 to several hundred acres in size. The Cabba soil is on the higher parts of the landscape. It has the profile described as representative of the series. The Lantry soil commonly is below the Cabba soil on the middle parts of the landscape.

Included with these soils in mapping were small areas of Moreau, Morton, and Wayden soils. Moreau and Wayden soils are on the lower parts of the landscape that are underlain by clayey shale. Morton soils are in the lower parts of some areas and also on smooth ridgetops.

The soils in this unit are not suitable for cultivation. They are low in fertility and have very low or low available water capacity. Runoff is rapid and the soils erode easily.

All areas are in native grass and are used for range. Capability unit VIIs–1, windbreak group 10; Cabba soil in Shallow range site, Lantry soil in Thin Upland range site.

CbF—Cabba-Lantry silt loams, 25 to 40 percent slopes. This mapping unit is mainly on the upper part of the breaks along the Moreau River and its tributaries. It is about 65 percent Cabba soil, 20 percent Lantry soil, and 15 percent less extensive soils. Areas are irregular in shape and range from 20 to several hundred acres in size. Slopes commonly are short and convex (fig. 8). The Cabba soils are on the tops and upper sides of ridges. The Lantry soils are on the mid and lower parts of the landscape. The profiles of both soils are shallower over sandstone than the ones described as representative of their respective series.

Included with these soils in mapping were small areas of Moreau, Morton, and Wayden soils. Moreau and Wayden soils are on the lower parts of the landscape that are underlain by clayey shale. Morton soils are in the lower parts of some areas and are also on flattened ridgetops.

The soils in this unit are not suitable for cultivation. They are low in fertility and have very low or low available water capacity. Runoff is rapid, and the risk of erosion is very severe.

All areas are in native grass and are used for range. Stringers of native trees and shrubs along drainageways provide wildlife habitat. Capability unit VIIs–1, windbreak group 10; Cabba soil in Shallow range site, Lantry soil in Thin Upland range site.

Canning Series

The Canning series consists of well-drained, nearly level loamy soils that are moderately deep over gravel and sand. These soils formed in alluvium and are on

Figure 8.—**An area of Cabba-Lantry silt loams, 25 to 40 percent slopes.**

terraces. The native vegetation was mainly mid and short grasses.

In a representative profile the surface layer is grayish-brown loam about 6 inches thick. The subsoil, about 20 inches thick, is dark grayish-brown clay loam in the upper 8 inches, grayish-brown clay loam in the next 8 inches, and grayish-brown gravelly loam in the lower 4 inches. The upper part is hard when dry and firm when moist. The lower part is calcareous. The underlying material is calcareous, multicolored gravel and coarse sand.

Canning soils are medium in fertility and moderate in content of organic matter. Runoff is slow. Permeability is moderate in the subsoil and rapid in the underlying gravel and sand. Available water capacity is low or moderate.

About half the acreage is cultivated. Other areas are in native grass and are used for range.

Representative profile of Canning loam, 0 to 2 percent slopes, in native grass, 200 feet north and 500 feet west of the southeast corner of sec. 17, T. 15 N., R. 26 E.

A1—0 to 6 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak, very fine and fine, granular structure; slightly hard, friable, sticky; common roots; slightly acid; clear, wavy boundary.

B21t—6 to 14 inches, dark grayish-brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate, medium, prismatic structure parting to weak, fine and medium, subangular blocky; hard, firm, sticky and plastic; common roots; thin patchy clay films; neutral; gradual, wavy boundary.

B22t—14 to 22 inches, grayish-brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate, coarse, prismatic structure parting to weak, fine, subangular blocky; very hard, firm, very sticky and plastic; common roots; thin patchy clay films; slight effervescence; neutral; clear, wavy boundary.

B3ca—22 to 26 inches, grayish-brown (2.5Y 5/2) gravelly loam, dark grayish brown (2.5Y 4/2) moist; weak, medium, prismatic structure parting to weak, fine, subangular blocky; slightly hard, very friable, slightly sticky; few roots; thin

patchy clay films; few fine segregations of lime and salt; slight effervescence; mildly alkaline; abrupt, wavy boundary.

IIC—26 to 60 inches, multicolored gravel and coarse sand, dark grayish brown (2.5Y 4/2) moist; single grained; loose; few fine segregations of lime and salt; slight effervescence; mildly alkaline.

Depth to gravel and sand ranges from 20 to 40 inches. The A horizon is grayish-brown or dark grayish-brown loam or silt loam and ranges from 4 to 8 inches in thickness. In places the B21t horizon is silty clay loam. The B22t horizon ranges from grayish brown to light yellowish brown in hue of 2.5Y or 10YR. In places few to many segregations of lime are concentrated in the B3ca or C1ca horizon. In places the gravel and sand in the IIC horizon contain angular fragments of sandstone or siltstone.

Canning soils are deeper over gravel and sand than the nearby Schamber soils.

CdA—Canning loam, 0 to 2 percent slopes. Areas of this nearly level soil are irregular in shape and range from 10 to 400 acres in size. Slopes are smooth and level. In places the subsoil is less clayey than is typical, and the underlying material contains more sand.

Included with this soil in mapping were small areas of Absher and Daglum soils in low areas or in slightly depressed swales. Also included was a soil that has a more clayey subsoil and is more than 40 inches deep over sand and gravel.

This Canning soil is medium in fertility and is easy to work. It is somewhat droughty because it is underlain by sand and gravel. Runoff is slow. Conserving moisture and controlling soil blowing are the main concerns in farming.

About half the acreage is cultivated. Small grain, alfalfa, and corn are the main crops. Small grain is better suited than corn. Other areas are in native grass and are used for range and hay. Silty range site; capability unit IIIs–2; windbreak group 6.

Chantier Series

The Chantier series consists of shallow, well-drained, gently sloping to strongly sloping, calcareous clayey soils on uplands. These soils formed in material weathered from the underlying shale. The native vegetation was mainly a sparse stand of mid grasses.

In a representative profile the surface layer is grayish-brown clay about 2 inches thick. The subsoil, about 9 inches thick, is grayish-brown clay. It is extremely hard when dry, extremely firm when moist, and very sticky and plastic when wet. The lower part of the subsoil has spots and streaks of gypsum and other salts. The underlying material is multicolored platy shale.

Chantier soils are low in fertility and in content of organic matter. Runoff is medium, and permeability is very slow. Available water capacity is very low.

All areas are in native grass and are used for range.

Representative profile of Chantier clay, 2 to 9 percent slopes, in native grass, 2,210 feet west and 325 feet south of the northeast corner of sec. 2, T. 11 N., R. 28 E.

A1—0 to 2 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, fine and very fine, granular structure; very hard, firm, sticky and plastic; few roots; strong effervescence; mildly alkaline; clear, wavy boundary.

B2—2 to 6 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, medium, blocky structure; extremely hard, extremely firm, very sticky and plastic; few roots; strong effervescence; mildly alkaline; clear, irregular boundary.

B3cssa—6 to 11 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, coarse, blocky structure; extremely hard, extremely firm, very sticky and plastic; few roots; many fine segregations of gypsum and other salts; strong effervescence; moderately alkaline, clear, wavy boundary.

C1—11 to 16 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; few roots; few fine segregations of gypsum and other salts; violent effervescence; mildly alkaline; abrupt, irregular boundary.

C2—16 to 60 inches, multicolored platy shale; strong effervescence along seams and fractures; mildly alkaline.

Depth to shale ranges from 10 to 20 inches. In some places the B and C horizons are as much as 25 percent fine fragments of shale. The A1 horizon is grayish brown or light brownish gray in hue of 2.5Y or 10YR. It is 1 to 3 inches thick. The B2 horizon ranges from grayish brown to light olive gray in hue of 2.5Y or 5Y. It ranges from mildly alkaline to strongly alkaline in reaction and from 4 to 8 inches in thickness. The C horizon ranges from neutral to strongly alkaline.

Chantier soils are near Dupree, Sansarc, and Swanboy soils. They contain more salts nearer the surface than Dupree and Sansarc soils. They are shallower over shale than Swanboy soils.

ChB—Chantier clay, 2 to 9 percent slopes. This gently sloping to sloping soil is irregular in shape and ranges from 30 to 300 acres in size. Slopes commonly are long and concave, but are short and convex between gullies that dissect the areas. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Swanboy soils and Shale land. Swanboy soils are on the lower parts of the landscape. Shale land is around the heads or on the shoulders of drainageways or gullies. Also included is a soil that is similar to this Chantier soil, but is 20 to 30 inches deep over shale.

This Chantier soil has a high content of salts and is low in fertility. It has very poor tilth and very low available water capacity. It is not suitable for cultivation.

All areas are in native grass and are used for range. Dense Clay range site; capability unit VIs–5; windbreak group 10.

CsC—Chantier-Shale land complex, 3 to 15 percent slopes. This mapping unit is about 55 percent Chantier soil and 45 percent Shale land. Areas are irregular in

shape and 40 to 400 acres in size. Many gullies up to 10 feet wide and about 3 feet deep have formed. The profile of this Chantier soil commonly is shallower over shale than the one described as representative of the series. Shale land is on the higher parts of the landscape around the heads and on the shoulders of drainageways and gullies. In these areas shale is at or near the surface.

This mapping unit is not suitable for cultivation. The Chantier soil is low in fertility and has very poor tilth and very low available water capacity. Salts commonly are within 10 inches of the surface. The hazard of erosion is very severe.

All areas are in native vegetation and are used as range. Shale land supports little or no vegetation, and the stand of grass is sparse on the Chantier soil. Chantier soil in Dense Clay range site, capability unit VIs–5, windbreak group 10; Shale land in capability unit VIIIs–2, not assigned to a range site or windbreak group.

Daglum Series

In the Daglum series are deep, moderately well drained, nearly level to gently sloping silty soils that have a claypan subsoil. These soils are on uplands. They formed in material weathered from soft shale. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is grayish-brown silt loam about 6 inches thick. The subsurface layer is light brownish-gray silty clay loam about 1 inch thick. The subsoil, about 19 inches thick, is silty clay that is grayish brown in the upper part and light brownish gray in the lower part. It is extremely hard when dry and very firm when moist. The lower part has spots and streaks of lime and salts extending into the underlying material. The underlying material to a depth of 42 inches is calcareous, light olive-gray silty clay. Below this is partly weathered shale.

Daglum soils are medium in fertility and moderate in content of organic matter. Runoff is slow to medium, and permeability is very slow. Available water capacity is low or moderate.

Many areas are in native grass and are used for range. Other areas are cultivated.

Representative profile of Daglum silt loam, 0 to 2 percent slopes, in native grass, 1,380 feet north and 150 feet east of the southwest corner of sec. 34, T. 17 N., R. 23 E.

A1—0 to 6 inches, grayish-brown (10YR 5/2) silt loam, very dark gray (10YR 3/1) moist; weak platy and weak, fine, granular structure; soft, friable, sticky; many roots; strongly acid; abrupt, smooth boundary.

A2—6 to 7 inches, light brownish-gray (10YR 6/2) silty clay loam, dark gray (10YR 4/1) moist; moderate, medium and fine, granular structure; hard, firm, sticky; many roots; medium acid; abrupt, wavy boundary.

B21t—7 to 16 inches, grayish-brown (10YR 5/2) silty clay, very dark gray (10YR 3/1) moist; moderate, medium and coarse, columnar structure parting to moderate, medium, blocky; extremely hard, very firm, sticky; common roots; thin patchy clay films; neutral; clear, wavy boundary.

B22t—16 to 21 inches, grayish-brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak, coarse, prismatic structure parting to moderate, coarse and medium, blocky; extremely hard, very firm, sticky; few roots; thin patchy clay films; slight effervescence; mildly alkaline; gradual, wavy boundary.

B3ca—21 to 26 inches, light brownish-gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate, medium, subangular blocky structure; extremely hard, very firm, very sticky; few roots; thin patchy clay films; few threads and masses of lime and salt; strong effervescence; mildly alkaline; gradual boundary.

C1cacs—26 to 42 inches, light olive-gray (5Y 6/2) silty clay, olive gray (5Y 4/2) moist; massive; extremely hard, very firm, sticky; many segregations of lime and salt; strong effervescence; mildly alkaline; gradual boundary.

C2—42 to 60 inches, pale-yellow (5Y 7/3) partly weathered shale, olive (5Y 5/3) moist; strong effervescence; mildly alkaline.

Depth to shale ranges from 40 to more than 60 inches. The A1 horizon is dark grayish-brown or grayish-brown silt loam or silty clay loam and ranges from 4 to 8 inches in thickness. The A2 horizon is grayish-brown or light brownish-gray silt loam or silty clay loam 1 to 3 inches thick. The B2t horizon ranges from dark grayish brown or grayish brown in the upper part to grayish brown or light brownish gray in the lower part. It is clay or silty clay 7 to 15 inches thick.

Daglum soils are mapped with Rhoades soils and are near Absher and Archin soils. They have a thicker A horizon than Absher and Rhoades soils. Their B horizon contains more clay and less sand than that of Archin soils. In contrast with Belfield soils, they have a distinct A2 horizon and a columnar structured B horizon.

DaA—Daglum silt loam, 0 to 2 percent slopes. This nearly level soil is on broad upland flats. It occurs as long, narrow areas 10 to 200 acres in size. Slopes are plane to slightly concave. The surface is a series of small low spots and very slight rises or mounds.

Included with this soil in mapping were small areas of Absher and Belfield soils. Absher soils are in the small low spots. Belfield soils are on some of the rises and also in narrow areas along drainageways. These included soils make up as much as 30 percent of some mapped areas.

This Daglum soil has poor tilth and low or moderate available water capacity. The claypan subsoil takes in moisture very slowly and releases it slowly to plants. The soil dries slowly in spring, but in most years is deficient in moisture late in summer. Improving tilth

and water intake and conserving moisture are the main concerns in management.

Many areas are in native grass and are used for range. Some areas are cultivated. Small grain and alfalfa are the main crops. Claypan range site; capability unit IVs–2; windbreak group 9.

Dupree Series

The Dupree series consists of shallow, well-drained, gently sloping to very steep clayey soils on uplands. These soils formed in clayey material weathered from acid shale. The native vegetation is mainly mid grasses and annual forbs.

In a representative profile the surface layer is grayish-brown clay about 4 inches thick. The subsoil, about 12 inches thick, is medium acid clay that is grayish brown in the upper part and light brownish gray in the lower part. The upper part is extremely hard when dry, extremely firm when moist, and very sticky and plastic when wet. The underlying material is gray and olive-gray shale.

Dupree soils are low in fertility and moderately low in content of organic matter. Runoff is medium to rapid, and permeability is very slow. Available water capacity is very low.

All areas are in native grass and are used for range.

Representative profile of Dupree clay in an area of Dupree-Sansarc clays, 9 to 25 percent slopes, in native grass, 2,280 feet east and 220 feet south of the northwest corner of sec. 31, T. 16 N., R. 26 E.

A1—0 to 4 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, very fine, granular and weak, medium, subangular blocky structure; extremely hard, very firm, very sticky and plastic; few fine fragments of soft shale; many roots; slightly acid; clear, wavy boundary.

B2—4 to 10 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, coarse, subangular blocky and weak, very fine, irregular blocky structure; extremely hard, extremely firm, very sticky and plastic; 5 to 10 percent fine fragments of soft shale; many roots; medium acid; clear, wavy boundary.

B3—10 to 16 inches, light brownish-gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, medium and fine, blocky structure; extremely hard, very firm, slightly sticky; many fine roots; about 20 percent gray platy and blocky fragments of shale that have yellowish-brown coatings; medium acid; clear, wavy boundary.

C—16 to 60 inches, gray (5Y 6/1) and olive-gray (5Y 5/2), bedded shale; thin seams of brown and yellow between plates; thin discontinuous seams of gypsum and other salts in upper part; fragments of unweathered shale are hard and brittle; common fine roots in upper 1 inch but none below.

Depth to bedded shale ranges from 10 to 20 inches. The horizons above the shale range from medium acid to mildly alkaline. The A horizon ranges from dark gray to light olive gray in hue of 10YR, 2.5Y, or 5Y. It is clay or silty clay 2 to 4 inches thick. The B2 horizon ranges from dark gray to light olive gray or light brownish gray in hue of 5Y or 2.5Y. It is 5 to 25 percent fine fragments of shale. The B3 horizon is clay or shaly clay.

Dupree soils are near Chantier soils and are mapped with Opal and Sansarc soils. They contain less salts than Chantier soils and are shallower over shale than Opal soils. They are less alkaline than Sansarc soils and also differ in not having free carbonates.

DoB—Dupree-Opal clays, 2 to 9 percent slopes. This mapping unit is about 45 percent Dupree soil, 45 percent Opal soil, and 10 percent less extensive soils. Areas are irregular in shape and range from 20 to several hundred acres in size. Slopes are plane to convex. The Opal soil commonly is on the lower parts of the landscape. It is shallower over shale than is typical. Included with these soils in mapping were small areas of Sansarc soils on the tops and upper sides of ridges.

These soils have poor tilth and take in water slowly. Available water capacity is very low or low. Runoff is medium. The Opal soil is suitable for cultivation, but the Dupree soil is not. In most areas the pattern of the Opal soil is such that cultivation is not practical. Improving tilth and water intake and controlling erosion are the main concerns of management.

Most areas are in native grass and are used for range. Dupree soil in Dense Clay range site, capability unit VIs–3, windbreak group 10; Opal soil in Clayey range site, capability unit IIIe–4, windbreak group 4.

DsE—Dupree-Sansarc clays, 9 to 25 percent slopes. This mapping unit is about 60 percent Dupree soil, 25 percent Sansarc soil, and 15 percent less extensive soils. Areas are irregular in shape and range from 40 to 2,000 acres in size. There are many small drainageways. Slopes commonly are short. The Dupree soil has the profile described as representative of the series. The Sansarc soil is on the tops and upper sides of ridges.

Included with these soils in mapping were small areas of Opal soils and Shale land. Opal soils are on the middle and lower parts of the landscape. Shale land is on the sides of ridges and around the heads of drainageways.

The soils in this unit are not suitable for cultivation. They are low in fertility and have very low available water capacity. Runoff is rapid, and the erosion hazard is very severe.

All areas are in native grass and are used for range. Capability unit VIIs–2; windbreak group 10; Dupree soil in Dense Clay range site, Sansarc soil in Shallow range site.

Ekalaka Series

The Ekalaka series consists of deep, well-drained, nearly level to sloping loamy soils that have a claypan subsoil. These soils are on uplands. They formed in local alluvium weathered from sandstone. The native vegetation is mainly tall, mid, and short grasses.

In a representative profile (fig. 9) the surface layer

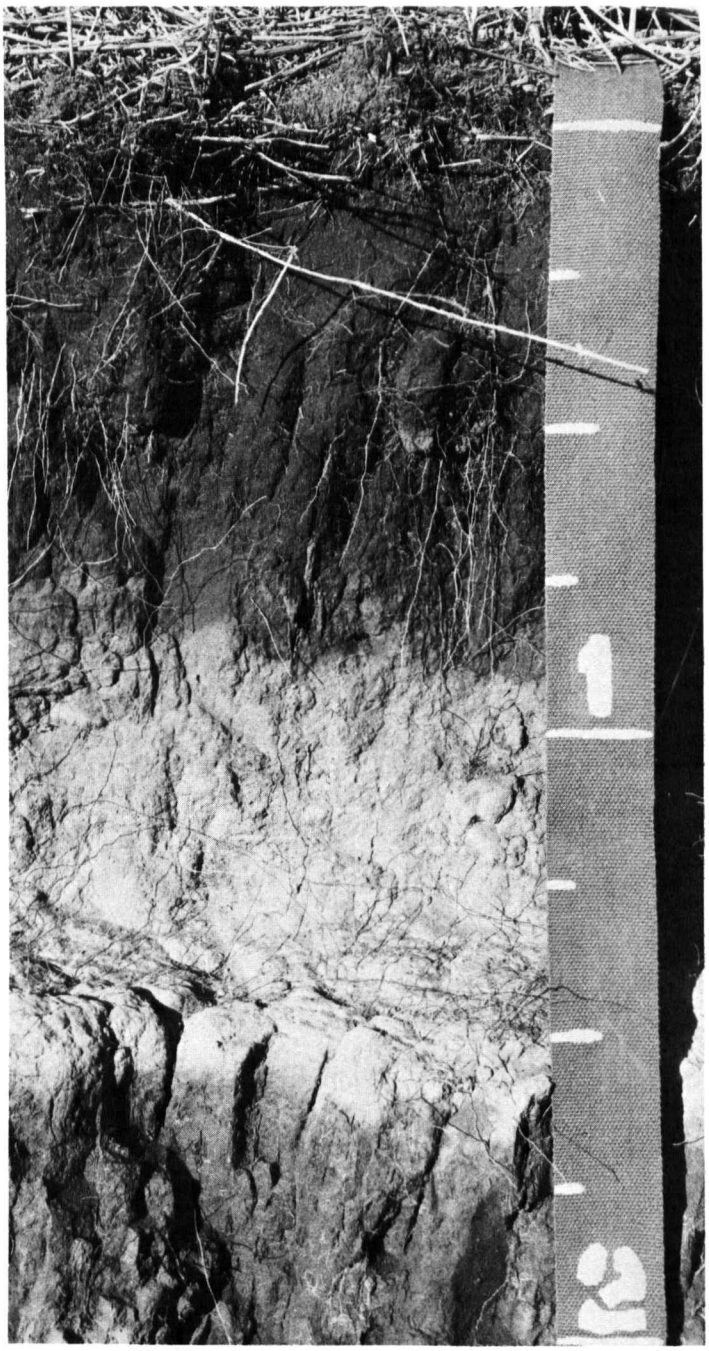

Figure 9.—**An extremely hard claypan is at a depth of about 18 inches in Ekalaka fine sandy loam, 0 to 6 percent slopes. Numbers on the tape are in feet.**

is grayish-brown fine sandy loam about 14 inches thick. The subsurface layer is light-gray loamy fine sand about 4 inches thick. The subsoil, about 20 inches thick, is light brownish gray. It is fine sandy loam in the upper 8 inches and loamy fine sand in the lower 12 inches. The upper part is extremely hard when dry and friable when moist. The lower part is calcareous and has many streaks and spots of soft lime and other salts extending into the underlying material. The underlying material is calcareous, light brownish-gray fine sandy loam.

Ekalaka soils are medium in fertility and moderate in content of organic matter. Runoff is slow to medium, and permeability is slow. Available water capacity is low or moderate.

Some areas are cultivated. Other areas are in native grass and are used for range.

Representative profile of Ekalaka fine sandy loam, 0 to 6 percent slopes, in native grass, 2,620 feet west and 100 feet north of the southeast corner of sec. 8, T. 17 N., R. 22 E.

A11—0 to 7 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak subangular blocky structure; slightly hard, very friable, slightly sticky; common roots; medium acid; gradual, smooth boundary.

A12—7 to 14 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, very coarse, prismatic structure parting to weak subangular blocky; soft, very friable; common roots; slightly acid; gradual, smooth boundary.

A2—14 to 18 inches, light-gray (2.5Y 7/2) loamy fine sand, grayish brown (10YR 5/2) moist; weak subangular blocky structure; soft, loose; few roots; mildly alkaline; abrupt, wavy boundary.

B21t—18 to 21 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; strong, very coarse, columnar structure; extremely hard, friable; uncoated sand grains coat upper part of peds, clay bridging between sand grains; few roots; moderately alkaline; abrupt, wavy boundary.

B22tca—21 to 26 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; moderate, very coarse, prismatic structure; very hard, friable; few roots; clay bridging between sand grains; common fine segregations of lime and other salts; strong effervescence; moderately alkaline; clear, wavy boundary.

B3ca—26 to 38 inches, light brownish-gray (2.5Y 6/2) loamy fine sand, grayish brown (2.5Y 5/2) moist; weak, very coarse, prismatic structure; hard, very friable; many fine segregations of lime and other salts; strong effervescence; strongly alkaline; gradual boundary.

C—38 to 60 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; weak platy structure; slightly hard, very friable; few fine segregations of lime and other salts; slight effervescence; strongly alkaline.

Depth to sandstone ranges from 40 to more than 60 inches. Depth to visible segregations of lime and salts ranges from 16 to 25 inches. In places the A1 horizon is dark grayish brown. The A2 horizon ranges from grayish brown to light gray in hue of 10YR or

2.5Y and is loamy fine sand or fine sandy loam. The A horizon ranges from 10 to 20 inches in thickness. The B2t horizon is grayish brown to pale olive in hue of 10YR, 2.5Y, or 5Y. It ranges from 7 to 15 inches in thickness. The B21t horizon has coarse or very coarse columnar structure. If dry, this horizon is extremely hard or very hard. In places the C horizon is loamy fine sand.

Ekalaka soils are mapped with Parshall soils and are near Archin, Rhoades, Vebar, and Tally soils. They have a thicker A horizon and a more sandy B2t horizon than Archin and Rhoades soils. In contrast with Parshall, Tally, and Vebar soils, they have a distinct A2 horizon and a columnar structured B2t horizon.

EkA—Ekalaka fine sandy loam, 0 to 6 percent slopes. This soil is in irregularly shaped areas that range from 20 to 600 acres in size. Slopes are plane to slightly convex. Low hummocks caused by soil blowing have formed in some cultivated areas. This Ekalaka soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Archin and Tally soils. Archin soils are in low spots up to 10 acres in size. Tally soils are on some of the rises that face southeast. These included soils make up less than 20 percent of any given area.

This Ekalaka soil is easy to work, but is subject to soil blowing. The claypan subsoil takes in water slowly and restricts roots. Runoff is slow. Controlling soil blowing is the main concern in farming.

Some areas are cultivated. Spring wheat, oats, and alfalfa are the main crops. Other areas are in native grass and are used for range. Sandy range site; capability unit IVe–13; windbreak group 5.

EkC—Ekalaka fine sandy loam, 6 to 9 percent slopes. This sloping soil is on upland ridges. Areas are oval in shape and range from 15 to 100 acres in size. Slopes are convex. The surface layer is thinner than in the profile described as representative of the series.

Included with this soil in mapping were small areas of Archin, Tally, and Vebar soils. Archin soils are intermingled with Ekalaka soils. Tally and Vebar soils commonly are on the southeast side of some of the ridges. These included soils make up less than 15 percent of any given area.

This Ekalaka soil is easy to work, but is highly susceptible to soil blowing and erosion. It is not suitable for cultivation. Runoff is medium.

Most areas are in native grass and are used for range. Sandy range site; capability unit VIe–6; windbreak group 10.

Farland Series

The Farland series consists of deep, well-drained, nearly level to gently sloping silty soils on high terraces and uplands. These soils formed in alluvium. The native vegetation was mainly mid and short grasses.

In a representative profile the surface layer is dark grayish-brown silt loam about 8 inches thick. The subsoil, about 17 inches thick, is grayish-brown clay loam in the upper 3 inches, light brownish-gray clay loam in the next 8 inches, and light brownish-gray loam in the lower 6 inches. The upper part is very hard when dry and firm when moist. The underlying material is light-gray, calcareous loam to a depth of 44 inches. Below this is light brownish-gray, calcareous very fine sandy loam.

Farland soils are medium in fertility and moderate in content of organic matter. Runoff is slow or medium, and permeability is moderate. Available water capacity is high.

Most areas are cultivated. A few areas are in native grass and are used for range.

Representative profile of Farland silt loam, 0 to 2 percent slopes, in cropland, 1,300 feet south and 150 feet west of the northeast corner of sec. 18, T. 12 N., R. 22 E.

Ap—0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; slightly hard, very friable, sticky; slightly acid; abrupt, smooth boundary.

A12—5 to 8 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, coarse, prismatic structure parting to weak, fine and medium, subangular blocky; hard, friable, sticky; slightly acid; clear, wavy boundary.

B21t—8 to 11 inches, grayish-brown (10YR 5/2) light clay loam, dark grayish brown (10YR 4/2) moist; moderate, fine and medium, prismatic structure parting to weak, fine and medium, subangular blocky; very hard, firm, very sticky and plastic; thin patchy clay films; neutral; gradual, wavy boundary.

B22t—11 to 19 inches, light brownish-gray (2.5Y 6/2) light clay loam, dark grayish brown (2.5Y 4/2) moist; moderate, medium, prismatic structure parting to weak, medium and coarse, subangular blocky; very hard, friable, sticky and plastic; mildly alkaline; gradual, wavy boundary.

B3—19 to 25 inches, light brownish-gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak, coarse, prismatic structure; slightly hard, friable, sticky; slight effervescence; neutral; clear boundary.

C1ca—25 to 44 inches, light-gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, sticky; few fine segregations of lime; strong effervescence; mildly alkaline; diffuse boundary.

C2—44 to 60 inches, light brownish-gray (2.5Y 6/2) very fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, sticky; few fine segregations of lime; strong effervescence; mildly alkaline.

Depth to bedrock commonly is more than 60 inches, but in some places ranges from 40 to 60 inches. Depth to free carbonates ranges from 16 to 30 inches. In places the A horizon is grayish brown. The B2t horizon ranges from grayish brown to light yellowish brown. It is loam, clay loam, or silty clay loam 8 to 16 inches thick. The C horizon ranges from loam to sandy loam.

Farland soils are mapped with Morton soils and are

near Agar, Reeder, and Shambo soils. They have a less silty C horizon than Agar soils and are deeper over bedrock than Morton and Reeder soils. Their B horizon contains more silt than that of Shambo soils.

FaA—Farland silt loam, 0 to 2 percent slopes. This nearly level soil is on terraces. Areas are irregular in shape and range from 10 to 400 acres in size. Slopes are long and plane. This soil has the profile described as representative of the series, but in places sand and gravel are at a depth of 40 to 60 inches.

Included with this soil in mapping were small areas of Canning, Morton, Reeder, and Shambo soils. Canning soils are in places where sand and gravel are at a depth of less than 40 inches. Morton and Reeder soils are in places where soft sandstone is at a depth of less than 40 inches. Farland soils are intermingled with Shambo soils on some of the lower terraces. These included soils make up less than 10 percent of any given area.

This Farland soil is easy to work. Available water capacity is high, and runoff is slow. Conserving moisture is the main concern in farming.

Most areas are cultivated. Small grain, corn, and alfalfa are the main crops. A few areas are in native grass and are used for range and hay. Silty range site; capability unit IIc–2; windbreak group 3.

FaB—Farland silt loam, 2 to 6 percent slopes. This gently sloping soil is on terraces. Areas are irregular in shape and range from 10 to 300 acres in size. Slopes are convex. In places sand and gravel are at a depth of 40 to 60 inches, but otherwise this soil has a profile similar to the one described as representative of the series.

Included with this soil in mapping were small areas of Canning, Morton, and Reeder soils. Canning soils are in places where sand and gravel are at a depth of less than 40 inches. Morton and Reeder soils are where sandstone is at a depth of less than 40 inches. These included soils make up less than 15 percent of any given area.

This Farland soil is easy to work. Available water capacity is high, and runoff is medium. Controlling erosion is the main concern in farming.

Many areas are cultivated. Small grain and alfalfa are the main crops. Other areas are in native grass and are used for range and hay. Silty range site; capability unit IIe–1; windbreak group 3.

Flasher Series

The Flasher series consists of shallow, somewhat excessively drained, gently undulating to steep sandy soils on uplands. These soils formed in material weathered from the underlying soft sandstone. The native vegetation is mainly short and mid grasses and dryland sedges.

In a representative profile the surface layer is grayish-brown loamy fine sand about 6 inches thick. The underlying material to a depth of 11 inches is brown, calcareous loamy fine sand. Below this is calcareous, soft sandstone.

Flasher soils are low in fertility and content of organic matter. Runoff is slow or medium, and permeability is rapid. Available water capacity is very low.

Nearly all areas are in native grass and are used for range.

Representative profile of Flasher loamy fine sand in an area of Flasher-Vebar complex, 6 to 15 percent slopes, in native grass, 1,000 feet east and 1,950 feet south of the northwest corner of sec. 20, T. 15 N., R. 24 E.

A1—0 to 6 inches, grayish-brown (10YR 5/2) loamy fine sand, dark grayish brown (10YR 4/2) moist; very weak, fine, granular structure; slightly hard, very friable; many roots; neutral; clear, smooth boundary.

C1—6 to 11 inches, brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; very weak, coarse, subangular blocky structure; soft, very friable; common roots; slight effervescence; mildly alkaline; clear, wavy boundary.

C2—11 to 15 inches, light yellowish-brown (2.5Y 6/3), soft sandstone, light olive brown (2.5Y 5/3) moist; massive crushing to single grained; soft, loose; few roots; slight effervescence; mildly alkaline; clear, wavy boundary.

C3—15 to 60 inches, light brownish-gray (2.5Y 6/2), soft sandstone, grayish brown (2.5Y 5/2) moist; bedded; slight effervescence; mildly alkaline.

Depth to sandstone ranges from 10 to 20 inches. In places the A horizon is light brownish-gray fine sandy loam or loamy fine sand 3 to 7 inches thick. The C horizon is loamy fine sand or fine sand. The underlying sandstone commonly is weakly cemented and crushes easily to fine sand or loamy fine sand. In places the upper 4 inches of the sandstone is interbedded with thin layers of harder sandstone (fig. 10).

Flasher soils are mapped with Vebar soils and are near Cabba and Parshall soils. They are sandier than Cabba soils. They are shallower over sandstone than Parshall and Vebar soils.

FbF—Flasher loamy fine sand, 25 to 40 percent slopes. This steep soil is on the sides of buttes on uplands. Areas range from 5 to 50 acres in size. In places fragments of sandstone up to 3 feet in diameter are on the surface. In places near the tops of buttes, the underlying sandstone is hard.

Included with this soil in mapping were small areas of Cabba, Lantry, and Vebar soils. Cabba and Lantry soils are in places where the underlying sandstone is fine grained. Vebar soils are on the lower parts of the landscape. Outcrops of hard sandstone are in some areas. These included soils make up less than 25 percent of any mapped area.

This Flasher soil is not suitable for cultivation. It is low in fertility and has very low available water capacity. Runoff is medium, and disturbed areas are subject to soil blowing and erosion.

All areas are in native grass and are used for range. In places the outcrops of hard sandstone are used as a source of coarse aggregates for roads and other engineering uses in lieu of gravel. Shallow range site; capability unit VIIe–4; windbreak group 10.

FvD—Flasher-Vebar complex, 6 to 15 percent slopes. This mapping unit is about 50 percent Flasher soil, 40

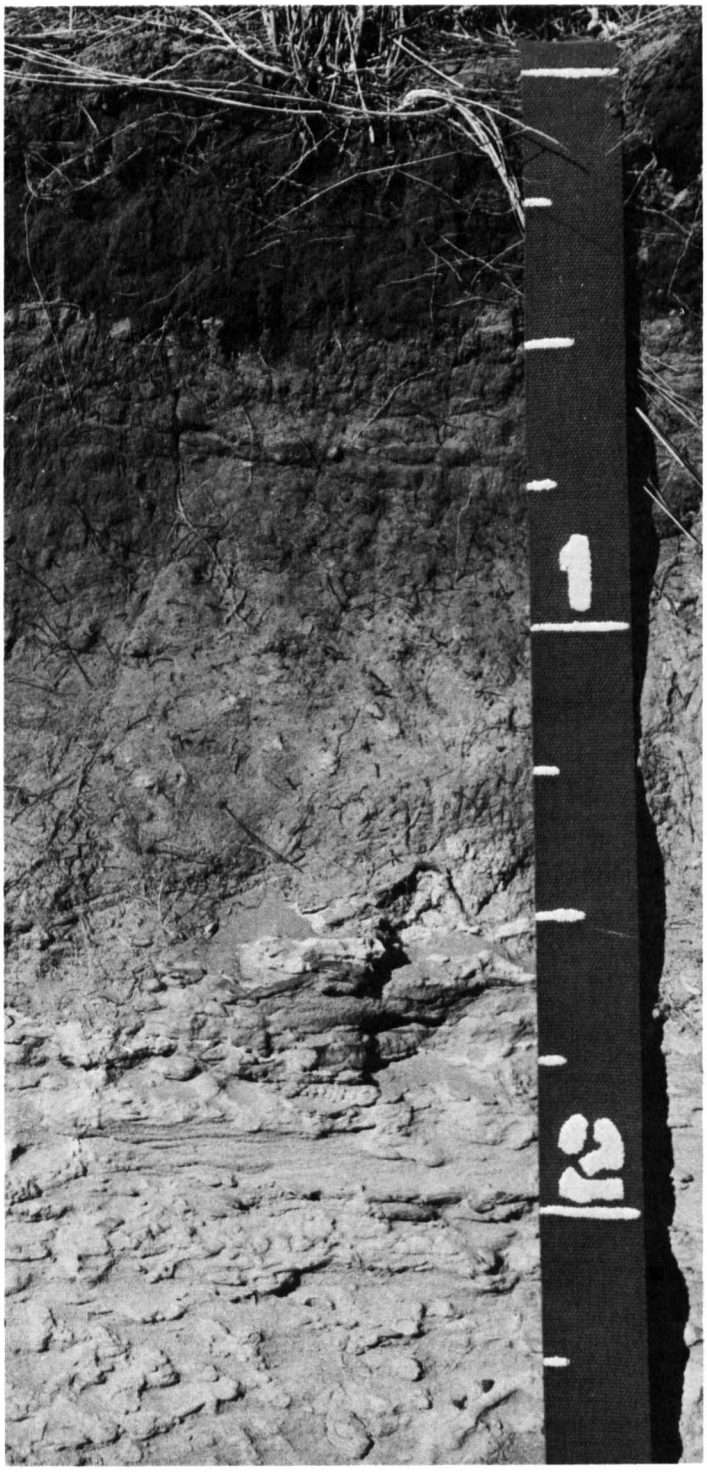

Figure 10.—**Discontinuous layers of cemented sandstone are at a depth of about 18 inches in this profile of Flasher loamy fine sand in an area of Flasher-Vebar complex. Numbers on the tape are in feet.**

percent Vebar soil, and 10 percent less extensive soils. Areas are irregular in shape and range from 20 to 400 acres in size. The Flasher soil is on the tops and upper sides of convex ridges. It has the profile described as representative of the series, but in places along the crests of ridges it is underlain by cemented sandstone. The surface layer is loamy fine sand. The Vebar soil is on the lower parts of the landscape. It commonly has slopes of less than 10 percent. The surface layer is fine sandy loam.

Included with these soils in mapping were small areas of Parshall and Tally soils. Parshall soils are in swales. Tally soils are intermingled with Vebar soils.

Runoff is slow on the Flasher soil and medium on the Vebar soil. The Flasher soil is not suitable for cultivation. It is low in fertility and is droughty. The Vebar soil is medium in fertility and has low available water capacity. Controlling soil blowing and erosion is the main concern in management.

Most areas are in native grass and are used for range. A few areas are cultivated. Capability unit VIe–10; Flasher soil in Shallow range site, windbreak group 10; Vebar soil in Sandy range site, windbreak group 5.

FvE—Flasher-Vebar complex, 15 to 25 percent slopes. This mapping unit is about 70 percent Flasher soil, 25 percent Vebar soil, and 5 percent less extensive soils. Areas are irregular in shape and range from 20 to 900 acres in size. They occur as upland ridges and the valley sides of entrenched drainageways. The Flasher soil is on the higher parts of the landscape. It has a surface layer of loamy fine sand. Fragments of sandstone are scattered on the surface, and in places the underlying sandstone is cemented. The Vebar soil is on the lower parts of the landscape. It has a surface layer of fine sandy loam, and sandstone commonly is nearer the surface than in the profile described as representative of the series.

Included with these soils in mapping were small areas of Parshall and Tally soils. Parshall soils are in swales. Tally soils are intermingled with Vebar soils.

This mapping unit is not suitable for cultivation. The available water capacity is very low or low. Runoff is slow or medium. Disturbed areas are subject to soil blowing and erosion.

All areas are in native grass and are used for range. Capability unit VIIe–4; windbreak group 10; Flasher soil in Shallow range site, Vebar soil in Sandy range site.

Glenross Series

The Glenross series consists of deep, poorly drained, nearly level loamy soils that have a claypan subsoil. These soils are on uplands and formed in alluvium. The native vegetation is mainly salt-tolerant grasses and forbs.

In a representative profile the surface layer is light-gray fine sandy loam about 1 inch thick. The subsoil, about 15 inches thick, is sandy clay loam that is light brownish gray in the upper part and light yellowish brown in the lower part. The upper part is very hard when dry and firm when moist. Visible salts are in the lower part and extend into the underlying material. The underlying material to a depth of 42 inches is light olive-gray sandy clay loam. Below this is olive-yellow and light olive-gray loamy fine sand. The entire profile is calcareous.

Glenross soils are low in fertility and in content of

organic matter. Runoff is very slow, and permeability is slow. Available water capacity is moderate. Depth to the water table ranges from 12 to 36 inches, and the soils have a high content of salts.

Most areas are in native vegetation and are used for range.

Representative profile of Glenross fine sandy loam, in native grass, 1,160 feet north and 630 feet east of the southwest corner of sec. 31, T. 17 N., R. 24 E.

A2—0 to 1 inch, light-gray (2.5Y 7/2) fine sandy loam, dark gray (10YR 4/1) moist; massive; soft, very friable; common roots; slight effervescence; moderately alkaline; abrupt, wavy boundary.

B2t—1 to 6 inches, light brownish-gray (2.5Y 6/2) sandy clay loam, grayish brown (2.5Y 5/2) moist; many, medium, faint mottles of light olive brown (2.5Y 5/6) moist; moderate, coarse and very coarse, columnar structure; very hard, firm, sticky; common roots; strong effervescence; strongly alkaline; gradual, wavy boundary.

B3sa—6 to 16 inches, light yellowish-brown (2.5Y 6/3) sandy clay loam, light olive brown (2.5Y 5/3) moist; weak, very coarse, prismatic structure parting to weak, coarse, subangular blocky; hard, firm, very sticky; few roots; common fine segregations of salt; violent effervescence; very strongly alkaline; gradual, wavy boundary.

C1sa—16 to 42 inches, light olive-gray (5Y 6/2) sandy clay loam, olive gray (5Y 5/2) moist; many, coarse, prominent mottles of strong brown (7.5YR 5/6) dry and moist; massive; very hard, firm, sticky; few roots to depth of 21 inches; common medium nests and striations of salt; violent effervescence; very strongly alkaline; clear, wavy boundary.

IIC2—42 to 60 inches, olive-yellow (2.5Y 6/6) and light olive-gray (5Y 6/2) loamy fine sand, light olive brown (2.5Y 5/6) and olive gray (5Y 5/2) moist; massive; hard, very friable; strong effervescence; very strongly alkaline.

Fragments of sandstone up to 2 inches in diameter commonly are scattered throughout the profile. The A horizon ranges from gray to light gray in hue of 10YR or 2.5Y. It is fine sandy loam or loamy fine sand 2 inches or less thick. The B2t horizon ranges from gray to light brownish gray in hue of 10YR or 2.5Y. It ranges from 3 to 10 inches in thickness. Mottles are faint or distinct. Texture commonly is sandy clay loam, but ranges from fine sandy loam to clay loam. The B3 and C horizons range from grayish brown to yellow. The B3 and C1 horizons are fine sandy loam, loam, or sandy clay loam. The C2 horizon is fine sandy loam or loamy fine sand. In some places it contains sandstone boulders ranging up to 3 feet in diameter.

Glenross soils are mapped with Regan soils and are near Ekalaka, Heil, Parshall, and Vebar soils. They are more poorly drained and more salty than Ekalaka, Parshall, and Vebar soils. They are less clayey and more salty in the B horizon than Heil soils. In contrast with Regan soils, they have a columnar structured B2t horizon.

Gb—Glenross fine sandy loam (0 to 2 percent slopes). This nearly level soil is in basins and swales on uplands. It occurs as long, irregular areas 10 to 300 acres in size. Slopes are plane to slightly concave. The surface is uneven because of scattered low spots. Drainageways are ill defined. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Heil, Parshall, Regan, and Vebar soils and Slickspots. Heil soils are in closed depressions less than 3 acres in size. Parshall and Vebar soils are at the edge of the areas. Regan soils and Slickspots are in the small low spots. These included soils make up less than 20 percent of any given area.

This Glenross soil is not suitable for cultivation. It is high in salts and is low in fertility. Runoff is very slow, and the water table fluctuates between depths of 12 and 36 inches.

Most areas are in native vegetation and are used for range. Saline Lowland range site; capability unit VIw–4; windbreak group 10.

Gr—Glenross-Regan fine sandy loams (0 to 2 percent slopes). This mapping unit is about 60 percent Glenross soil, 35 percent Regan soil, and 5 percent other soils. Areas are irregular in shape and range from 15 to 200 acres in size. They are along ill-defined drainageways and around Intermittent lakes. Slopes are plane to slightly concave. The surface is uneven because low mounds rise a few inches above the intervening low areas. The two soils are closely intermingled, but the Regan soil commonly is in the low areas. This Regan soil has the profile described as representative of the series.

Included with these soils in mapping were small areas of Heil and Parshall soils and Slickspots. Heil soils are in closed depressions. Parshall soils are at the edge of the areas. Slickspots are in small low spots where salt is at or near the surface.

These soils are not suitable for cultivation. They contain salts and have low fertility. Runoff is very slow, and the water table fluctuates between depths of 12 and 36 inches.

Most areas are in native vegetation and are used for range. Capability unit VIw–4; windbreak group 10; Glenross soil in Saline Lowland range site, Regan soil in Subirrigated range site.

Havrelon Series

The Havrelon series consists of deep, moderately well drained and well drained, nearly level, calcareous loamy soils on bottom land and low terraces. These soils formed in stratified alluvium. The native vegetation is mainly tall and mid grasses.

In a representative profile the surface layer is grayish-brown loam about 9 inches thick. The underlying material is grayish-brown calcareous loam and clay loam thinly stratified with very fine sand.

Havrelon soils are low in fertility and moderately low in content of organic matter. Runoff is slow, and permeability is moderate. Available water capacity is high. These soils receive additional moisture in the

form of runoff from nearby sloping soils. They also are subject to flooding from stream overflow in some years.

Most areas are in native grass and are used for range. Stringers of native trees and shrubs along stream channels provide wildlife habitat. A few small areas are cultivated.

The Havrelon soils in Dewey County are mapped only with Lohler and Trembles soils.

Representative profile of Havrelon loam in an area of Trembles-Havrelon complex, in native grass, 180 feet south and 2,510 feet west of the northeast corner of sec. 29, T. 15 N., R. 26 E.

A1—0 to 9 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak subangular blocky structure; slightly hard, very friable, slightly sticky; common roots; slight effervescence; neutral; clear, smooth boundary.

C1—9 to 38 inches, grayish-brown (2.5Y 5/2) loam stratified with thin lenses of very fine sand, dark grayish brown (2.5Y 4/2) moist; weak, coarse, prismatic structure; hard, friable, sticky; common roots to 15-inch depth, few roots to 38-inch depth; slight effervescence; mildly alkaline; clear, smooth boundary.

C2—38 to 60 inches, grayish-brown (2.5Y 5/2) clay loam stratified with thin lenses of very fine sand, grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky; slight effervescence; mildly alkaline.

The A horizon is grayish brown or light brownish gray in hue of 10YR or 2.5Y. It ranges from fine sandy loam to clay loam in texture and from 6 to 15 inches in thickness. The C horizon ranges from grayish brown to pale yellow. Loam is the dominant texture, but it is stratified with thin lenses of material ranging from fine sand to silty clay in texture.

Havrelon soils are mapped with Lohler soils and are near Banks, Promise, and Trembles soils. They contain less sand and more clay than Banks and Trembles soils. They are less clayey than Lohler and Promise soils.

Heil Series

The Heil series consists of deep, level silty soils that are poorly drained, and have a claypan subsoil. These soils are in closed depressions in the uplands. They formed in alluvium washed in from adjacent soils. The native vegetation is mainly mid grasses.

In a representative profile the surface layer is gray silty clay loam about 2 inches thick. The subsoil, about 29 inches thick, is gray clay. The upper part is extremely hard when dry, extremely firm when moist, and very sticky and plastic when wet. The underlying material is grayish-brown, calcareous clay.

Heil soils are low in fertility and are moderate in content of organic matter. Runoff is ponded, and the soils are frequently flooded. Permeability is very slow. Available water capacity is low or moderate.

Almost all areas are in native grass and are used for range and hay.

Representative profile of Heil silty clay loam in an area of Heil soils, in native grass, 2,400 feet south and 1,650 feet west of the northeast corner of sec. 5, T. 12 N., R. 25 E.

A2—0 to 2 inches, gray (10YR 6/1) silty clay loam, very dark gray (10YR 3/1) moist; moderate, fine, granular structure; hard, friable, very sticky and plastic; many roots; medium acid; abrupt, wavy boundary.

B21t—2 to 8 inches, gray (5Y 5/1) clay, very dark gray (2.5Y 3/1) moist; moderate, coarse, columnar structure parting to strong, medium, blocky; extremely hard, extremely firm, very sticky and plastic; columns coated with bleached very fine sand grains; few roots; slightly acid; gradual, wavy boundary.

B22t—8 to 24 inches, gray (2.5Y 5/1) clay, very dark gray (2.5Y 3/1) moist; moderate, coarse, prismatic structure parting to strong, coarse, blocky; extremely hard, extremely firm, very sticky and plastic; patchy coats of bleached silt and very fine sand grains on prisms; few roots; neutral; gradual, wavy boundary.

B3—24 to 31 inches, gray (5Y 5/1) clay, very dark gray (5Y 3/1) moist; weak, coarse, blocky structure; very hard, very firm, very sticky and plastic; mildly alkaline; gradual boundary.

Ccs—31 to 60 inches, grayish-brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak, coarse, blocky structure; very hard, very firm, sticky, plastic; few masses of gypsum; slight effervescence; mildly alkaline.

Depth to carbonates ranges from 15 to more than 40 inches. The A2 horizon ranges from gray to light brownish gray in hue of 10YR or 2.5Y. It ranges from sandy loam to clay in texture and is 1 to 3 inches thick. The B horizon ranges from gray to grayish brown or olive gray in hue of 2.5Y or 5Y. The columnar structure in the B21t horizon is moderate or strong, and the columns range from medium to very coarse in size. The B21t horizon is 4 to 7 inches thick. The C horizon is clay or silty clay that has few to many masses of gypsum. It ranges from mildly alkaline to strongly alkaline.

Heil soils are more poorly drained than the nearby Agar, Morton, Reeder, and Regent soils. They have a more clayey B horizon and are deeper over segregated salts than Glenross and Regan soils, which also are poorly drained.

Hc—Heil soils (0 to 1 percent slopes). This mapping unit is in closed depressions on uplands. Most areas are circular to oval in shape and range from 5 to 200 acres in size. The surface layer ranges from sandy loam to clay.

Included with this unit in mapping were small areas of a soil that is similar to the Heil soil, but has a thicker surface layer and a subsoil that does not have columnar structure. Also included in some areas are barren soils that are high in salts and resemble Slickspots.

Runoff is ponded and remains on the surface until it evaporates. The clayey subsoil takes in water very

slowly. Tilth is very poor. These soils are not suitable for cultivation.

All areas are in native grass and are used for range and hay. Closed Depression range site; capability unit VIs–1; windbreak group 10.

Hurley Series

The Hurley series consists of moderately deep, moderately well drained and well drained, nearly level to sloping silty soils that have a claypan subsoil. These soils are on uplands. They formed in material weathered from the underlying clay shale. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is gray silty clay loam about 3 inches thick. The subsoil, about 15 inches thick, is dark grayish-brown clay in the upper part and grayish-brown clay in the lower part. It is extremely hard when dry and very firm when moist. The underlying material to a depth of 34 inches is grayish-brown, calcareous clay and shaly clay. Below this is bedded shale.

Hurley soils are low in fertility and are moderate in content of organic matter. Runoff is slow to medium, and permeability is very slow. Available water capacity is very low or low.

Most areas are in native grass and are used for range.

Representative profile of Hurley silty clay loam in an area of Hurley-Slickspots complex, 2 to 9 percent slopes, in native grass, 2,430 feet south and 1,510 feet west of the northeast corner of sec. 28, T. 16 N. R. 30 E.

A2—0 to 3 inches, gray (10YR 5/1) silty clay loam, very dark gray (10YR 3/1) moist; weak, fine, granular structure; slightly hard, friable, slightly sticky; many roots; slightly acid; abrupt, smooth boundary.

B2t—3 to 10 inches, dark grayish-brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; moderate, medium, columnar structure parting to moderate, fine and medium, blocky; extremely hard, very firm, sticky and plastic; tops of columns are coated with light-gray silty material; few roots; mildly alkaline; clear, smooth boundary.

B3ca—10 to 18 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate, medium, blocky structure; extremely hard, very firm, sticky and plastic; few flattened roots; common masses of segregated lime and salt on faces of peds; strong effervescence; mildly alkaline; gradual, smooth boundary.

C1—18 to 25 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, medium, blocky structure; hard, firm, sticky and plastic; few roots; strong effervescence; moderately alkaline; gradual, smooth boundary.

C2—25 to 34 inches, grayish-brown (2.5Y 5/2) shaly clay, dark grayish brown (2.5Y 4/2) moist; massive; hard, firm, sticky and plastic; many fragments of shale; strong effervescence; mildly alkaline; gradual, smooth boundary.

C3—34 to 60 inches, light brownish-gray and dark-gray bedded shale; slight effervescence on faces of shale plates in upper part; mildly alkaline.

Depth to bedded shale commonly ranges from 30 to 40 inches, but in some places is more than 40 inches. The B and C horizons range from mildly alkaline to strongly alkaline. The A horizon ranges from gray to light brownish gray in hue of 10YR or 2.5Y. It is silty clay loam or silt loam and 1 to 4 inches thick. The B2t horizon ranges from dark gray to grayish brown in hue of 10YR or 2.5Y. Structure in the B2t horizon is moderate or strong.

Hurley soils are mapped with Opal soils and are near Promise soils. In contrast with those soils, they have a distinct A2 horizon and a columnar structured B2t horizon.

HsB—Hurley-Slickspots complex, 2 to 9 percent slopes. This mapping unit is about 65 percent Hurley soil, 20 percent Slickspots, and 15 percent other soils. Areas are irregular in shape and range from 15 to 600 acres in size. Slopes are long and are plane to slightly convex. The surface is uneven because many low mounds rise a few inches above the intervening low spots. The low spots range from 5 to 50 feet in diameter. Glacial stones are scattered on the surface in some areas in the northeastern part of the county. In places the Hurley soil is deeper over shale than is typical. Slickspots, in some of the low spots, have a puddled or "slicked-over" surface.

Included with this unit in mapping were small areas of Opal soils on the higher parts of the landscape. Also included were areas of a soil that has a thicker surface layer than the Hurley soil.

This mapping unit is not suitable for cultivation. Fertility is low, tilth is poor, and available water capacity is low or very low. Permeability is very slow.

Most areas are in native grass and are used for range. Slickspots are bare or nearly bare of vegetation. Hurley soil in Thin Claypan range site, capability unit VIs–1, windbreak group 10; Slickspots in capability unit VIIIs–3, not assigned to a range site or windbreak group.

Intermittent Lakes

In—Intermittent lakes (0 to 1 percent slopes) are shallow lakes that are filled with runoff water each spring, but in most years are dry during some part of the year. The lakes are circular or oval in shape and range from 5 to several hundred acres in size. The lakebed material is sediment washed in or blown in from adjacent soils. The material commonly is stratified loamy sand to sandy clay loam, is strongly alkaline, and is high in salts.

These areas have little or no value for grazing. Annuals grow on the lake bottoms during dry periods, but forage grasses generally grow only in a narrow band along the edge of the areas. Capability unit VIIIw–1; not assigned to a range site or windbreak group.

Lantry Series

The Lantry series consists of moderately deep, well-drained, gently undulating to steep silty soils on uplands. These soils formed in material weathered from sandstone, siltstone, or loamy shale. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is grayish-brown silt loam about 4 inches thick. The subsoil, about 12 inches thick, is grayish-brown and light brownish-gray loam. The upper part is slightly hard when dry and very friable when moist. The lower part has spots and streaks of lime that extend into the underlying material. The underlying material to a depth of 30 inches is light brownish-gray loam. Below this is light brownish-gray soft sandstone. The entire profile is calcareous.

Lantry soils are low in fertility and moderately low in content of organic matter. Runoff is medium or rapid, and permeability is moderate. Available water capacity is low.

Many areas are in native grass and are used for range. Some areas are cultivated.

Representative profile of Lantry silt loam in an area of Lantry-Morton silt loams, 6 to 15 percent slopes, in native grass, 150 feet south and 1,750 feet west of the northeast corner of sec. 8, T. 12 N., R. 24 E.

A1—0 to 4 inches, grayish-brown (2.5Y 5/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; weak, fine and medium, subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many roots; slight effervescence; neutral; gradual, smooth boundary.

B2—4 to 8 inches, grayish-brown (2.5Y 5/2) and light brownish-gray (2.5Y 6/2) loam, very dark grayish brown (2.5Y 3/2) and dark grayish brown (2.5Y 4/2) moist; moderate, medium, prismatic structure parting to weak, medium, subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common roots; slight effervescence; mildly alkaline; clear, smooth boundary.

B3ca—8 to 16 inches, light brownish-gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; hard, very friable, slightly sticky and slightly plastic; common roots; many fine and medium masses and threads of segregated lime; violent effervescence; mildly alkaline; gradual, smooth boundary.

C1ca—16 to 30 inches, light brownish-gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak, medium, subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few roots; many coarse and medium segregations of lime; violent effervescence; mildly alkaline; gradual, smooth boundary.

C2—30 to 40 inches, light brownish-gray (2.5Y 6/2) soft sandstone, grayish brown (2.5Y 5/2) moist; few roots in upper part; strong effervescence; mildly alkaline; gradual, smooth boundary.

C3—40 to 60 inches, light brownish-gray (2.5Y 6/2) soft sandstone, grayish brown (2.5Y 5/2) moist; brownish-yellow (10YR 6/6) stains on fracture faces of sandstone; strong effervescence; moderately alkaline.

Depth to soft siltstone, sandstone, or loamy shale ranges from 20 to 40 inches. Free carbonates are at or within 4 inches of the surface. The A horizon ranges from grayish brown to light yellowish brown in hue of 2.5Y or 10YR. It commonly is silt loam, but is loam or very fine sandy loam in places. The A horizon is 2 to 4 inches thick. The B and C horizons range from grayish brown to pale yellow in hue of 2.5Y or 10YR and are loam, silt loam, or very fine sandy loam. The B2 horizon is 4 to 6 inches thick. Segregations of lime in the B3ca and C1ca horizons are common or many.

Lantry soils are mapped with Cabba and Morton soils and are near Reeder soils. They are deeper over bedrock than Cabba soils. They have thinner A and B horizons than Morton and Reeder soils.

LmD—Lantry-Morton silt loams, 6 to 15 percent slopes. This mapping unit is on upland ridges and the sides of entrenched drainageways. It is about 50 percent Lantry soil, 40 percent Morton soil, and 10 percent other soils. Areas are irregular in shape and range from 10 to 100 acres in size. Fragments of sandstone or siltstone are scattered on the surface in some areas. The Lantry soil is on the higher parts of the landscape. It has the profile described as representative of the series. The Morton soil is on the lower parts of the landscape, where in most places slopes are less than 9 percent. In places it is shallower over sandstone than is typical.

Included with this unit in mapping were small areas of Cabba and Reeder soils. Cabba soils are on the tops and upper sides of some ridges. Reeder soils are intermingled with Morton soils.

This mapping unit is easy to work, but the Lantry soil is low in fertility and is highly erosive. Runoff is medium to rapid. Controlling erosion is the main concern in cultivated areas.

Many areas are in native grass and are used as range. Some areas are cultivated. Small grain and alfalfa are the main crops. Lantry soil in Thin Upland range site, capability unit VIe–3, windbreak group 10; Morton soil in Silty range site, capability unit IIIe–1. windbreak group 3.

Lohler Series

The Lohler series consists of deep, moderately well drained, nearly level, calcareous clayey soils on bottom land. These soils formed in stratified alluvium. The native vegetation consists mainly of tall and mid grasses. Stringers of native trees and shrubs generally are along the stream channels.

In a representative profile the surface layer is dark grayish-brown silty clay about 4 inches thick. Next is a layer of light brownish-gray silty clay loam about 6 inches thick. It is hard when dry and friable when moist. The rest of the underlying material is silty clay

and silty clay loam stratified with shaly clay and loamy sand. The entire profile is calcareous.

Lohler soils are low in fertility and are moderately low in content of organic matter. Runoff is slow, and permeability is moderately slow or slow. Available water capacity is moderate or high. Many areas receive additional moisture as runoff from nearby soils or from stream flooding.

Many areas are in native vegetation and are used for range, hay, and wildlife. A few areas are cultivated.

Representative profile of Lohler silty clay, in native grass, 1,300 feet east and 1,800 feet north of the southwest corner of sec. 17, T. 15 N., R. 27 E.

A1—0 to 4 inches, dark grayish-brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak, medium, subangular blocky structure; very hard, firm, sticky; common roots; slight effervescence; mildly alkaline; abrupt, smooth boundary.

C1—4 to 10 inches, light brownish-gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate, medium, platy structure; hard, friable, sticky; common roots; slight effervescence; mildly alkaline; abrupt, smooth boundary.

Ab1—10 to 22 inches, grayish-brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; massive; hard, friable, sticky; few roots; common fine fragments of shale; slight effervescence; neutral; abrupt, smooth boundary.

C2—22 to 40 inches, light brownish-gray (2.5Y 6/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; few faint mottles of brown; massive; slightly hard, friable, sticky; few roots; slight effervescence; mildly alkaline; abrupt, smooth boundary.

Ab2—40 to 45 inches, dark grayish-brown (2.5Y 4/2) shaly clay, very dark grayish brown (2.5Y 3/2) moist; massive; hard, friable, sticky; few roots; slight effervescence; mildly alkaline; abrupt, smooth boundary.

C3—45 to 51 inches, grayish-brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, friable, sticky; few roots; slight effervescence; mildly alkaline; abrupt, smooth boundary.

C4—51 to 54 inches, grayish-brown (2.5Y 5/2) loamy sand, dark grayish brown (2.5Y 4/2) moist; massive; loose; slight effervescence; mildly alkaline; abrupt, smooth boundary.

C5—54 to 60 inches, grayish-brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, sticky; slight effervescence; mildly alkaline.

Average clay content between depths of 10 and 40 inches is 35 to 45 percent. Free carbonates are at or within 10 inches of the surface. Some profiles do not have a buried A horizon. The A1 horizon ranges from dark grayish brown to light brownish gray. It commonly is silty clay, but ranges from loam to clay and from 4 to 10 inches in thickness. The C horizon ranges from grayish brown to pale yellow. It commonly is stratified with loamy sand to clay.

Lohler soils are mapped with Havrelon soils and are near Trembles soils. They contain more clay throughout the profile than Havrelon and Trembles soils.

Lo—Lohler silty clay (0 to 2 percent slopes). This nearly level soil is on bottom land (fig. 11) along the Moreau River and its tributaries. Areas are mostly long in shape and range from 15 to 200 acres in size. Old channels and meander scars are common. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Havrelon and Promise soils. Havrelon soils are in scattered areas at the same elevation as the Lohler soils. Promise soils are on low isolated terraces several feet above the bottom land.

This Lohler soil is low in fertility, but has moderate or high available water capacity. Most areas receive additional moisture in the form of runoff from adjacent soils. Some areas are subject to stream flooding almost every year, but other areas rarely are flooded. Flood damage seldom is serious. Conserving moisture is the main concern in farming.

Many areas are in native grass and are used for range and hay. Stringers and clumps of native trees and shrubs commonly are along the stream channels. A few areas are cultivated. Alfalfa, oats, and wheat are the main crops. This soil has a potential for irrigation. Overflow range site; capability unit IIc–1; windbreak group 1.

Lp—Lohler and Havrelon soils (0 to 2 percent slopes). This mapping unit is on bottom land along the main tributaries of the Moreau River. Lohler soil commonly is dominant at the lower end of the valleys as the streams join the Moreau River. Havrelon soil is dominant along the upper reaches of the watersheds. Both soils occur along creeks. The long, narrow areas range up to several hundred acres in size. Meandering stream channels dissect the areas into small parcels.

Included with this unit in mapping were small areas of Absher soils and Slickspots on low terraces at the edge of the areas. Also included were areas of a soil that has a thicker and darker colored surface layer than the Havrelon soil. Included soils make up less than 15 percent of any given area.

These soils are low in fertility and have moderate or high available water capacity. They commonly receive additional moisture as runoff from adjacent soils and in some years are subject to stream overflow. Damage from flooding seldom is severe. Conserving moisture is the main concern in cultivated areas.

Many areas are in native grass and are used for range and hay. Stringers of native trees and shrubs commonly are along the stream channels. A few small areas are cultivated. Alfalfa is the main crop. Overflow range site; capability unit IIc–1; windbreak group 1.

Lowry Series

The Lowry series consists of deep, well-drained,

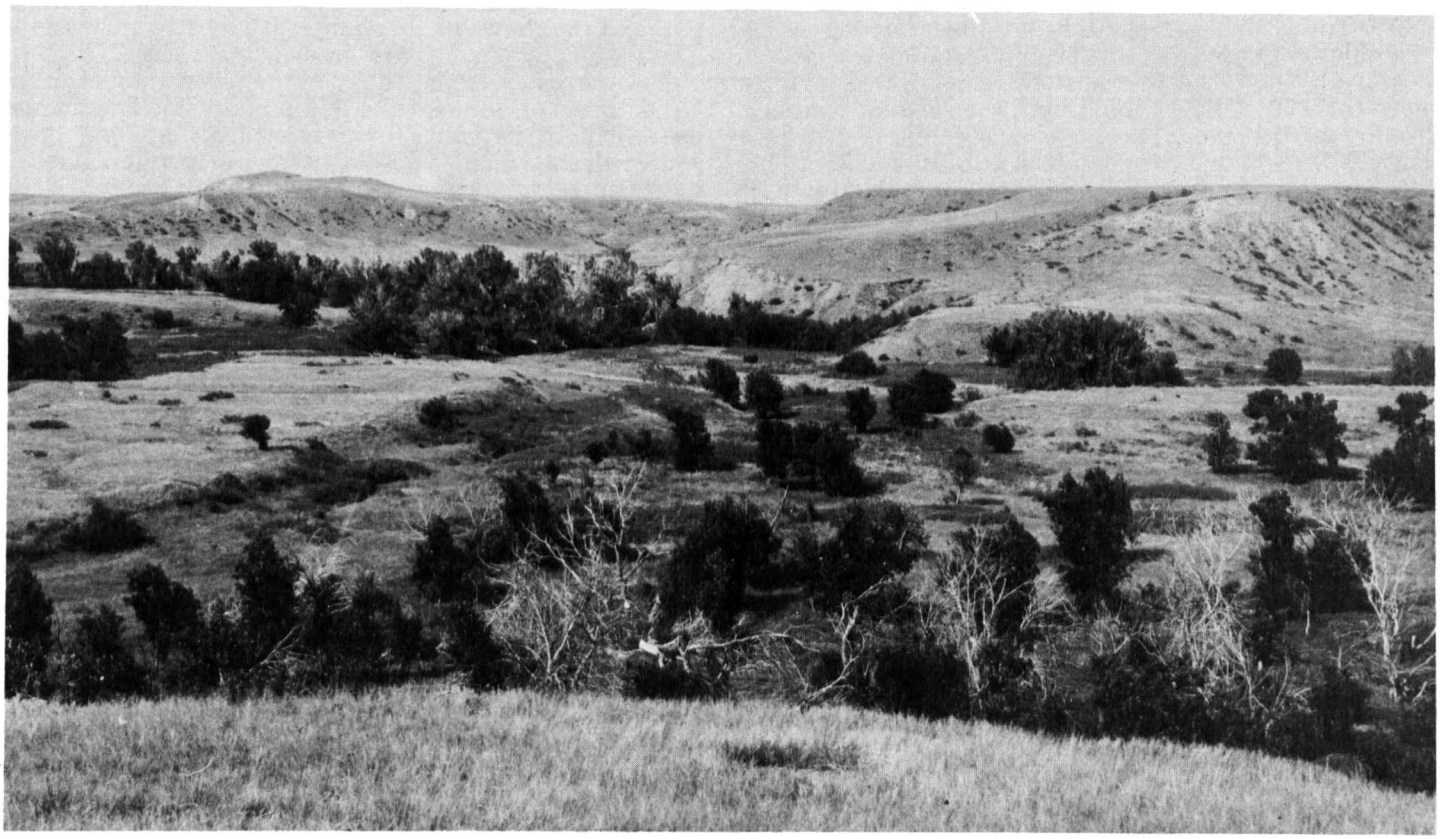

Figure 11.—**Area of Lohler silty clay.**

nearly level to gently sloping silty soils on terraces. These soils formed in wind-deposited material. The native vegetation was mainly mid and short grasses.

In a representative profile the surface layer is dark grayish-brown silt loam about 10 inches thick. The subsoil, about 20 inches thick, is grayish-brown, calcareous silt loam. It is slightly hard when dry and very friable when moist. The lower part has spots and streaks of lime that extend into the underlying material. The underlying material to a depth of 55 inches is light brownish-gray, calcareous silt loam. Below this is light brownish-gray, calcareous gravelly loam.

Lowry soils are medium in fertility and are moderate in content of organic matter. Runoff is slow or medium, and permeability is moderate. Available water capacity is high.

Most areas are cultivated. Some areas are in native grass and are used for range.

Representative profile of Lowry silt loam, 0 to 2 percent slopes, in a cropped area, 130 feet north and 2,400 feet east of the southwest corner of sec. 2, T. 16 N., R. 31 E.

Ap—0 to 10 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, very friable, slightly sticky; common roots; neutral; gradual, wavy boundary.

B2—10 to 18 inches, grayish-brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, coarse, prismatic structure; slightly hard, very friable, slightly sticky; common roots; slight effervescence; mildly alkaline; diffuse, smooth boundary.

B3—18 to 30 inches, grayish-brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak, coarse, prismatic structure; slightly hard, very friable, slightly sticky; few roots; few fine segregations of lime; strong effervescence; mildly alkaline; diffuse, smooth boundary.

C1ca—30 to 40 inches, light brownish-gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; hard, very friable, slightly sticky; common fine segregations of lime; violent effervescence; moderately alkaline; diffuse, smooth boundary.

C2—40 to 55 inches, light brownish-gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky; few fine segregations of lime; strong effervescence; moderately alkaline; gradual, smooth boundary.

IIC3—55 to 60 inches, light brownish-gray (2.5Y 6/2) gravelly loam, grayish brown

(2.5Y 5/2) moist; loose, very friable; few fine segregations of lime; strong effervescence; moderately alkaline.

The silty material in which the soil formed is 40 to more than 60 inches thick. Depth to carbonates ranges from 8 to 16 inches. The A horizon ranges from dark grayish brown to brown and is 4 to 10 inches thick. The B2 horizon ranges from dark grayish brown to brown in hue of 10YR or 2.5Y. The thickness of the B2 and B3 horizons combined ranges from 10 to 20 inches. The content of fine sand in the C horizon gradually increases with increasing depth.

Lowry soils contain less clay in the B horizon than the nearby Agar, Promise, and Reliance soils.

LwA—Lowry silt loam, 0 to 2 percent slopes. This nearly level soil is on terraces near Lake Oahe. Areas are irregular in shape and range from 60 to 500 acres in size. This soil has the profile described as representative of the series, but in a few places sand and gravel are at a depth of 50 to 60 inches.

Included with this soil in mapping were small areas of Agar and Reliance soils in the lower, more nearly level areas. Also included were areas of a soil that has a lighter colored surface layer than the Lowry soil. Included soils make up 5 percent or less of any given area.

This Lowry soil is easy to work and has high available water capacity. Runoff is slow. Controlling soil blowing is the main concern in farming.

Most areas are cultivated. Small grain, alfalfa, and corn are the main crops. Some areas are in native grass and are used for range and hay. Silty range site; capability unit IIe–1; windbreak group 3.

LwB—Lowry silt loam, 2 to 6 percent slopes. This gently sloping soil is on terraces near Lake Oahe. Areas are mostly long and range from 50 to 400 acres in size. Slopes are mostly long and smooth. In a few places sand and gravel are at a depth of 50 to 60 inches, but otherwise the profile is similar to the one described as representative of the series.

Included with this soil in mapping were small areas of Agar, Reliance, and Schamber soils. Agar and Reliance soils are in swales, and Schamber soils are at the edge of some mapped areas. Also included is a soil that has a lighter colored surface layer than the Lowry soil. Included soils make up less than 10 percent of any given area.

This Lowry soil is easy to work and has high available water capacity. Runoff is medium. Controlling soil blowing and erosion is the main concern in farming.

Many areas are cultivated. Small grain and alfalfa are the main crops. Other areas are in native grass and are used for range and hay. Silty range site; capability unit IIe–1; windbreak group 3.

Mine Pits and Dumps

Ma—Mine pits and dumps are open excavations of lignite strip mines and uneven accumulations or piles of disturbed soil and waste material adjacent to the pits. The dump material is sandy to clayey and commonly is moderately alkaline and calcareous.

Mine pits and dumps are irregular in shape and range from 20 to 300 acres in size. The pits are flat bottomed and commonly contain water. The sides of the pits and the slopes of the dumps are mostly very steep. The dumps commonly are eroded and rough.

Many areas support little or no vegetation. Annual weeds grow on some of the dump material. The dumps have little or no value for grazing livestock, but have some value as wildlife habitat. Capability unit VIIIs–2; not assigned to a range site or windbreak group.

Moreau Series

The Moreau series consists of moderately deep, well-drained, gently undulating to steep clayey soils on uplands. These soils formed in clayey material weathered from the underlying shale. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is grayish-brown silty clay about 5 inches thick. The subsoil, about 16 inches thick, is grayish-brown, calcareous silty clay and clay. It is very hard when dry, firm to very firm when moist, and sticky and plastic when wet. The underlying material to a depth of 29 inches is light brownish-gray, calcareous shaly clay. Below this is soft platy shale.

Moreau soils are medium in fertility and moderate in content of organic matter. Runoff is medium or rapid, and permeability is slow. Available water capacity is low.

Almost all areas are in native grass and are used for range. A few areas are cultivated.

Representative profile of Moreau silty clay in an area of Wayden-Moreau silty clays, 25 to 40 percent slopes, in native grass, 3,170 feet east and 2,080 feet north of the southwest corner of sec. 25, T. 13 N., R. 23 E.

A1—0 to 5 inches, grayish-brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate, very fine and fine, granular structure; hard, firm, sticky and plastic; many roots; mildly alkaline; clear, smooth boundary.

B21—5 to 7 inches, grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3//2) moist; weak, coarse, prismatic structure parting to moderate, fine and medium, blocky; very hard, firm, sticky and plastic; many roots; slight effervescence; mildly alkaline; clear, smooth boundary.

B22—7 to 17 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate, medium, prismatic structure parting to moderate, fine and medium, subangular blocky; very hard, very firm, sticky and plastic; many roots; slight effervescence; mildly alkaline; clear, smooth boundary.

B3—17 to 21 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, medium, prismatic structure parting to moderate, medium, subangular blocky; very hard, firm, sticky and plastic; few roots; few fine fragments of shale; few fine segregations of

lime; slight effervescence; mildly alkaline; clear, smooth boundary.

C1ca—21 to 29 inches, light brownish-gray (2.5Y 6/2) shaly clay, grayish brown (2.5Y 5/2) moist; massive; very hard, firm, sticky; few roots; many fine fragments of shale; common fine segregations of lime; slight effervescence; mildly alkaline; clear, smooth boundary.

C2—29 to 60 inches, light brownish-gray (2.5Y 6/2) soft platy shale, grayish brown (2.5Y 5/2) moist; mildly alkaline.

Depth to shale ranges from 20 to 40 inches. Reaction in horizons below the A horizon ranges from mildly alkaline to strongly alkaline. The A horizon is grayish brown or dark grayish brown in hue of 2.5Y or 10YR. It commonly is silty clay, but is clay loam or silty clay loam in places. The A horizon is 3 to 7 inches thick and is calcareous in some cultivated areas. The B horizon is clay, silty clay, or heavy silty clay loam. The B2 horizon is grayish brown or light brownish gray in hue of 2.5Y or 10YR and 7 to 14 inches thick. The B3 horizon is 4 to 10 inches thick. The underlying shale ranges from olive to light brownish gray in hue of 5Y or 2.5Y.

Moreau soils are mapped with Regent and Wayden soils and are near Cabba and Morton soils. They are deeper over shale than Cabba and Wayden soils. They are more clayey than Morton soils and have thinner A and B2 horizons than Regent soils.

MbD—Moreau-Wayden silty clays, 9 to 25 percent slopes. This mapping unit is on upland ridges and the sides of entrenched drainageways (fig. 12). It is about 45 percent Moreau soil, 35 percent Wayden soil, and 20 percent other soils. Areas are irregular in shape and range from 20 to several hundred acres in size. Moreau soils are on the mid and lower parts of the landscape below Wayden soils, which are on the higher parts.

Included with this unit in mapping were small areas of Absher, Belfield, Cabba, Lantry, and Regent soils. Of these, Regent soils, which commonly are intermingled with Moreau soils, are the most extensive. Absher soils occur as small, scattered areas. Belfield soils are in swales. Cabba and Lantry soils are on some of the ridges.

This mapping unit is too steep and erosive for cultivation. The soils take in water slowly and have low or very low available water capacity. Runoff is medium to rapid.

Figure 12.—**Moreau-Wayden silty clays, 9 to 25 percent slopes.**

Almost all areas are in native grass and are used for range. Capability unit VIe–4; windbreak group 10; Moreau soil in Clayey range site, Wayden soil in Shallow range site.

Morton Series

The Morton series consists of moderately deep, well-drained, nearly level to sloping silty soils on uplands. These soils formed in material weathered from the underlying sandstone, siltstone, or loamy shale. The native vegetation was mainly mid and short grasses.

In a representative profile (fig. 13) the surface layer is dark grayish-brown silt loam about 5 inches thick. The subsoil is about 19 inches thick. The upper 12 inches is grayish-brown loam, and the lower 7 inches is light brownish gray loam. The upper part is very hard when dry and friable when moist; the lower part is calcareous and has spots of lime extending into the underlying material. The underlying material to a depth of 37 inches is pale-yellow, calcareous loam. Below this is light brownish-gray, soft sandstone.

Morton soils are medium in fertility and are moderate in content of organic matter. Runoff is slow or medium, and permeability is moderate. Available water capacity is moderate.

Many areas are cultivated. Some are in native grass and are used for range.

Representative profile of Morton silt loam, 2 to 6 percent slopes, in native grass, 200 feet south of the northwest corner of sec. 22, T. 13 N., R. 23 E.

A1—0 to 5 inches, dark grayish-brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak, fine, granular structure; soft, very friable, slightly sticky; many roots; slightly acid; clear, wavy boundary.

B21t—5 to 11 inches, grayish-brown (10YR 5/2) heavy loam, very dark grayish brown (10YR 3/2) moist; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky; very hard, friable, sticky and plastic; common roots; neutral; clear, wavy boundary.

B22t—11 to 17 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate, coarse, prismatic structure parting to weak, coarse, subangular blocky; hard, friable, sticky; few patchy clay films on vertical faces of peds; common roots; neutral; clear, wavy boundary.

B3ca—17 to 24 inches, light brownish-gray (2.5Y 6/2) loam, grayish brown (2.5Y 5/2) moist; weak, coarse, prismatic structure; hard, friable, sticky; few roots; common, medium and fine segregations of lime; violent effervescence; mildly alkaline; gradual, wavy boundary.

C1ca—24 to 37 inches, pale-yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; massive, some vertical cleavage; hard, very friable, slightly sticky; few roots; common medium and fine segregations of lime; violent effervescence; mildly alkaline; clear boundary.

C2—37 to 60 inches, light brownish-gray (2.5Y 6/2) soft sandstone; weakly bedded; slight effervescence; moderately alkaline.

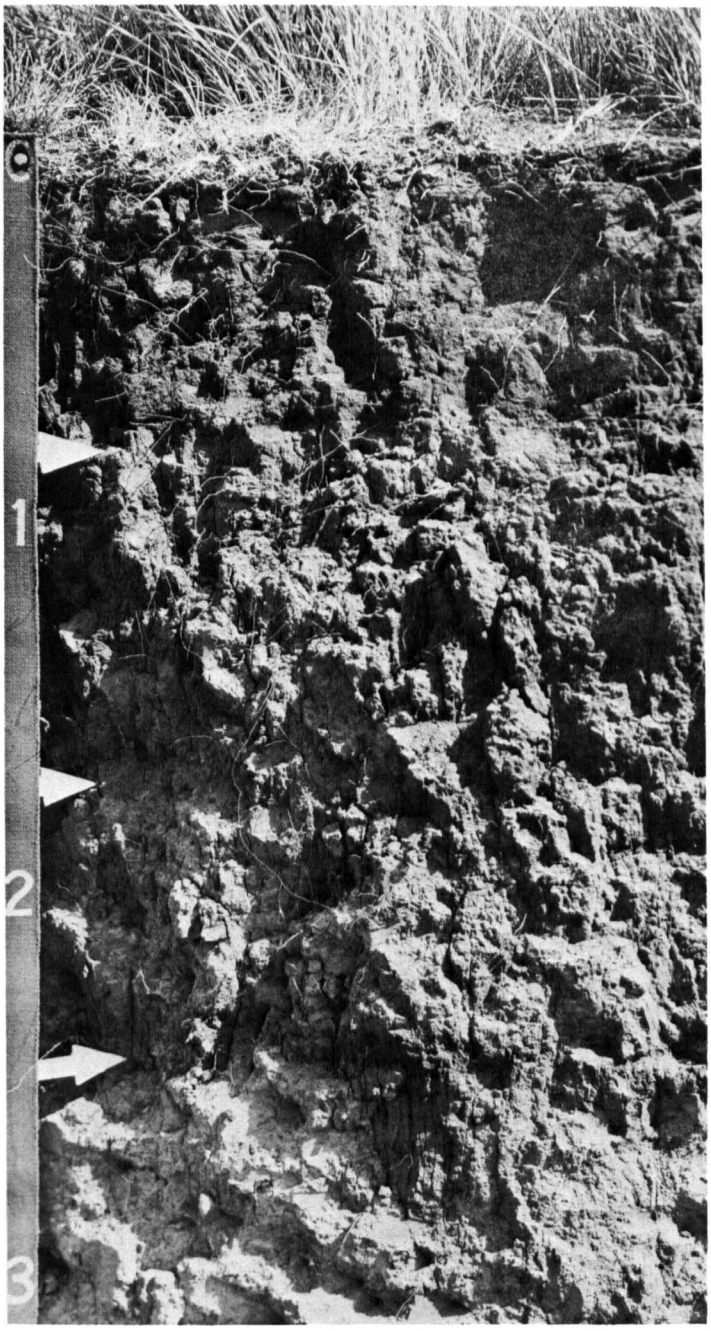

Figure 13.—**Favorable structure allows grass roots to penetrate to a depth of 3 feet in Morton silt loam, 2 to 6 percent slopes. Numbers on tape are in feet.**

Depth to soft sandstone, siltstone, or shale ranges from 20 to 40 inches. The A horizon is grayish brown in places. It commonly is silt loam, but in places is loam or very fine sandy loam. The A horizon ranges from

4 to 8 inches in thickness. The B2t horizon ranges from grayish brown to light yellowish brown in hue of 10YR or 2.5Y. It is loam, clay loam, or silty clay loam 8 to 16 inches thick. The B3ca and C1ca horizons combined are 15 to 20 inches thick and have common to many segregations of lime.

Morton soils are mapped with Belfield, Farland, and Lantry soils. They are near Reeder and Regent soils. They contain less clay in the B horizon than Belfield and Regent soils and more silt and less sand than Reeder soils. They are shallower over bedrock than Farland soils. They have thicker A and B horizons than Lantry soils.

McB—Morton silt loam, 2 to 6 percent slopes. This soil is on uplands in irregularly shaped areas that range from 10 to several hundred acres in size. The smooth, convex slopes are mostly 2 to 6 percent, but in small included areas they are less than 2 percent. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Belfield, Farland, Heil, Lantry, and Reeder soils. Belfield and Farland soils are in swales. Heil soils are in closed depressions, less than 3 acres in size, which are designated on the soil map by a wet spot symbol. Lantry soils are on or near the crests of ridges. The included soils commonly make up about 25 percent of any mapped area.

This Morton soil is easy to work and has moderate available water capacity. Runoff is medium. Controlling erosion is the main concern in management.

Many areas are cultivated. Small grain, alfalfa, and corn are the main crops. Other areas are in native grass and are used for range and hay. Silty range site; capability unit IIe–1; windbreak group 3.

MdA—Morton-Belfield complex, 0 to 2 percent slopes. This mapping unit is about 45 percent Morton soil, 35 percent Belfield soil, and 20 percent included soils. It is in irregularly shaped areas that range from 10 to 150 acres in size. The Morton soil is on very slight rises. The Belfield soil is in the lower, more nearly level parts of the landscape. The Morton soil has a subsoil of clay loam, but otherwise has a profile similar to the one described as representative of the series. The Belfield soil has a surface layer of loam.

Included with these soils in mapping were areas of Absher, Daglum, Farland, Heil, and Rhoades soils. Of these, Daglum and Farland soils are the most common included soils. Absher, Daglum, and Rhoades soils are along ill-defined drainageways and in low areas near Belfield soils. Farland soils generally are between the areas of Morton and Belfield soils. Heil soils are in closed depressions, many of which are identified on the soil map by a wet spot symbol.

Available water capacity is moderate. Runoff is slow. The clayey subsoil of the Belfield soil takes in water slowly and releases it slowly to plants. Conserving moisture is the main concern in management, but improving water intake in the Belfield soil is also important.

Many areas are cultivated. Wheat, other small grain, and alfalfa are the main crops. Other areas are in native grass and are used for range and hay. Capability unit IIc–2; Morton soil in Silty range site, windbreak group 3; Belfield soil in Clayey range site, windbreak group 4.

MdB—Morton-Belfield complex, 2 to 6 percent slopes. This mapping unit is about 60 percent Morton soil, 25 percent Belfield soil, and 15 percent other soils. It is in irregularly shaped areas that range from 10 to 200 acres in size. Slopes are long and smooth. The Morton soil is on the mid and upper parts of the landscape, and the Belfield soil is on the lower parts and in swales. The Morton soil has a subsoil of clay loam, but otherwise has a profile similar to the one described as representative of the series. The Belfield soil has a loam surface layer.

Included with these soils in mapping were small areas of Absher, Farland, Heil, Reeder, and Rhoades soils. Absher and Rhoades soils are in small scattered spots throughout the areas. Farland soils generally are between areas of Morton and Belfield soils. Heil soils are in closed depressions, some of which are identified on the soil map by a wet spot symbol. Lantry soils are on some of the ridgetops.

These soils have moderate available water capacity. The clayey subsoil of the Belfield soil takes in water slowly and releases it slowly to plants. Runoff is medium. Controlling erosion is the main concern in management, but improving water intake in the Belfield soil is also important.

Some areas are cultivated. Small grain and alfalfa are the main crops. Other areas are in native grass and are used for range and hay. Capability unit IIe–1; Morton soil in Silty range site, windbreak group 3; Belfield soil in Clayey range site, windbreak group 4.

MfA—Morton-Farland silt loams, 0 to 2 percent slopes. This mapping unit is 65 percent Morton soil, 30 percent Farland soil, and 5 percent other soils. It is on uplands in irregularly shaped areas 10 to 200 acres in size. The Morton soil is on very slight rises. It has a thicker surface layer, but otherwise has a profile similar to the one described as representative of the series. Slopes are slightly convex. The Farland soil is on the more nearly level parts of the landscape. Slopes are smooth to slightly concave.

Included with these soils in mapping were small areas of Belfield, Heil, and Reeder soils. Belfield soils are in some of the low areas. Heil soils are in closed depressions, some of which are identified on the soil map by a wet spot symbol. Reeder soils are on slight rises near Morton soils.

These soils are easy to work and have moderate or high available water capacity. Runoff is slow. Conserving moisture is the main concern in farming.

Many areas are cultivated. Small grain, alfalfa, and corn are the main crops. Some areas are in native grass and are used for range and hay. Silty range site; capability unit IIc–2; windbreak group 3.

MgB—Morton-Lantry silt loams, 2 to 9 percent slopes. This mapping unit is about 55 percent Morton soil, 30 percent Lantry soil, and 15 percent other soils. It is on uplands in areas that range from 10 to 150 acres in size. The Morton soil is on the mid and lower parts of the landscape. It has a thinner surface layer and subsoil, but otherwise has a profile similar to the one described as representative of the series. The Lantry soil is on the tops and upper sides of ridges. Slopes are short and convex. In cultivated areas plowing has mixed the original surface layer of this soil with the subsoil, and the present surface layer is lighter colored

than is typical. Some cultivated areas are moderately eroded.

Included with these soils in mapping were small areas of Belfield, Cabba, and Reeder soils. Belfield soils are in swales, and Cabba soils are on some of the ridgetops. Reeder soils are intermingled with Morton soils and make up as much as 25 percent of some areas in the northern part of the county.

The soils in this unit are easy to work. Runoff is medium. The Lantry soil is low in fertility and erodes easily. Controlling erosion is the main concern in farming.

Some areas are cultivated. Small grain and alfalfa are the main crops. Many areas are in native grass and are used for range and hay. Capability unit IIIe–1; Morton soil in Silty range site, windbreak group 3; Lantry soil in Thin Upland range site, windbreak group 8.

Natriborolls

Na—Natriborolls, channeled (0 to 2 percent slopes) are mainly mixed claypan soils along drainageways and in upland swales. Areas range from 20 to 300 acres in size. Many are long and narrow and are dissected by channels. Some areas are mainly Daglum soils, and some are mainly Belfield and Farland soils. Spots of Absher soils and Slickspots commonly occur with the Daglum soils. Narrow strips of Havrelon soils are along the channels in some areas.

This unit receives runoff from nearby soils and in some years is flooded by overflow from the channels. Flood damage generally is minor and is mainly damaged fences and deposits of debris.

A few areas are cultivated. Alfalfa and small grain are the main crops. Most areas are in native grass and are used for range. Overflow range site; capability unit VIw–1; windbreak group 10.

Opal Series

The Opal series consists of moderately deep, well-drained, nearly level to moderately steep clayey soils on uplands. These soils formed in material weathered from the underlying shale. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is grayish-brown clay about 5 inches thick. The subsoil, about 15 inches thick, is grayish-brown clay. It is extremely hard when dry, extremely firm when moist, and very sticky and plastic when wet. The lower part is calcareous and has spots and streaks of lime that extend into the underlying material. The underlying material to a depth of 33 inches is light yellowish-brown clay and pale-olive shaly clay. Below this is light olive-gray and very dark gray shale.

Opal soils are medium in fertility and are moderate in content of organic matter. Runoff is medium or rapid, and permeability is very slow. Available water capacity is low or very low.

Most areas are in native grass and are used for range. Some areas are cultivated.

Representative profile of Opal clay, 2 to 9 percent slopes, in native grass, 510 feet east and 780 feet south of the northwest corner of sec. 4, T. 11 N., R. 27 E.

A1—0 to 5 inches, grayish-brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak, fine, subangular blocky structure parting to weak, fine, granular; hard, very firm, very sticky and plastic; common roots; neutral; clear, wavy boundary.

B2—5 to 14 inches, grayish-brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak, coarse, prismatic structure parting to moderate, medium, blocky and subangular blocky; extremely hard, extremely firm, very sticky and plastic; common roots; mildly alkaline; clear, gradual boundary.

B3ca—14 to 20 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, coarse, blocky structure; extremely hard, extremely firm, very sticky and plastic; few roots; few medium segregations of lime; slight effervescence; mildly alkaline; clear, gradual boundary.

C1cacs—20 to 28 inches, light yellowish-brown (2.5Y 6/3) clay, olive brown (2.5Y 4/3) moist; weak, coarse, blocky structure; very hard, very firm, very sticky and plastic; few roots; many fine segregations of lime and gypsum; strong effervescence; mildly alkaline; clear, gradual boundary.

C2—28 to 33 inches, pale-olive (5Y 6/3) shaly clay, olive (5Y 4/3) moist; massive; hard, firm, sticky; few roots; common fine segregations of lime and gypsum; slight effervescence; mildly alkaline; clear, gradual boundary.

C3—33 to 60 inches, light olive-gray and very dark gray shale; mildly alkaline.

Depth to bedded shale ranges from 20 to 40 inches. Free carbonates commonly are throughout the profile above the shale, and reaction in the B and C horizons is mildly alkaline or moderately alkaline. In places, however, the soil is noncalcareous and reaction is neutral in the B horizon. The A horizon ranges from dark gray to grayish brown in hue of 10YR or 2.5Y. It is clay or silty clay and 4 to 7 inches thick. The B horizon ranges from dark gray to light olive gray in hue of 2.5Y or 5Y. In places the B2 horizon does not have prismatic structure. Total thickness of the B2 and B3 horizons ranges from 12 to 18 inches.

Opal soils are mapped with Dupree, Promise, and Sansarc soils. They are near Chantier and Swanboy soils. They are deeper over shale than Chantier, Dupree, and Sansarc soils. They are shallower over shale than Promise and Swanboy soils.

OaB—Opal clay, 2 to 9 percent slopes. This soil is on uplands in irregular shaped areas that range from 20 to 2,000 acres in size. It is mostly gently sloping. Slopes are long and convex. Scattered stones of glacial origin are on the surface in the eastern part of the county. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Dupree, Hurley, Promise, and Sansarc soils. Of

these, Promise soils, which are on the lower parts of the landscape, are the most common. Dupree and Hurley soils are in the lower areas along drainageways. Sansarc soils are on the tops and upper sides of some of the ridges and knolls.

This Opal soil has poor tilth and low or very low available water capacity. Permeability is very slow, and runoff is medium. Controlling erosion is the main concern in cultivated areas.

Most areas are in native grass and are used for range. Small grain is the main crop in cultivated areas. Clayey range site; capability unit IIIe–4; windbreak group 4.

OhB—Opal-Hurley complex, 0 to 9 percent slopes. This mapping unit is about 50 percent Opal soil, 25 percent Hurley soil, and 25 percent other soils. Areas are in irregular in shape and range from 20 to 300 acres in size. Slopes are mostly long and smooth. The Hurley soil is in places where the surface is uneven because of low mounds that rise a few inches above the intervening low spots. In places this soil is deeper over bedded shale than is typical.

Included with this unit in mapping were small areas of Dupree and Promise soils and Slickspots. Dupree soils are on the higher parts of the landscape. Promise soils are on fans and in swales. Slickspots are in small low spots with Hurley soils. Also included were areas of a soil that has a thicker surface layer than the Hurley soil.

Tilth is poor, and the available water capacity is low or very low. Permeability is very slow, and runoff is slow or medium. Controlling erosion and improving tilth and water intake are concerns in management.

Most areas are in native grass and are used for range. A few areas are cultivated. Crops grow unevenly on the Hurley soil. Opal soil in Clayey range site, capability unit IIIe–4, windbreak group 4; Hurley soil in Thin Claypan range site, capability unit VIs–1, windbreak group 10.

OpA—Opal-Promise clays, 1 to 4 percent slopes. This mapping unit is about 50 percent Opal soil, 40 percent Promise soil, and 10 percent other soils. Areas are long and range from 100 to 1,000 acres in size. They are mostly nearly level. Slopes are plane to slightly concave. The Opal soil is on the rises, and the Promise soil is on the lower and flatter parts of the landscape.

Included with this unit in mapping were small areas of Dupree and Hurley soils. Dupree soils are on some of the rises, and Hurley soils are in some of the low areas.

Tilth is poor, and the soils take in water slowly. Runoff is slow to medium. Improving tilth and water intake and conserving moisture are the main concerns in management.

Most areas are in native grass and are used for range and hay. Wheat is the main crop in cultivated areas. Clayey range site; capability unit IIIs–3; windbreak group 4.

OsC—Opal-Sansarc clays, 6 to 15 percent slopes. This mapping unit is on upland ridges and the valley sides of small creeks. It is about 60 percent Opal soil, 25 percent Sansarc, and 15 percent other soils. Areas are long and range from 20 to several hundred acres in size. The Opal soil is on the mid and lower parts of the landscape. The Sansarc soil is on the higher parts and on the shoulders of drainageways.

Included with this unit in mapping were small areas of Dupree and Promise soils. Dupree soils are on the mid and upper parts of the landscape. Promise soils are on fans and in swales.

The soils in this unit take in water slowly and have low or very low available water capacity. Runoff is medium. The shallow Sansarc soil is not suitable for cultivation. In places where slopes are less than 9 percent, the Opal soil is suitable for cultivation, but elsewhere it is too erodible for crops.

Most areas are in native grass and are used for range. Capability unit VIe–4; windbreak group 10; Opal soil in Clayey range site, Sansarc soil in Shallow range site.

OtB—Opal-Slickspots complex, 2 to 6 percent slopes. This mapping unit is about 50 percent Opal soil, 30 percent Slickspots, and 20 percent other soils. Areas are irregular in shape and range from 15 to 300 acres in size. Slopes range up to 8 percent in a few areas. The Opal soil commonly is neutral and is less calcareous than is typical. Slickspots occur as small low spots along upland drainageways. In these areas the surface is uneven.

Included with this unit in mapping were small areas of Dupree and Hurley soils. Dupree soils are intermingled with Opal soils. Hurley soils are at the edge of Slickspots.

Runoff is medium on the Opal soil, but ponds on the small spots of Slickspots. Controlling erosion and improving water intake are the main management concerns if the Opal soil is cultivated. The irregular pattern of Slickspots in many areas makes cultivation impractical.

Slickspots are bare or nearly bare of vegetation. The rest of the acreage is in native grass and is used for range and hay. Opal soil in Clayey range site, capability unit IIIe–4, windbreak group 4; Slickspots in capability unit VIIIs–3, not assigned to a range site or windbreak group.

Parshall Series

The Parshall series consists of deep, well-drained, nearly level loamy soils in swales in the uplands. These soils formed in alluvium washed in from adjacent sloping soils. The native vegetation was mainly tall and mid grasses.

In a representative profile the surface layer is dark grayish-brown fine sandy loam about 8 inches thick. The subsoil, about 28 inches thick, is fine sandy loam that is dark grayish brown in the upper part and olive brown in the lower. The upper part is slightly hard when dry and very friable when moist. The lower part is calcareous. The underlying material is light olive-brown, calcareous loamy fine sand and fine sand.

Parshall soils are medium in fertility and moderate in content of organic matter. Runoff is slow, and permeability is moderately rapid. Available water capacity is moderate.

Many areas are cultivated. Other areas are in native grass and are used for range.

Representative profile of Parshall fine sandy loam, in a cultivated area, 300 feet east and 1,850 feet north of the southwest corner of sec. 22, T. 17 N., R. 25 E.

Ap—0 to 5 inches, dark grayish-brown (10YR

4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak, medium, granular structure; soft, very friable; neutral; abrupt, smooth boundary.

A12—5 to 8 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, thick, platy structure parting to weak, fine and medium, subangular blocky; slightly hard, very friable; slightly acid; gradual, smooth boundary.

B21—8 to 19 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; slightly hard, very friable; slightly acid; gradual, smooth boundary.

B22—19 to 31 inches, olive-brown (2.5Y 4/3) fine sandy loam, olive brown (2.5Y 3/3) moist; weak, fine and medium, subangular blocky structure; hard, friable; slightly acid; gradual, smooth boundary.

B3—31 to 36 inches, olive-brown (2.5Y 4/4) fine sandy loam, olive brown (2.5Y 3/3) moist; weak, medium, subangular blocky structure; slightly hard, very friable; slight effervescence; neutral; gradual, smooth boundary.

C—36 to 60 inches, light olive-brown (2.5Y 5/4) loamy fine sand and fine sand, olive brown (2.5Y 4/4) moist; single grained; loose; slight effervescence; neutral.

Depth to soft sandstone ranges from 50 to more than 60 inches. The A horizon ranges from dark grayish brown to brown and is 8 to 17 inches thick. The B2 horizon ranges from dark grayish brown to light olive brown and is 14 to 25 inches thick. The B3 horizon is fine sandy loam or loamy fine sand and in places has a few segregations of lime. In places the C horizon is fine sandy loam.

Parshall soils are mapped with Ekalaka soils and are near Vebar soils. They do not have the distinct A2 horizon and the columnar-structured B horizon that are typical of Ekalaka soils. They have a thicker A horizon and are deeper over sandstone than Vebar soils.

Pa—Parshall fine sandy loam (0 to 2 percent slopes). This soil is in swales in the uplands. Areas are long and narrow and range from 10 to 150 acres in size. This soil has the profile described as representative of the series, but in places the subsoil contains slightly more clay.

Included with this soil in mapping were areas of Ekalaka and Vebar soils. Ekalaka soils are in low areas, and Vebar soils are at the edge of some areas.

This Parshall soil is easy to work and has moderate available water capacity. Runoff is slow. Controlling soil blowing is the main concern in farming.

Many areas are cultivated. Small grain, corn, and alfalfa are the main crops. Other areas are in native grass and are used for range and hay. Sandy range site; capability unit IIIe–7; windbreak group 1.

Pe—Parshall-Ekalaka fine sandy loams (0 to 2 percent slopes). This mapping unit is in swales in the uplands. It is about 65 percent Parshall soil, and 35 percent Ekalaka soil. Areas range from 10 to 200 acres in size. Some are very slightly undulating. In places these soils contain slightly more clay in the subsoil than is typical.

These soils are easy to work and take in water readily. Runoff is slow. Most areas receive runoff from adjacent soils. Controlling soil blowing is the main concern in farming.

Many areas are cultivated. Alfalfa, corn, and small grain are the main crops. Other areas are in native grass and are used for range and hay. Sandy range site; capability unit IIIe–7; Parshall soil in windbreak group 1, Ekalaka soil in windbreak group 5.

Promise Series

The Promise series consists of deep, well-drained, nearly level to gently sloping clayey soils on uplands and terraces. These soils formed in material weathered in place from clay shale or washed in from adjacent soils. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is dark grayish-brown clay about 4 inches thick. The subsoil, about 27 inches thick, is clay that is dark grayish brown in the upper part and grayish brown in the lower part. The upper part is extremely hard when dry, extremely firm when moist, and very sticky and plastic when wet. The lower part is calcareous. The underlying material is light brownish-gray, calcareous silty clay.

Promise soils are medium in fertility and moderate in content of organic matter. Runoff is slow or medium, and permeability is slow or very slow. Available water capacity is low or moderate.

Many areas are in native grass and are used for range. Other areas are cultivated.

Representative profile of Promise clay, 2 to 6 percent slopes, in a cultivated area, 100 feet south and 1,150 feet west of the northeast corner of sec. 17, T. 17 N., R. 30 E.

Ap—0 to 4 inches, dark grayish-brown (10YR 4/2) clay, very dark brown (10YR 2/2) moist; weak, medium and coarse, subangular blocky structure parting to moderate, fine, granular; very hard, firm, very sticky and plastic; common roots; medium acid; clear, wavy boundary.

B21—4 to 10 inches, dark grayish-brown (2.5Y 4/2) clay, very dark grayish brown (2.5Y 3/2) moist; weak, very coarse, prismatic structure parting to moderate, medium, subangular blocky; extremely hard, extremely firm, very sticky and plastic; common roots; neutral; clear, wavy boundary.

B22—10 to 20 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, coarse, prismatic structure parting to moderate, coarse, subangular blocky; extremely hard, extremely firm, very sticky and plastic; few roots; slight effervescence; mildly alkaline; gradual, smooth boundary.

B3—20 to 31 inches, grayish-brown (2.5Y 5/2)

clay, dark grayish brown (2.5Y 4/2) moist; weak, coarse, subangular blocky structure; extremely hard, very firm, sticky and plastic; few roots; strong effervescence; mildly alkaline; gradual, smooth boundary.

C1ca—31 to 45 inches, light brownish-gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; weak, coarse, subangular blocky structure; very hard, very firm, sticky; many very fine segregations of lime and gypsum; strong effervescence; mildly alkaline; gradual, smooth boundary.

C2cs—45 to 60 inches, light brownish-gray (2.5Y 6/2) silty clay, grayish brown (2.5Y 5/2) moist; massive; hard, firm, sticky; few fine fragments of shale; common fine segregations of gypsum; few fine segregations of lime; strong effervescence; mildly alkaline.

Depth to shale ranges from 40 to more than 60 inches. In places free carbonates are at or near the surface. The A horizon ranges from dark gray to grayish brown in hue of 10YR or 2.5Y. It is clay or silty clay 4 to 8 inches thick. The B2 horizon ranges from dark grayish brown to pale olive in hue of 2.5Y or 5Y. The prisms in the B2 horizon range from medium to very coarse. In places segregations of lime are in the B3 horizon.

Promise soils are mapped with Opal and Swanboy soils and are near Lohler soils. They are more clayey than Lohler soils and also differ from Lohler soils in having a B horizon. They are deeper over shale than Opal soils. They contain less salt in the upper part of the profile than Swanboy soils.

PrA—Promise clay, 0 to 2 percent slopes. This soil is in irregularly shaped areas that range from 15 to 400 acres in size. It is mostly nearly level. Slopes are plane to concave and in places are as much as 4 percent. A few scattered, large glacial stones are on the surface in some areas in the eastern part of the county.

Included with this soil in mapping were small areas of Opal and Swanboy soils. Opal soils are on slight rises. Swanboy soils are in low areas. Included soils make up less than 10 percent of any given area.

This Promise soil has poor tilth and takes in water slowly. Available water capacity is moderate or low. Runoff is slow to medium. Improving tilth and water intake are the main concerns in cultivated areas.

Many areas are in native grass and are used for range and hay. Wheat and alfalfa are the main crops in cultivated areas. Clayey range site; capability unit IIIs–3; windbreak group 4.

PrB—Promise clay, 2 to 6 percent slopes. This soil is in irregularly shaped areas that range from 15 to 1,000 acres in size. Slopes are long and smooth and are mostly gentle, but in a few places they are as much as 9 percent. Scattered glacial boulders are on the surface in some areas in the eastern part of the county. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Opal soils on the higher parts of the landscape where slopes are shorter and more convex.

This Promise soil is difficult to work and takes in water slowly. Runoff is medium. Controlling erosion and improving tilth and water intake are the main concerns in farming.

Many areas are in native grass and are used for range and hay. Wheat and alfalfa are the main crops in cultivated areas. Clayey range site; capability unit IIIe–4; windbreak group 4.

PsA—Promise-Slickspots complex, 0 to 2 percent slopes. This mapping unit is on upland flats below strongly sloping ridges. It is about 70 percent Promise soils, 25 percent Slickspots, and 5 percent other soils. Areas are irregular in shape and range from 20 to 250 acres in size. Slopes are plane to slightly concave. The profile of the Promise soil has a thinner surface layer and commonly has salts nearer the surface than the one described as representative of the series. Scattered Slickspots occur throughout the landscape. These spots have a puddled or "slicked-over" surface, and salt is within a few inches of the surface.

Included with this unit in mapping were small areas of Swanboy soils adjacent to Slickspots. In a few areas, Swanboy soils make up as much as 25 percent of the mapped area.

The Promise soil has poor tilth and takes in water very slowly. Improving tilth and water intake is the main concern in managing this soil. Slickspots are not suitable for cultivation. Runoff is slow and ponded.

Slickspots are bare or nearly bare of vegetation. The rest of the acreage is in native grass and is used for range. The pattern of Slickspots in many areas is such that cropping the Promise soil is impractical. Promise soil in Clayey range site, capability unit IIIs–3, windbreak group 4; Slickspots in VIIIs–3, not assigned to a range site or windbreak group.

Pw—Promise-Swanboy clays, channeled (0 to 4 percent slopes). This mapping unit is on low terraces and bottom land along creeks (fig. 14). It is about 65 percent Promise soil, 25 percent Swanboy soil, and 10 percent other soils. Areas are long and narrow and range from 20 to 400 acres in size. Meandering channels ranging up to 20 feet deep and 50 feet wide dissect areas into small parcels. Swanboy soils are on fans at the edge of the mapped areas. In places the material underlying these soils is more stratified than is typical.

Included with this unit in mapping were small areas of Lohler soils in low areas immediately adjacent to the channels.

This mapping unit is subject to flooding in some years. Streambank erosion and flooding are the main concerns of management. Cultivation is not practical, because the meandering channels dissect the areas into small parcels.

Almost all the acreage is in native grass and is used for range and hay. Stringers of native trees and shrubs are along stream channels in some areas. Overflow range site; capability unit VIw–1; windbreak group 10.

Reeder Series

The Reeder series consists of moderately deep, well-drained, nearly level to undulating loamy soils on uplands. These soils formed in material weathered from

Figure 14.—**Promise-Swanboy clays, channeled.**

the underlying soft sandstone. The native vegetation was mainly mid and short grasses.

In a representative profile the surface layer is dark grayish-brown loam about 7 inches thick. The subsoil, about 19 inches thick, is loam that is dark brown in the upper part and brown in the lower part. The upper part is very hard when dry and friable when moist. The underlying material to a depth of 36 inches is light olive-brown, calcareous fine sandy loam. Below this is light olive-brown soft sandstone.

Reeder soils are medium in fertility and moderate in content of organic matter. Runoff is slow or medium, and permeability is moderate. Available water capacity is low or moderate.

Many areas are cultivated. Others are in native grass and are used for range.

Representative profile of Reeder loam, 2 to 6 percent slopes, in a cropped area, 75 feet west and 1,150 feet south of the northeast corner of sec. 6, T. 17 N., R. 28 E.

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak, medium and fine, subangular blocky structure parting to weak, fine, granular; slightly hard, friable, slightly sticky; slightly acid; abrupt, smooth boundary.

B21t—7 to 12 inches, dark-brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; moderate, coarse, prismatic structure parting to moderate, medium, subangular blocky; very hard, friable, sticky; thin patchy clay films; slightly acid; clear, wavy boundary.

B22t—12 to 18 inches, brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky; very hard, firm, sticky; thin patchy clay films; neutral; gradual, smooth boundary.

B3—18 to 26 inches, brown (10YR 5/3) loam, dark brown (10YR 4/3) moist; weak, medium, prismatic structure parting to weak, medium, subangular blocky; slightly hard, very friable, slightly sticky; neutral; gradual, smooth boundary.

C1ca—26 to 36 inches, light olive-brown (2.5Y

5/3) fine sandy loam, olive brown (2.5Y 4/3) moist; weak, coarse, prismatic structure; slightly hard, very friable, slightly sticky; few fine segregations of lime; strong effervescence; mildly alkaline; diffuse, smooth boundary.

C2—36 to 60 inches, light olive-brown (2.5Y 5/3) soft sandstone, olive brown (2.5Y 4/3) moist; strong effervescence; mildly alkaline.

Depth to soft sandstone ranges from 20 to 40 inches. The A horizon is dark grayish brown or grayish brown. It commonly is loam, but is silt loam in places. The A horizon is 5 to 8 inches thick. The B horizon ranges from dark grayish brown to light yellowish brown in hue of 10YR or 2.5Y. The B2t horizon commonly is loam or clay loam, but in places is sandy clay loam 6 to 16 inches thick. Some profiles have a B3ca horizon. In places thin discontinuous ledgy layers of hard sandstone are in the upper part of the soft sandstone.

Reeder soils are near Belfield, Farland, Morton, and Vebar soils. They have a less clayey B horizon than Belfield soils. They are shallower over sandstone than Farland soils. They contain more sand and less silt than Morton soils. They contain more clay in the B horizon than Vebar soils.

RaA—Reeder loam, 0 to 2 percent slopes. This soil is on uplands, mostly near the village of Glencross. Areas are irregular in shape and range from 10 to 100 acres in size. Slopes are slightly concave to convex.

Included with this soil in mapping were small areas of Belfield, Heil, Morton, and Vebar soils. Of these, Morton soils, which are intermingled with Reeder soils, are the most common. Belfield soils are in swales. Heil soils are in small depressions, which are identified on the soil map by wet spot symbols. Vebar soils are very gently undulating. Included soils make up less than 15 percent of any given area.

This Reeder soil is easy to work, is medium in fertility, and has moderate or low available water capacity. Runoff is slow. Conserving moisture and controlling soil blowing are the main concerns in farming.

Many areas are cultivated. Small grain and alfalfa are the main crops. Some corn is grown, mainly for silage. Some areas are in native grass and are used for range and hay. Silty range site; capability unit IIc–2; windbreak group 3.

RaB—Reeder loam, 2 to 6 percent slopes. This soil is on uplands in irregularly shaped areas that range from 10 to several hundred acres in size. Slopes are short and convex. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Belfield, Heil, Morton, Regent, and Vebar soils. Of these, Morton soils are the most common. Belfield soils are in swales. Heil soils are in circular depressions of less than 5 acres and are identified on the soil map by wet spot symbols. Morton, Regent, and Vebar are on the sides of some of the ridges and knolls. Included soils make up 10 percent or less of any given area.

This Reeder soil is easy to work. Runoff is medium. Controlling erosion and soil blowing are the main concerns in management.

Many areas are cultivated. Small grain, alfalfa, and corn are the main crops. Most of the corn is grown for silage. Some areas are in native grass and are used for range and hay. Silty range site; capability unit IIe–1; windbreak group 3.

RaC—Reeder loam, 6 to 9 percent slopes. This undulating soil is on upland ridges. Areas are long and range from 5 to 45 acres in size. Slopes are short and convex. The profile of this soil has a thinner surface layer and subsoil than in the one described as representative of the series. Depth to the underlying sandstone commonly ranges from 20 to 30 inches.

Included with this soil in mapping were small areas of Belfield, Heil, Morton, and Vebar soils. Belfield soils are in swales. Heil soils are in circular depressions of less than 5 acres and are identified on the soil map by wet spot symbols. Morton and Vebar soils are intermingled with the Reeder soil. These included soils make up 10 percent or less of any given area.

This Reeder soil is easy to work, but erodes easily. Runoff is medium. Controlling erosion and soil blowing is the main concern in management.

Many areas are in native grass and are used for range. Small grain and alfalfa are the main crops in cultivated areas. Silty range site; capability unit IIIe–1; windbreak group 3.

Regan Series

The Regan series consists of deep, very poorly drained, nearly level loamy soils along sluggish drainageways in the uplands. These soils formed in alluvium. The native vegetation is mainly tall grasses.

In a representative profile the surface layer is very dark gray fine sandy loam about 5 inches thick. The underlying material to a depth of 17 inches is calcareous loam that has spots and streaks of salt and lime. It is slightly hard when dry and friable when moist. Below this is calcareous fine sandy loam, loam, and loamy fine sand.

Regan soils are low in fertility and moderately low in content of organic matter. Runoff is slow, and permeability is moderate. Available water capacity is moderate. The water table is within a depth of 36 inches, and water commonly is at or near the surface during spring.

All areas are in native grass and are used for range. These soils are too wet for cultivation.

The Regan soils in Dewey County are mapped only with Glenross soils.

Representative profile of Regan fine sandy loam in an area of Glenross-Regan fine sandy loams, in native grass, 900 feet north and 1,160 feet east of the southwest corner of sec. 24, T. 17 N., R. 24 E.

A1—0 to 5 inches, very dark gray (10YR 3/1) fine sandy loam, black (10YR 2/1) moist; weak, fine, subangular blocky structure parting to weak, fine, granular; slightly hard, friable, slightly sticky; common roots; slight effervescence; mildly alkaline; clear, wavy boundary.

C1ca—5 to 11 inches, 60 percent light-gray (2.5Y 7/1) and 40 percent dark-gray (2.5Y 4/1) loam, dark gray (2.5Y 4/1) moist; weak subangular blocky structure parting to weak, fine, granular; slightly hard, friable, sticky; common roots; common

nests of salt crystals; common segregations of lime; strong effervescence; mildly alkaline; gradual, wavy boundary.

C2ca—11 to 17 inches, 80 percent light brownish-gray (2.5Y 6/2) and 20 percent white (2.5Y 8/1) loam, gray (5Y 6/1) moist; weak, fine, granular structure; slightly hard, friable, very sticky; common roots; common nests of salt crystals; many segregations of lime; violent effervescence; moderately alkaline; gradual boundary.

C3ca—17 to 26 inches, gray (5Y 6/1) fine sandy loam, gray (5Y 5/1) moist; massive; slightly hard, friable, sticky; few roots; common nests of salt crystals; many segregations of lime; strong effervescence; mildly alkaline; gradual boundary.

C4ca—26 to 42 inches, 70 percent pale-olive (5Y 6/3) and 30 percent white (5Y 8/1) loam, light olive brown (2.5Y 5/3) moist; massive; slightly hard, friable, sticky; common nests of salt crystals; many segregations of lime; strong effervescence; mildly alkaline; clear boundary.

IIC5—42 to 60 inches, light olive-brown (2.5Y 5/3) loamy fine sand, olive brown (2.5Y 4/3) moist; massive; slightly hard, very friable; layer of hard, rust-colored sandstone about 2 inches thick is at a depth of 46 to 48 inches; neutral.

The A horizon ranges from very dark gray to dark grayish brown in hue of 10YR or 2.5Y. It is 4 to 9 inches thick. In places the C horizon contains layers of very fine sandy loam. The clay content of the C horizon, between depths of 10 and 40 inches, is 18 to 27 percent. Calcium carbonate content of the Cca horizon is 15 to 35 percent. In places the C horizon below a depth of 40 inches is fine sandy loam. The Regan soils in Dewey County contain more sand and less silt in the upper part of the profile than is defined as the range for the series, but this does not alter their use or management.

Regan soils are mapped with Glenross soils and are near Heil and Parshall soils. They contain less sodium and are more calcareous than Glenross soils. They are more calcareous and less clayey than Heil soils. They are more calcareous and wetter than Parshall soils.

Regent Series

The Regent series consists of moderately deep, well-drained, nearly level to sloping silty soils on uplands. These soils formed in clayey material weathered from the underlying soft shale. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is grayish-brown silty clay loam about 6 inches thick. The subsoil, about 32 inches thick, is silty clay that is grayish brown in the upper part and light brownish gray in the lower part. It is very hard when dry and very firm when moist. The lower part is calcareous. The underlying material is grayish-brown, calcareous shale.

Regent soils are medium in fertility and are moderate in content of organic matter. Runoff is slow or medium, and permeability is slow. Available water capacity is low or moderate.

Many areas are cultivated. Other areas are in native grass and are used for range.

Representative profile of Regent silty clay loam in an area of Regent-Ridgeview silty clay loams, 2 to 6 percent slopes, in native grass, 2,730 feet north and 225 feet west of the southeast corner of sec. 6, T. 13 N., R. 22 E.

A1—0 to 6 inches, grayish-brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; weak, fine, subangular blocky structure parting to weak, fine, granular; hard, firm, sticky and plastic; common roots; slightly acid; clear, smooth boundary.

B21t—6 to 14 inches, grayish-brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak, coarse, prismatic structure parting to moderate, very fine and fine, blocky; very hard, very firm, very sticky and plastic; shiny coats on faces of peds; few roots; neutral; gradual, wavy boundary.

B22t—14 to 27 inches, light brownish-gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate, medium, blocky structure; very hard, very firm, very sticky and plastic; shiny coats on faces of peds; few roots; slight effervescence; mildly alkaline; gradual, wavy boundary.

B3cacs—27 to 38 inches, light brownish-gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak, medium, subangular blocky structure; very hard, very firm, very sticky; few roots; common fine nests of gypsum crystals; strong effervescence; mildly alkaline; gradual boundary.

C—38 to 60 inches, grayish-brown, platy shale; pale-yellow coatings in seams; strong effervescence; mildly alkaline.

Depth to bedded shale ranges from 20 to 40 inches. The A horizon ranges from dark gray to brown in hue of 10YR or 2.5Y. It is clay loam in places and is 5 to 9 inches thick. The B horizon ranges from grayish brown to pale olive in hue of 10YR, 2.5Y, or 5Y. It is heavy silty clay loam, silty clay, or clay. The blocky structure in the B2t horizon is strong in some places. This horizon is 12 to 22 inches thick.

Regent soils are mapped with Moreau and Ridgeview soils and are near Belfield, Morton, Promise, Reliance, and Wayden soils. They are shallower over shale than Belfield, Promise, Reliance, and Ridgeview soils. They have thicker A and B2 horizons than Moreau soils and are more clayey in the B horizon than Morton soils. They are deeper over shale than Wayden soils.

RbC—Regent silty clay loam, 6 to 9 percent slopes. This sloping soil is on the sides of upland ridges and around the heads of drainageways. Areas range from 10 to 100 acres in size. Slopes are convex on the higher parts of the landscape and concave on the lower

parts. Depth to the underlying shale commonly is less than in the profile described as representative of the series.

Included with this soil in mapping were small areas of Moreau and Ridgeview soils. Moreau soils are on the tops and upper sides of some ridges. Ridgeview soils are on the lower parts of the landscape. Included soils make up 15 percent or less of any given area.

This Regent soil has low or moderate available water capacity. Runoff is medium. Controlling erosion is the main concern in farming.

Small grain and alfalfa are the main crops. Many areas are in native grass and are used for range. Clayey range site; capability unit IIIe–1; windbreak group 3.

RmB—Regent-Moreau complex, 2 to 9 percent slopes. This mapping unit is about 55 percent Regent soil, 40 percent Moreau soil, and 5 percent other soils. Areas are long and range from 10 to 200 acres in size. Slopes are short and convex on the higher parts of the landscape, but are longer and plane to concave on the lower parts. The Moreau soil commonly is on the higher parts of the landscape. The surface layer is silty clay loam or silty clay.

Included with this unit in mapping were small areas of Wayden soils. They are on some of the ridgetops.

This mapping unit takes in water slowly, and the clayey subsoil releases moisture slowly to plants. Runoff is medium. Controlling erosion is the main concern in cultivated areas.

Many areas are in native grass and are used for range and hay. Small grain and alfalfa are the main crops in cultivated areas. Clayey range site; capability unit IIIe–1; Regent soil in windbreak group 3, Moreau soil in windbreak group 4.

RpA—Regent-Ridgeview silty clay loams, 0 to 2 percent slopes. This mapping unit is about 50 percent Regent soil, 45 percent Ridgeview soil, and 5 percent other soils. Areas are irregular in shape and range from 10 to 150 acres in size. Regent soils are on very slight rises. Ridgeview soils are on the more nearly level parts of the landscape and have plane to slightly concave slopes. These soils have a slightly thicker surface layer than is typical.

Included with this unit in mapping were small areas of Belfield and Heil soils. Belfield soils are in shallow swales. Heil soils are in depressions of less than 5 acres and are identified on the soil map by wet spot symbols.

This mapping unit takes in water slowly. Surface runoff is slow. Conserving moisture is the main concern in farming.

Many areas are cultivated. Wheat and alfalfa are the main crops. Other areas are in native grass and are used for range and hay. Clayey range site; capability unit IIc–2; Regent soil in windbreak group 3, Ridgeview soil in windbreak group 4.

RpB—Regent-Ridgeview silty clay loams, 2 to 6 percent slopes. This mapping unit is about 50 percent Regent soil, 45 percent Ridgeview soil, and 5 percent other soils. Areas are irregular in shape and range from 10 to several hundred acres in size. Slopes are long and plane to convex and in a few areas range up to 9 percent. The Ridgeview soil is mostly on the mid and lower parts of the landscape. Both soils have the profiles described as representative of their respective series.

Included with this unit in mapping were small areas of Belfield, Daglum, Heil, and Rhoades soils. Belfield and Daglum soils are in swales. Heil soils are in closed depressions of less than 5 acres and are identified on the soil map by wet spot symbols. Rhoades soils are in depressed spots near Regent soils.

This mapping unit takes in water slowly and releases it slowly to plants. Runoff is medium. Controlling erosion is the main concern in farming.

Many areas are cultivated. Wheat, other small grain, and alfalfa are the main crops. Winter wheat grows well on these soils. Some areas are in native grass and are used for range and hay. Clayey range site; capability unit IIe–1; Regent soil in windbreak group 3, Ridgeview soil in windbreak group 4.

Reliance Series

The Reliance series consists of deep, well-drained, nearly level to gently sloping silty soils on uplands. These soils formed in a thin mantle of loess. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is dark grayish-brown silty clay loam about 8 inches thick. The subsoil, about 20 inches thick, is silty clay loam. The upper 3 inches is dark grayish brown, the next 9 inches is light olive brown, and the lower 8 inches is grayish brown. The upper 12 inches is very hard when dry and friable to firm when moist. The lower 8 inches is calcareous and has spots and streaks of lime that extend into the underlying material. The underlying material to a depth of 41 inches is light brownish-gray, calcareous silty clay loam. Below this is clay shale.

Reliance soils are medium in fertility and moderate in content of organic matter. Runoff is slow or medium, and permeability is moderately slow. Available water capacity is moderate.

Many areas are in native grass and are used for range. Other areas are cultivated.

Representative profile of Reliance silty clay loam, 0 to 2 percent slopes, in native grass, 2,000 feet east and 2,500 feet south of the northwest corner of sec. 6, T. 15 N., R. 30 E.

A1—0 to 8 inches, dark grayish-brown (10YR 4/2) silty clay loam, very dark gray (10YR 3/1) moist; weak, very fine, granular structure; soft, very friable, slightly sticky; common roots; neutral; clear, irregular boundary.

B21t—8 to 11 inches, dark grayish-brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak, fine and medium, prismatic structure; very hard, friable, slightly sticky; thin patchy clay films; common roots; neutral; abrupt, smooth boundary.

B22t—11 to 20 inches, light olive-brown (2.5Y 5/3) heavy silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate, fine and medium, prismatic structure parting to strong, fine and very fine, subangular blocky; very hard, firm, sticky; thin patchy clay films; few roots; neutral; clear, smooth boundary.

B3ca—20 to 28 inches, grayish-brown (2.5Y 5/2)

silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate, very fine and fine, subangular blocky structure; hard, firm, sticky; thin patchy clay films; few roots; common fine and medium segregations of lime; strong effervescence; mildly alkaline; gradual, smooth boundary.

C1ca—28 to 41 inches, light brownish-gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, sticky; few roots; many fine segregations of lime; violent effervescence; mildly alkaline; clear, smooth boundary.

IIC2—41 to 60 inches, grayish-brown (2.5Y 5/2) clay shale, dark grayish brown (2.5Y 4/2) moist; violent effervescence between shale fractures; neutral.

Depth to partly weathered clay shale ranges from 40 to more than 60 inches. The A horizon ranges from dark gray to grayish brown and in places is silt loam. It is 4 to 12 inches thick. The B2t horizon is silty clay in some places. It is 11 to 18 inches thick. The B3 and B3ca horizons range up to 12 inches in thickness. In places the soil has a B3 horizon. Segregations of lime in the B3ca and Cca horizons range from few to many. In a few places a layer of sand and gravel is at a depth of 40 to 60 inches.

Reliance soils are near Agar and Promise soils. They have a more clayey B2t horizon than Agar soils. They are less clayey than Promise soils.

RsA—Reliance silty clay loam, 0 to 2 percent slopes. This soil is in irregularly shaped areas that range from 10 to 100 acres in size. Slopes are long and are plane to slightly convex. This soil has the profile described as representative of the series.

Included with this soil in mapping were small areas of Agar and Promise soils. Agar soils are on very slight rises. Promise soils are in low areas. Included soils make up no more than 5 percent of any given area.

This Reliance soil has moderate available water capacity. Runoff is slow. Conserving moisture is the main concern in farming.

This soil is well suited to cultivated crops, but most areas are in native grass and are used for range. Small grain, alfalfa, and corn are the main crops in cultivated areas. Silty range site; capability unit IIc–2; windbreak group 3.

RsB—Reliance silty clay loam, 2 to 6 percent slopes. This soil is in irregularly shaped areas that range from 10 to 200 acres in size. Slopes are long, smooth, and slightly convex.

Included with this soil in mapping were small areas of Agar and Promise soils. Agar soils are on the higher parts of the landscape. Promise soils are in places that lack a thin mantle of silty material. Included soils make up no more than 5 percent of any given area.

This Reliance soil has moderate available water capacity. Runoff is medium. Controlling erosion is the main concern in cultivated areas.

Many areas are in native grass and are used for range. Wheat and alfalfa are the main crops in cultivated areas. Silty range site; capability unit IIe–1; windbreak group 3.

Rhoades Series

The Rhoades series consists of deep, moderately well drained, gently sloping loamy soils that have a claypan subsoil. These soils are on uplands. They formed in material weathered from soft shale. The native vegetation is mainly short and mid grasses.

In a representative profile the surface layer is grayish-brown loam about 4 inches thick. The subsoil is grayish-brown silty clay about 19 inches thick. The upper part is extremely hard when dry, very firm when moist, and very sticky and plastic when wet. The lower part is calcareous and has spots and streaks of lime and salt extending into the underlying material. The underlying material to a depth of 37 inches is grayish-brown, calcareous silty clay loam. Below this is light brownish-gray, calcareous silty clay.

Rhoades soils are low in fertility and moderate in content of organic matter. Runoff is medium, and permeability is very slow. Available water capacity is low or moderate.

Most areas are in native grass and are used for range. A few areas are cultivated.

Representative profile of Rhoades loam in an area of Rhoades-Daglum complex, 2 to 6 percent slopes, in native grass, 100 feet west and 2,450 feet south of the northeast corner of sec. 7, T. 17 N., R. 23 E.

A2—0 to 4 inches, grayish-brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; moderate, thin, platy and weak, coarse, prismatic structure; hard, friable, slightly sticky; common roots; slightly acid; abrupt, wavy boundary.

B21t—4 to 14 inches, grayish-brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; strong, medium, columnar structure parting to strong, medium, blocky; extremely hard, very firm, very sticky and plastic; coats of light-gray (10YR 7/2) silt and very fine sand grains on tops and sides of the columns; thin patchy clay films; few roots; neutral; clear, wavy boundary.

B22tca—14 to 18 inches, grayish-brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate, very coarse, prismatic structure parting to moderate, fine and medium, blocky; extremely hard, very firm, sticky and plastic; thin patchy clay films; few roots; few nests of gypsum and salt crystals; many fine segregations of lime; strong effervescence; mildly alkaline; gradual, wavy boundary.

B3casa—18 to 23 inches, grayish-brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak, medium and coarse, subangular blocky structure; extremely hard, very firm, very sticky; thin patchy clay films; few roots; many segregations of lime and salt; strong effervescence; mildly alkaline; gradual boundary.

C1casa—23 to 37 inches, grayish-brown (2.5Y 5/2) silty clay loam, olive gray (5Y 4/2) moist; massive; very hard, very firm,

very sticky; many fine segregations of lime and salt; slight effervescence; mildly alkaline; gradual boundary.

C2—37 to 60 inches, light brownish-gray (2.5Y 6/2) silty clay, olive gray (5Y 4/2) moist; massive; very hard, very firm, very sticky; common fine segregations of lime and salt; slight effervescence; mildly alkaline.

In places the soil has a thin A1 horizon. The A horizon ranges from grayish brown to light brownish gray. It is loam, silt loam, or very fine sandy loam 1 to 5 inches thick. In places the upper part of the B2t horizon is dark grayish brown. It has columnar structure that ranges from moderate to strong in grade and from medium to coarse in size. The B2t horizon is 6 to 15 inches thick. Segregations of lime, gypsum, and other salts in the B3 and C horizons range from few to many.

Rhoades soils are mapped with Daglum soils and are near Absher, Belfield, and Ekalaka soils. They have a thicker, darker colored A horizon than Absher soils. They have a thinner A horizon than Daglum, Belfield, and Ekalaka soils.

RtB—Rhoades-Daglum complex, 2 to 6 percent slopes. This mapping unit is about 45 percent Rhoades soil, 30 percent Daglum soil, and 25 percent other soils. Areas are irregular in shape and range from 10 to several hundred acres in size. Slopes commonly are long. Some short slopes range up to 10 percent. The surface is uneven because of many small mounds that rise a few inches above the intervening low spots. The surface layer is loam and silt loam. The Rhoades soil is commonly on the higher parts of the landscape. It has the profile described as representative of the series. In places it is only 30 to 40 inches deep over shale. The Daglum soil is on the lower parts of the landscape.

Included with this unit in mapping were small areas of Absher and Belfield soils and Slickspots. Absher soils and Slickspots are in low spots between the mounds. Belfield soils are in swales.

Tilth is poor. Available water capacity is low or moderate. Runoff is medium. The claypan subsoil takes in water very slowly and restricts roots. Improving tilth and water intake are the main concerns in cultivated areas. The Rhoades soil is not suitable for cultivation.

Most areas are in native grass and are used for range. Small grain and alfalfa are the main crops in cultivated areas. Capability unit VIs–1; Rhoades soil in Thin Claypan range site, windbreak group 10; Daglum soil in Claypan range site, windbreak group 9.

Ridgeview Series

The Ridgeview series consists of deep, well-drained, nearly level to gently sloping silty soils on uplands. These soils formed in clayey alluvium washed in from adjacent soils. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is dark-gray silty clay loam about 5 inches thick. The subsoil, about 29 inches thick, is grayish-brown silty clay and clay in the upper part and light brownish-gray clay in the lower part. The upper part is hard when dry and firm when moist. The lower part is calcareous and has spots and streaks of lime that extend into the underlying material. The underlying material is grayish-brown, calcareous clay.

Ridgeview soils are medium in fertility and moderate in content of organic matter. Runoff is slow or medium, and permeability is slow. Available water capacity is moderate or high.

Many areas are cultivated. Some areas are in native grass and are used for range.

Representative profile of Ridgeview silty clay loam in an area of Regent-Ridgeview silty clay loams, 2 to 6 percent slopes, in native grass, 315 feet east and 115 feet south of the northwest corner of sec. 6, T. 13 N., R. 22 E.

A1—0 to 5 inches, dark-gray (10YR 4/1) silty clay loam, very dark gray (10YR 3/1) moist; weak, fine, granular and subangular blocky structure; slightly hard, friable, sticky and plastic; common roots; slightly acid; clear, smooth boundary.

B1—5 to 10 inches, grayish-brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate, very fine and fine, subangular blocky structure; hard, firm, very sticky and plastic; continuous shiny surfaces on peds; common roots; slightly acid; clear, wavy boundary.

B21t—10 to 17 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate, medium, prismatic structure parting to strong, coarse and medium, blocky; extremely hard, extremely firm, very sticky and plastic; continuous shiny surfaces on peds; few roots; slight effervescence; neutral; clear, irregular boundary.

B22t—17 to 25 inches, light brownish-gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, very coarse, prismatic structure parting to strong, coarse, blocky; extremely hard, extremely firm, very sticky and plastic; continuous shiny surfaces on peds; few roots; strong effervescence; mildly alkaline; gradual boundary.

B3ca—25 to 34 inches, light brownish-gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate, coarse, subangular blocky structure; very hard, very firm, very sticky and plastic; few, fine and medium segregations of lime; strong effervescence; mildly alkaline; gradual boundary.

C1cacs—34 to 44 inches, grayish-brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y 3/2) moist; massive; very hard, very firm, sticky and plastic; few striations and nests of gypsum; few medium segregations of lime; strong effervescence; mildly alkaline; gradual boundary.

C2—44 to 60 inches, grayish-brown (2.5Y 5/2) clay, very dark grayish brown (2.5Y

3/2) moist; massive; hard, firm, sticky and plastic; strong effervescence; mildly alkaline.

Depth to bedded shale ranges from 40 to more than 60 inches. Depth to free carbonates ranges from 8 to 12 inches. The A horizon ranges from dark gray to grayish brown in hue of 10YR or 2.5Y. It is 4 to 7 inches thick. The B2t horizon ranges from dark grayish brown to light brownish gray in hue of 2.5Y or 10YR. Tongues and coatings similar in color to the A horizon commonly extend into the B2t horizon along cracks. In places the B2t horizon is silty clay. In some places a thin film of bleached silt and sand grains coats the upper 1 or 2 inches of the prisms; in some, the blocky secondary structure is moderate in grade. The B2t horizon ranges from neutral to moderately alkaline in reaction and from 14 to 20 inches in thickness. The C horizon ranges from grayish brown to pale yellow in hue of 2.5Y or 5Y. It is clay, silty clay, or shaly clay. Segregations of lime and gypsum in the C1 horizon range from few to common.

Ridgeview soils are mapped with Regent soils and are near Belfield, Morton, and Promise soils. They have a thinner A horizon than Belfield soils. They have a more clayey B horizon than Morton soils and a less clayey B horizon than Promise soils. They are deeper over shale than Regent soils.

RvA—Ridgeview silty clay loam, 0 to 2 percent slopes. This soil is on uplands in irregularly shaped areas that range from 10 to 100 acres in size. Slopes are long and plane to slightly concave. The surface layer is thicker than in the profile described as representative of the series.

Included with this soil in mapping were small areas of Belfield, Daglum, Regent, and Rhoades soils. Belfield, Daglum, and Rhoades soils are on the lower parts of the landscape. Regent soils are on very slight rises. These included soils make up no more than 15 percent of any given area.

This Ridgeview soil takes in water slowly, and the clayey subsoil releases moisture slowly to plants. Improving water intake and maintaining tilth are the main concerns in farming.

Many areas are cultivated. Wheat and alfalfa are the main crops. Winter wheat grows well on this soil. Some areas are in native grass and are used for range and hay. Clayey range site; capability unit IIIs–3; windbreak group 4.

Sansarc Series

The Sansarc series consists of shallow, well drained, sloping to very steep, calcareous clayey soils on uplands. These soils formed in material weathered from the underlying shale. The native vegetation is mid and short grasses.

In a representative profile the surface layer is grayish-brown clay about 4 inches thick. The underlying material to a depth of 17 inches is light brownish-gray, calcareous clay and shaly clay. It is hard when dry and friable when moist. Below this is light brownish-gray bedded shale.

Sansarc soils are low in fertility and are moderately low in content of organic matter. Runoff is medium to very rapid, and permeability is slow. Available water capacity is very low.

Almost all areas are in native grass and are used for range.

Representative profile of Sansarc clay in an area of Sansarc-Opal clays, 15 to 25 percent slopes, in native grass, 10 feet south and 10 feet east of the northwest corner of sec. 5, T. 11 N., R. 28 E.

A1—0 to 4 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate, fine and medium, granular structure; hard, friable, very sticky and plastic; common roots; slight effervescence; mildly alkaline; clear, smooth boundary.

C1—4 to 10 inches, light brownish-gray (2.5Y 6/2) clay, dark grayish brown (2.5Y 4/2) moist; weak platy structure parting to moderate, medium, granular; hard, friable, very sticky and plastic; common very fine fragments of shale; common roots; strong effervescence; mildly alkaline; gradual, wavy boundary.

C2—10 to 17 inches, light brownish-gray (2.5Y 6/2) shaly clay, dark grayish brown (2.5Y 4/2) moist; fine-earth fraction is massive; hard, friable, sticky; more than 50 percent is partly weathered shale fragments; few roots; strong effervescence; mildly alkaline; clear, wavy boundary.

C3—17 to 60 inches, light brownish-gray (2.5Y 6/2) bedded shale, dark grayish brown (2.5Y 4/2) moist; many nests of gypsum in seams; slight effervescence; neutral.

Depth to bedded shale ranges from 6 to 20 inches. Colors throughout the profile above the shale range from grayish brown to light gray in hue of 10YR, 2.5Y, or 5Y. A thin, fragile crust of very fine granules as much as ½ inch thick commonly is on the surface.

Sansarc soils are mapped with Dupree and Opal soils and are near Chantier, Promise, and Wayden soils. They contain less salts than Chantier soils. They are more friable and more calcareous than Dupree soils. They are shallower over shale than Opal and Promise soils and are more clayey than Wayden soils.

SaE—Sansarc-Dupree clays, 9 to 45 percent slopes. This mapping unit is in rough, broken areas near the Cheyenne River and its tributaries. It is 50 percent Sansarc soil, 30 percent Dupree soil, and 20 percent other soils. Areas are irregular in shape and are as much as several thousand acres in size. Slopes are short and irregular. Many gullied drainageways dissect the areas. Sansarc soils are on the higher parts of the landscape. Their profile is less alkaline and more acid than the one described as representative of the series. Dupree soils have plane to slightly concave slopes that are mostly less than 15 percent.

Included with this unit in mapping were small areas of Chantier and Opal soils and Shale land. Of these, Shale land, the most common, is on cutbanks and sharp shoulders of drainageways. Chantier soils are on the lower part of the landscape along drainageways. Opal soils are on some of the wider ridgetops between drainageways.

These soils take in water slowly and have very low available water capacity and rapid runoff. They are not suitable for cultivation.

All areas are in native grass and are used for range. Capability unit VIIs–2; windbreak group 10; Sansarc soil in Shallow range site, Dupree soil in Dense Clay range site.

SbC—Sansarc-Opal clays, 6 to 15 percent slopes. This mapping unit is on upland ridges and the sides of entrenched drainageways. It is about 45 percent Sansarc soil, 40 percent Opal soil, and 15 percent other soils. Areas are irregular in shape and range from 20 to 400 acres in size. Slopes are plane to convex. In the eastern part of the county, glacial boulders commonly are on the surface. Sansarc soils are on the higher parts of the landscape. Opal soils are on the lower parts and commonly have slopes of less than 9 percent. Depth to the underlying shale commonly is less than in the profile described as representative of the Opal series.

Included with this unit in mapping were small areas of Dupree and Promise soils. Dupree soils are below Sansarc soils in some areas. Promise soils are on the lower parts of the landscape.

These soils take in water slowly and have very low or low available water capacity. Runoff is medium to rapid. The shallow Sansarc soil is not suitable for cultivation. The Opal soil is suitable for cultivation, but generally is not conveniently located for that use. Controlling erosion is the main concern of management.

Most areas are in native grass and are used for range. Capability unit VIs–3; windbreak group 10; Sansarc soil in Shallow range site, Opal soil in Clayey range site.

SbE—Sansarc-Opal clays, 15 to 25 percent slopes. This mapping unit is mainly on the sides of entrenched drainageways (fig. 15). It is about 60 percent Sansarc soil, 30 percent Opal soil, and 10 percent other soils. Areas are irregular in shape and range from 20 to several thousand acres in size. Slopes are plane to convex. In the eastern part of the county, scattered glacial boulders are on the surface. The Sansarc soils are on the higher parts of the landscape and have the profile described as representative of the series. The Opal soil is on the lower parts of the landscape or on some of the wider ridgetops. The depth to shale is less than in the profile described as representative of the Opal series.

Included with this unit in mapping were small areas of Dupree and Promise soils and Shale land. Dupree and Promise soils are on the lower parts of the landscape. Areas of Shale land are around the heads and on the sharp shoulders of some of the small drainageways.

These soils take in water slowly and have very low or low available water capacity and rapid runoff. They erode easily and are not suitable for cultivation.

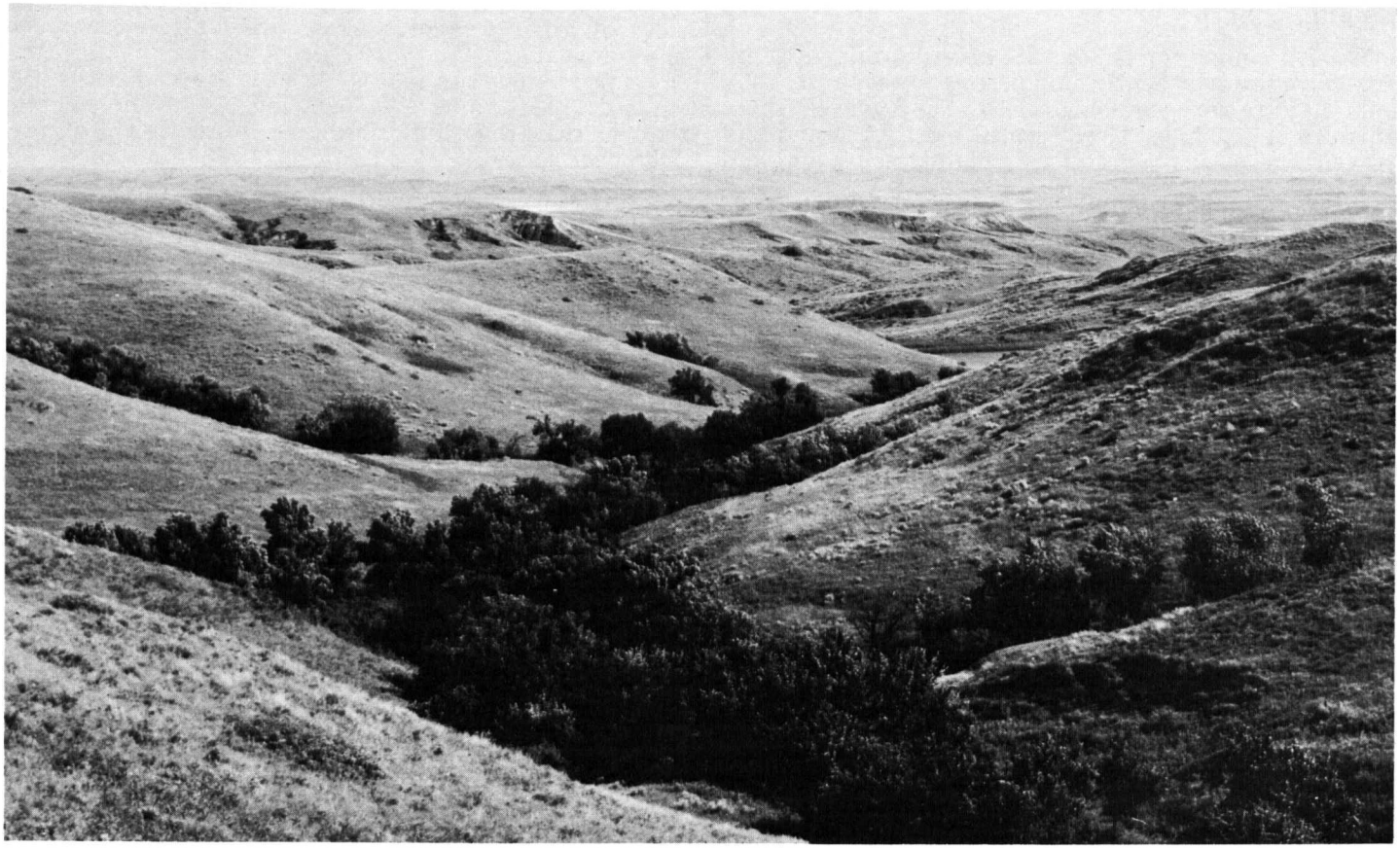

Figure 15.—An area of Sansarc-Opal clays.

All areas are in native grass and are used for range. Capability unit VIIs–2; windbreak group 10; Sansarc soil in Shallow range site, Opal soil in Clayey range site.

ScF—Sansarc-Shale land complex, 15 to 45 percent slopes. This mapping unit is about 55 percent Sansarc soil and 45 percent Shale land. Areas range from 20 to 400 acres in size. Slopes are hilly to steep and short and convex and in some areas range up to 60 percent. Many gullied drainageways lace the landscape, and slump areas are common on the bluffs above deeply entrenched drainageways. This Sansarc soil is shallower over bedded shale than is typical. Shale land is mainly outcrops of shale intermingled with soils that are less than 6 inches of shaly clay over bedded shale. Areas of Shale land range up to 25 acres in size.

Included in some mapped areas were small areas of Dupree soils. These soils commonly are on the lower parts of the landscape.

This mapping unit is not suitable for cultivation. The soils are low in fertility and have very low available water capacity. Runoff is rapid or very rapid. Geologic erosion is active on Shale land.

All areas are in native vegetation and are used for range. Shale land is bare or nearly bare of vegetation. Sansarc soil in Shallow range site, capability unit VIIs–2, windbreak group 10; Shale land in capability unit VIIIs–2, not assigned to a range site or windbreak group.

Schamber Series

The Schamber series consists of well-drained to excessively drained, gently undulating to steep gravelly soils that are very shallow over sand and gravel. These soils are on uplands. They formed mostly in sand and gravel. The native vegetation is mainly short and mid grasses.

In a representative profile the surface layer is grayish-brown gravelly sandy loam and brown gravelly loamy sand about 5 inches thick. The underlying material is light brownish-gray, calcareous coarse sand and gravel.

Schamber soils are low in fertility and low in content of organic matter. Runoff is medium, and permeability is rapid. Available water capacity is very low or low.

All areas are in native grass and are used for range. These soils are a potential source of sand and gravel.

Representative profile of Schamber gravelly sandy loam in an area of Schamber-Sansarc complex, 15 to 40 percent slopes, in native grass, 3,150 feet east and 1,700 feet south of the northwest corner of sec. 34, T. 10 N., R. 27 E.

A11—0 to 2 inches, grayish-brown (10YR 5/2) gravelly sandy loam, very dark grayish brown (10YR 3/2) moist; weak, fine, subangular blocky structure; soft, very friable; common roots; neutral; clear, wavy boundary.

A12—2 to 5 inches, brown (10YR 5/3) gravelly loamy sand, dark grayish brown (10YR 4/2) moist; single grained; soft, very friable; common roots; neutral; clear, irregular boundary.

C1ca—5 to 17 inches, light brownish-gray (10YR 6/2) sand and gravel, grayish brown (10YR 5/2) moist; single grained; loose; few roots; undersides of pebbles are coated with lime; slight effervescence; mildly alkaline; abrupt, wavy boundary.

C2ca—17 to 28 inches, light brownish-gray (10YR 6/2) coarse sand and gravel, grayish brown (10YR 5/2) moist; single grained; loose; undersides of pebbles are coated with lime; strong effervescence; mildly alkaline; abrupt boundary.

C3—28 to 60 inches, light brownish-gray (10YR 6/2) coarse sand and gravel, grayish brown (10YR 5/2) moist; single grained; loose; undersides of pebbles are coated with lime; slight effervescence; mildly alkaline; clear boundary.

Depth to sand and gravel is less than 10 inches. The A horizon ranges from grayish brown to light yellowish brown in hue of 10YR or 2.5Y. It ranges from gravelly loamy sand to loam in texture and from 4 to 9 inches in thickness. The C horizon ranges from grayish brown to pale yellow in hue of 10YR or 2.5Y. In places clay and shale are below the sand and gravel at a depth of 40 to 60 inches.

Schamber soils are shallower over sand and gravel than the nearby Canning, Farland, Talley, and Vebar soils.

SdC—Schamber gravelly sandy loam, 3 to 15 percent slopes. This gently undulating to rolling soil is on the sides of stream valleys. Areas are long and narrow and range from 20 to 100 acres in size. Slopes are short and convex. In places near the Moreau River the surface layer is gravelly loam and is darker colored than in the profile described as representative of the Schamber series.

Included with this soil in mapping were small areas of Opal, Sansarc, Tally, and Vebar soils. Opal and Sansarc soils are on the sides of drainageways or on the lower parts of the landscape. Tally and Vebar soils are in swales in some areas. Also included in some areas is a soil that is deeper over gravelly sand than the Schamber soil. These included soils make up about 20 percent of a given area.

This Schamber soil takes in water readily, but has very low or low available water capacity and slow or medium runoff. It is too droughty for cultivation. If the vegetation is disturbed, it blows easily.

All areas are in native grass and are used for range. This soil is a potential source of gravel. Very Shallow range site; capability unit VIs–4, windbreak group 10.

SfF—Schamber-Sansarc complex, 15 to 40 percent slopes. This mapping unit is mostly hilly to steep soils on terrace fronts above the valleys of the Cheyenne and Moreau Rivers. It is about 50 percent Schamber soil, 25 percent Sansarc soil, and 25 percent other soils. Some areas are long and narrow; others are irregular. The Schamber soil has well-rounded slopes and is on the higher parts of the landscape. It has the profile described as representative of the Schamber series. The surface layer is gravelly loam and gravelly loamy sand. The Sansarc soil is commonly below the Schamber soil. It has a clay surface layer; in places scattered gravel is on the surface.

Included with this unit in mapping were small areas of Dupree, Farland, and Opal soils. Dupree and Opal soils are on the lower parts of the landscape. Farland soils are on small isolated flats above the Schamber soils.

This mapping unit has very low or low available water capacity. Runoff is medium to rapid. The soils are too droughty and too steep for cultivation.

All areas are in native grass and are used for range. Capability unit VIIs–4; windbreak group 10; Schamber soil in Very Shallow range site, Sansarc soil in Shallow range site.

Shale Land

Sh—Shale land consists of outcrops of soft clayey shale and very shallow shaly clay that is less than 6 inches deep over bedded shale. The outcrops of shale commonly are bare of vegetation.

Areas of Shale land are irregular in shape and range from 20 to several hundred acres in size. Slopes are 4 to 45 percent and convex to angular. They generally are more than 20 percent in the northern part of the county, but are less steep in the southern part. Uncrossable gullies are in many areas. Slumps and cutbanks of shale outcrop are in the steeper areas. Spots and streaks of salts are at or near the surface in some areas.

Included with Shale land in mapping were small areas of Chantier, Dupree, and Sansarc soils. Chantier and Dupree soils are on fans on the lower parts of the landscape. Sansarc soils are on the higher parts, which are vegetated and are more stable than the dominant Shale land. The included soils make up no more than 25 percent of any given area.

Runoff is very rapid. Geologic erosion is active. Fresh rills form after each heavy rain and during periods of snowmelt.

Plant cover is either lacking or sparse. Shale land has very low value for grazing domestic livestock, but provides some grazing for wildlife. Capability unit VIIIs–2, not assigned to a range site or windbreak group.

Shambo Series

The Shambo series consists of deep, well-drained, nearly level loamy soils on low terraces. These soils formed in alluvium. The native vegetation is mainly mid and short grasses.

In a representative profile the surface layer is grayish-brown loam about 6 inches thick. The subsoil, about 11 inches thick, also is grayish-brown loam. It is very hard when dry and friable when moist. The lower part of the subsoil is calcareous. The underlying material is grayish-brown and light brownish-gray, calcareous loam.

Shambo soils are medium in fertility and are moderate in content of organic matter. Runoff is slow, and permeability is moderate. Available water capacity is high.

Most areas are in native grass and are used for range. A few areas are cultivated.

Representative profile of Shambo loam, in native grass, 1,330 feet east and 1,850 feet south of the northwest corner of sec. 29, T. 15 N., R. 26 E.

A1—0 to 6 inches, grayish-brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak, fine, subangular blocky structure parting to weak, fine, granular; hard, friable, slightly sticky; many roots; slightly acid; clear, smooth boundary.

B21—6 to 10 inches, grayish-brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky; very hard, friable, slightly sticky; many roots; neutral: clear, smooth boundary.

B22—10 to 17 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate, medium, prismatic structure parting to moderate, medium, subangular blocky; very hard, friable, slightly sticky; many roots; few fine segregations of lime; slight effervescence; mildly alkaline; clear, wavy boundary.

C1ca—17 to 30 inches, grayish-brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; weak, medium, subangular blocky structure; slightly hard, friable, slightly sticky; common roots; many, fine segregations of lime; strong effervescence; mildly alkaline; clear, wavy boundary.

C2—30 to 60 inches, light brownish-gray (10YR 6/2) loam, dark brownish gray (10YR 4/2) moist; massive; soft, very friable, slightly sticky; few fine segregations of lime; slight effervescence; mildly alkaline.

The A horizon commonly is loam, but in places is silt loam. The A horizon is 5 to 8 inches thick. In places the B2 horizon is light clay loam. It is 10 to 22 inches thick. Grade of structure is weak or moderate. In places this soil has a B3 horizon as much as 6 inches thick. In places the C horizon is stratified with lenses of material ranging from loamy fine sand to silt loam.

Shambo soils are near Farland, Havrelon, and Tally soils. They have a less silty B horizon than Farland soils. They are less calcareous than Havrelon soils and also differ from those soils in having a B horizon. They contain less sand in the B horizon than Tally soils.

Sm—Shambo loam (0 to 2 percent slopes). This nearly level soil is on low terraces along the Moreau River. Areas are irregular in shape and range from 10 to 100 acres in size. Slopes are plane and are less than 1 percent in some areas.

Included with this soil in mapping were small areas of Belfield, Farland, and Tally soils. Belfield and Farland soils are in the more nearly level parts of the landscape. Tally soils are on very slight rises. Included soils make up no more than 10 percent of a given area.

This Shambo soil is easy to work and has high available water capacity. Runoff is slow. Conserving moisture is the main concern in cultivated areas.

Many areas are in native grass and are used for

range. This soil is well suited to all crops grown in the county and to irrigation, but areas commonly are small and isolated. Silty range site; capability unit IIc–2; windbreak group 3.

Swanboy Series

The Swanboy series consists of deep, well drained or moderately well drained, nearly level, calcareous clayey soils on terraces and uplands. These soils formed in alluvium. The native vegetation is mainly mid grasses.

In a representative profile the surface layer is gray clay about 1 inch thick. The subsoil is gray clay about 8 inches thick. It is extremely hard when dry, extremely firm when moist, and very sticky and plastic when wet. The underlying material is gray clay that has many fine spots of salts. The entire profile is calcareous.

Swanboy soils are low in fertility and in content of organic matter. Runoff is medium or rapid, and permeability is very slow. Available water capacity is low. The salt content is high.

All areas are in native grass and are used for range.

Representative profile of Swanboy clay, in native grass, 1,430 feet north and 840 feet east of the southwest corner of sec. 29, T. 16 N., R. 28 E.

A1—0 to 1 inch, gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; weak, fine, granular structure; very hard, firm, very sticky and plastic; few roots; strong effervescence; moderately alkaline; clear, smooth boundary.

B2—1 to 9 inches, gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; weak, coarse, subangular blocky structure parting to weak, medium, blocky; extremely hard, extremely firm, very sticky and plastic; few roots; strong effervescence; moderately alkaline; gradual, wavy boundary.

C—9 to 60 inches, gray (5Y 5/1) clay, dark gray (5Y 4/1) moist; massive; extremely hard, extremely firm, very sticky and plastic; many fine segregations of salts; strong effervescence; moderately alkaline.

The A horizon ranges from gray to light olive gray in hue of 2.5Y and is 2 inches or less thick. The B2 horizon ranges from gray to pale olive in hue of 2.5Y or 5Y and from 8 to 18 inches in thickness. Reaction of the B and C horizons ranges from mildly alkaline to strongly alkaline.

Swanboy soils are near Chantier, Opal, Promise, and Sansarc soils. They are deeper over shale than Chantier, Opal, and Sansarc soils. They have salts nearer the surface than Promise soils.

Sw—Swanboy clay (0 to 2 percent slopes). This soil is on fans below areas of steeper clay soils. Areas are irregular in shape and range from 20 to 400 acres in size. Slopes are long and slightly concave to slightly convex. Large gullied drainageways that range up to 30 feet deep and 50 feet wide are in some areas. This soil has the profile described as representative of the series.

Included with this soil in mapping were spots of Slickspots. These spots have a puddled or "slicked-over" surface and commonly are bare of vegetation.

This Swanboy soil has very poor tilth, takes in water very slowly, and has medium to rapid runoff. It is not suitable for cultivation.

All areas are in native grass and are used for range. Dense Clay range site; capability unit VIs–5; windbreak group 10.

Sy—Swanboy-Slickspots complex (0 to 2 percent slopes). This mapping unit is on bottom land, terraces, and fans along creeks and drainageways. It is about 50 percent Swanboy soil, 30 percent Slickspots, and 20 percent other soils. Areas are long and narrow and range from 20 to 300 acres in size. Commonly they are dissected by gullied channels 15 to 30 feet deep and 20 to 50 feet wide. In places this Swanboy soil below a depth of 20 inches is stratified with coarser textured material. Slickspots occur as scattered areas and have a puddled or "slicked-over" surface underlain by clay.

Included with this unit in mapping were small areas of Promise soils in narrow bands adjacent to the channels. Channels commonly make up about 5 to 10 percent of the mapped areas.

This mapping unit is not suitable for cultivation. The soils have very poor tilth and take in water very slowly. Runoff is medium to rapid. Streambank erosion is active in the channels. The areas rarely are flooded from overflow because of the depth of the channels.

All areas are in native grass and are used for range. Slickspots are bare or nearly bare of vegetation. Swanboy soil in Dense Clay range site, capability unit VIs–5, windbreak group 10; Slickspots in capability unit VIIIs–3, not assigned to a range site or windbreak group.

Tally Series

The Tally series consists of deep, well-drained, nearly level loamy soils on terraces and upland. These soils formed in alluvium. The native vegetation is mainly tall and mid grasses.

In a representative profile the surface layer is dark grayish-brown fine sandy loam about 7 inches thick. The subsoil, about 15 inches thick, is grayish-brown fine sandy loam. It is hard when dry and very friable when moist. The underlying material to a depth of 29 inches is light brownish-gray, calcareous fine sandy loam. Below this is light brownish-gray, calcareous loamy fine sand.

Tally soils are medium in fertility and are moderate in content of organic matter. Runoff is slow, and permeability is moderately rapid. Available water capacity is moderate.

Most areas are in native grass and are used for range.

Representative profile of Tally fine sandy loam, in native grass, 610 feet south and 1,760 feet east of the northwest corner of sec. 17, T. 14 N., R. 24 E.

A1—0 to 7 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak, fine and medium, subangular blocky structure parting to weak, fine, granular; slightly hard, very friable; many roots; neutral; clear, smooth boundary.

B21—7 to 13 inches, grayish-brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, very coarse, prismatic structure parting to weak, coarse, subangular blocky; hard, very friable; common roots; neutral; gradual, smooth boundary.

B22—13 to 22 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, very coarse, prismatic structure parting to weak, coarse, subangular blocky; hard, very friable; common roots; neutral; gradual, smooth boundary.

C1ca—22 to 29 inches, light brownish-gray (10YR 6/2) fine sandy loam, grayish brown (10YR 5/2) moist; weak, coarse, prismatic structure; slightly hard, very friable; few roots; few fine segregations of lime; strong effervescence; neutral, gradual boundary.

C2—29 to 60 inches, light brownish-gray (10YR 6/2) loamy fine sand, grayish brown (10YR 5/2) moist; massive; soft, very friable; strong effervescence; mildly alkaline.

The A horizon ranges from dark grayish brown to brown in hue of 10YR or 2.5Y and is 5 to 9 inches thick. The B2 horizon ranges from grayish brown to pale brown in hue of 10YR or 2.5Y. It is 8 to 15 inches thick. In places this soil has a B3 or B3ca horizon of fine sandy loam or loamy fine sand.

Tally soils are near Shambo and Trembles soils. They have a more sandy B horizon than Shambo soils. In contrast with Trembles soils, they have a B horizon and are deeper over lime.

Ta—Tally fine sandy loam (0 to 2 percent slopes). This nearly level soil is on terraces and uplands. The irregularly shaped areas range from 10 to 150 acres in size. Slopes are mostly plane, but are very slightly undulating in some areas.

Included with this soil in mapping were small areas of Shambo and Trembles soils. Shambo soils are intermingled with Tally soils. Trembles soils are at slightly lower levels adjacent to channels. Included soils make up no more than 10 percent of any given area.

This Tally soil is easy to work and takes in water readily, but it blows easily. Available water capacity is moderate, and runoff is slow. Controlling soil blowing is the main concern in cultivated areas.

Many areas are in native grass and are used for range. This soil is suited to most crops in the county and has a potential for irrigation. Sandy range site; capability unit IIIe–7; windbreak group 5.

Trembles Series

The Trembles series consists of deep, well-drained, nearly level loamy soils on bottom land and low terraces. These soils formed in alluvium. The native vegetation is mainly tall and mid grasses. Scattered trees and shrubs are along stream channels.

In a representative profile the surface layer is grayish-brown fine sandy loam about 4 inches thick. Next is a layer of light brownish-gray fine sandy loam about 4 inches thick. It is slightly hard when dry and very friable when moist. The underlying material is light brownish-gray, calcareous fine sandy loam.

Trembles soils are low in fertility and in content of organic matter. Runoff is slow, and permeability is moderately rapid. Available water capacity is moderate or high. These soils receive additional moisture in the form of runoff from nearby upland soils, and some areas are subject to stream flooding.

Most areas are in native grass and are used for range and hay. A few areas are cultivated.

Representative profile of Trembles fine sandy loam in an area of Trembles-Havrelon complex, in native grass, 1,540 feet west and 400 feet south of the northeast corner of sec. 29, T. 15 N., R. 26 E.

A1—0 to 4 inches, grayish-brown (2.5Y 5/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak, fine, granular structure; soft, very friable; common roots; mildly alkaline; clear, smooth boundary.

AC—4 to 8 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak, coarse, prismatic structure parting to weak, medium, subangular blocky; slightly hard, very friable; common roots; mildly alkaline; clear, smooth boundary.

C—8 to 60 inches, light brownish-gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable; few roots to 36-inch depth; strong effervescence; moderately alkaline.

Free carbonates are at or within 12 inches of the surface. Colors throughout the profile range from grayish brown to light yellowish brown in hue of 10YR or 2.5Y. In places the A1 horizon is as dark as very dark grayish brown and is less than 5 inches thick. The A and AC horizons commonly are fine sandy loam or very fine sandy loam, but range from loamy fine sand to silt loam. In places the soil does not have an AC horizon. The C horizon commonly is stratified with lenses of coarser and finer textures ranging from fine sand to silty clay loam, but between depths of 10 and 40 inches the texture averages a fine sandy loam; clay content is 9 to 15 percent.

Trembles soils are mapped with or are near Banks, Havrelon, and Lohler soils. They are less sandy than Banks soils. They are less clayey and more sandy than Havrelon and Lohler soils.

Th—Trembles-Havrelon complex. This mapping unit is on bottom land and low terraces along the Moreau River. It is about 55 percent Trembles soil, 35 percent Havrelon soil, and 10 percent other soils. Areas are irregular in shape and range from 15 to 300 acres in size. Except in partly filled flood channels and on short rises between levels of the stream valley, slopes are plane and smooth. The surface layer is fine sandy loam and loam. Both soils have the profiles described as representative of their respective series.

Included with this unit in mapping were small areas of Banks and Lohler soils. Banks soils commonly are

near the stream channel. Lohler soils are in the low areas and in old channel scars.

The soils in this unit are easy to work and take in water readily. Available water capacity is moderate or high. Runoff is slow. Most areas receive additional moisture in the form of runoff from adjacent uplands, and in some years the lower levels are subject to flooding. Flood damage usually is minor, and the additional moisture is beneficial. Controlling soil blowing and conserving moisture are the main concerns in farming.

Most areas are in native grass and are used for range and hay. The scattered native trees and shrubs along the channel in many areas provide protection for livestock and wildlife. Alfalfa, oats, and wheat are the main crops in cultivated areas. These soils have a potential for irrigation. Overflow range site; capability unit IIIe–7; windbreak group 1.

Tr—Trembles and Banks soils (0 to 2 percent slopes). Some areas of this mapping unit are mainly Trembles soil, some are mainly Banks soil, and some contain both soils. The irregularly shaped areas are on bottom land (fig. 16) and range from 20 to several hundred acres in size. Some areas are very slightly undulating or hummocky. The surface layer is fine sandy loam and loamy fine sand. The Banks soil has the profile described as representative of the series.

Included with this unit in mapping were small areas of Havrelon and Lohler soils. Havrelon soils are in the less sandy parts. Lohler soils are in low areas and flood channels. Included soils make up as much as 20 percent of some areas.

The soils in this unit take in water readily, but are low in fertility and blow easily. The Banks soil has low available water capacity and is droughty. Many areas receive additional moisture in the form of runoff from adjacent uplands, and the lower levels are subject to flooding from stream overflow. Flood damage usually is minor. Controlling soil blowing is the main concern of management.

Almost all areas are in native grass and are used for range. Scattered native trees and shrubs, growing singly or in clumps, provide protection for livestock and wildlife. Trembles soil in Overflow range site, capability unit IIIe–7, windbreak group 1; Banks soil in Sands range site, capability unit VIe–8, windbreak group 7.

Vebar Series

The Vebar series consists of moderately deep, well-drained, nearly level to hilly loamy soils on uplands. These soils formed in material weathered from the underlying soft sandstone. The native vegetation is mainly tall and mid grasses.

In a representative profile the surface layer is dark grayish-brown fine sandy loam about 7 inches thick. The subsoil, about 17 inches thick, is fine sandy loam that is grayish brown in the upper part and brown in the lower part. The upper part is slightly hard when dry and friable when moist. The underlying material to a depth of 32 inches is light-gray and light-brown loamy fine sand. Below this is light-gray soft sandstone.

Vebar soils are medium in fertility and are moderate in content of organic matter. Runoff is slow or medium,

Figure 16.—**An area of Trembles and Banks soils.**

and permeability is moderately rapid. Available water capacity is low.

Many areas are cultivated. Other areas are in native grass and are used for range.

Representative profile of Vebar fine sandy loam, 0 to 6 percent slopes, in cropland, 900 feet east and 1,050 feet south of the northwest corner of sec. 9, T. 17 N., R. 25 E.

Ap—0 to 7 inches, dark grayish-brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak, medium, subangular blocky structure parting to weak, fine and medium, granular; slightly hard, friable; many roots; slightly acid; abrupt, smooth boundary.

B2—7 to 18 inches, grayish-brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; upper 4 inches is very dark grayish brown (10YR 3/2) moist; weak, medium and coarse, prismatic structure parting to weak, fine and medium, subangular blocky; slightly hard, friable; common roots; slightly acid; clear, wavy boundary.

B3—18 to 24 inches, brown (10YR 5/3) fine sandy loam, dark grayish brown (10YR 4/2) moist; weak, coarse, prismatic structure parting to weak, fine, subangular blocky; slightly hard, very friable; common roots; slightly acid; gradual, wavy boundary.

C1—24 to 32 inches, about 60 percent light-gray (10YR 7/2) and 40 percent light-brown (7.5YR 6/3) loamy fine sand, light yellowish brown (2.5Y 6/3) and brown (7.5YR 5/3) moist; massive; soft, very friable; few roots; slightly acid; gradual, wavy boundary.

C2—32 to 60 inches, light-gray (10YR 7/2) soft sandstone, light yellowish brown (2.5Y 6/3) moist; many fragments of cemented brown sandstone; neutral.

Depth to bedded sandstone ranges from 20 to 40 inches. Scattered angular fragments of hard sandstone up to 24 inches in diameter commonly are on the surface and in places throughout the profile. The A horizon is dark grayish brown or grayish brown in hue of 10YR or 2.5Y. In some cultivated areas, the Ap horizon is loamy fine sand. The A horizon is 4 to 8 inches thick. The B2 horizon ranges from grayish brown to light yellowish brown in hue of 10YR or 2.5Y. In places the upper part of the B2 horizon when moist is very dark grayish brown or dark brown. The B2 horizon is 10 to 18 inches thick. The B3 horizon ranges from grayish brown to pale yellow in hue of 10YR or 2.5Y and is 6 to 9 inches thick. In places it is loamy fine sand. In places thin layers of cemented sandstone are in the upper part of the underlying soft sandstone.

Vebar soils are mapped with Flasher soils and are near Parshall, Reeder, and Tally soils. They are deeper over sandstone than Flasher soils. They are shallower over sandstone than Parshall and Tally soils. They are more sandy and contain less clay in the B horizon than Reeder soils.

VeB—Vebar fine sandy loam, 0 to 6 percent slopes. This soil is on uplands in irregularly shaped areas that range up to several hundred acres in size. It has the profile described as representative of the series.

Included with this soil in mapping were small areas of Flasher, Parshall, Reeder, and Tally soils. Flasher soils are on the tops and upper sides of some of the ridges. Parshall soils are in swales. Reeder and Tally soils are in the lower parts of some areas. These included soils make up 15 percent or less of any given area.

This Vebar soil is easy to work and takes in water readily, but it blows easily and has low available water capacity. Runoff is slow to medium. Controlling soil blowing and erosion is the main concern in farming.

Many areas are cultivated. Alfalfa, small grain, and corn are the main crops. Other areas are in native grass and are used for range. Sandy range site; capability unit IIIe–10; windbreak group 5.

VfB—Vebar-Flasher complex, 2 to 9 percent slopes. Vebar soils make up about 60 percent of this mapping unit and Flasher soils 40 percent. Areas are long and range from 10 to 300 acres in size. Slopes are convex and in small areas are 9 percent or more. Vebar soils are on the mid and lower parts of the landscape. Their surface layer is fine sandy loam. Flasher soils, on the higher parts of the landscape, have short convex slopes and have a surface layer of loamy fine sand.

Included with this unit in mapping were small areas of Parshall, Reeder, and Tally soils. Parshall soils are in swales. Reeder and Tally soils are on the lower parts of the landscape. Included soils commonly make up less than 5 percent of any given area.

The soils in this unit are easy to work and take in water readily, but they blow easily and are droughty. Runoff is medium. Controlling soil blowing and erosion is the main concern in farming. The Flasher soil is not suitable for cultivation.

Many areas are cultivated. Small grain and alfalfa are the main crops, but corn and tame grasses also are grown. Other areas are in native grass and are used for range. Vebar soil in Sandy range site, capability unit IVe–8, windbreak group 5; Flasher soil in Shallow range site, capability unit VIe–10, windbreak group 10.

Wayden Series

The Wayden series consists of shallow, excessively drained, rolling to steep, calcareous clayey soils on uplands. These soils formed in material weathered from the underlying soft shale. The native vegetation is mainly short and mid grasses.

In a representative profile the surface layer is grayish-brown silty clay about 5 inches thick. Next is a layer of grayish-brown clay about 6 inches thick. It is very hard when dry and friable when moist. The rest of the underlying material to a depth of 16 inches is light brownish-gray shaly clay. At a depth of 16 inches is light brownish-gray bedded soft shale. The entire profile, including the shale, is calcareous.

Wayden soils are low in fertility and in content of organic matter. Runoff is rapid, and permeability is slow. Available water capacity is very low.

Almost all areas are in native grass and are used for range.

Representative profile of Wayden silty clay in an area of Wayden-Moreau silty clays, 25 to 40 percent slopes, in native grass, 3,170 feet east and 2,090 feet north of the southwest corner of sec. 25, T. 13 N., R. 23 E.

A1—0 to 5 inches, grayish-brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak, very fine, granular structure; slightly hard, friable, sticky; many roots; slight effervescence; neutral; clear, smooth boundary.

C1—5 to 11 inches, grayish-brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; weak, medium, prismatic structure parting to weak, medium and fine, subangular blocky; very hard, friable, sticky; common roots; common fine fragments of shale; few fine segregations of lime; slight effervescence; mildly alkaline; clear, smooth boundary.

C2—11 to 16 inches, light brownish-gray (2.5Y 6/2) shaly clay, grayish brown (2.5Y 5/2) moist; weak, medium, prismatic structure; hard, friable, sticky; few roots; few fine segregations of lime; slight effervescence; mildly alkaline; gradual, smooth boundary.

C3—16 to 24 inches, light brownish-gray (2.5Y 6/2) bedded soft shale, grayish brown (2.5Y 5/2) moist; platy rock structure; hard, friable, sticky; few roots along fracture faces; common coatings of lime on faces of fractures; slight effervescence; moderately alkaline; gradual, smooth boundary.

C4—24 to 60 inches, light brownish-gray (2.5Y 6/2) bedded soft shale, grayish brown (2.5Y 5/2) moist; very hard, friable, sticky; slight effervescence; mildly alkaline.

Depth to soft shale or siltstone commonly is 10 to 16 inches, but ranges from 6 to 20 inches. The A horizon commonly is silty clay, but in places is clay loam or silty clay loam. It is 2 to 5 inches thick. The C horizon is clay loam or silty clay loam to clay or shaly clay. The average clay content is 35 to 50 percent.

Wayden soils are mapped with Moreau soils and are near Cabba, Regent, and Sansarc soils. They are more clayey than Cabba soils and are shallower over shale than Moreau and Regent soils. They are less clayey than Sansarc soils.

WaF—Wayden-Moreau silty clays, 25 to 40 percent slopes. This mapping unit is mainly in the upper part of rough broken land along streams and large drainageways. It is about 70 percent Wayden soil, 20 percent Moreau soil, and 10 percent other soil. Areas are irregular in shape and range from 20 to several hundred acres in size. Slopes are mostly convex. The Wayden soil is on the higher parts of the landscape. Moreau soils are on the mid and lower parts below Wayden soils. Each of these soils has the profile described as representative of the series.

Included with this unit in mapping were small areas of Opal, Regent, and Sansarc soils. Opal and Sansarc soils are on the lower sides of some of the entrenched drainageways. Regent soils are on the lower parts of some areas or are on wide ridgetops.

The soils in this unit take in water slowly and have very low or low available water capacity and rapid runoff. They erode easily and are too steep for cultivation.

All areas are in native grass and are used for range. Capability unit VIIs–2, windbreak group 10; Wayden soil in Shallow range site, Moreau soil in Clayey range site.

Use and Management of the Soils

The soils of Dewey County are used extensively for range and also crops, tame pasture, windbreaks, and wildlife. This section suggests how the soils can be managed for these purposes. It explains the capability grouping used by the Soil Conservation Service, describes the soils in each capability unit, and suggests management suited to the soils in each unit. This section lists predicted yields of the principal crops grown in the county under two levels of management. It also contains a section on engineering, which has information of value to engineers, planning commissions, and others.

Range [3]

Except for stringers of trees along streams and some of the drainageways, the native vegetation of Dewey County was grass. As the county was settled, some of the grassland was broken and farmed. Most areas selected for cultivation were gently sloping soils. Many areas in native grass are soils that are not suitable for cultivation because they are shallow and steep or have a restrictive claypan subsoil.

About 88 percent of the land area is in native grass and is used for range. This acreage is dominantly in the Opal-Sansarc-Promise, Sansarc-Dupree, Sansarc-Opal, and Wayden-Cabba associations.

If well managed, most of the range supports a good stand of grass. A considerable acreage is heavily grazed, which results in less than maximum returns. The range should be grazed at such intensity that the quality of the vegetation will be maintained or improved and the amount of plant residue will be sufficient to conserve soil and water. Range sites and range condition are means of appraising the present plant cover and comparing it with the potential for a specific soil.

A *range site* is a distinctive kind of range that differs from other kinds in its potential to produce native plants. In the absence of abnormal disturbance and physical site deterioration, a range site supports a plant community that differs from that of other range sites in kinds and proportion of plant species or in total annual yield. This natural plant community is referred to as *climax* vegetation or *climax* plant cover.

Range condition is the present state of vegetation on a range site as related to the climax plant cover for that site. It expresses the degree to which the present

[3] By THOMAS H. POZANSKY, range conservationist, Soil Conservation Service.

composition on a range site has departed from that of the climax cover.

Four range condition classes are recognized: excellent, good, fair, and poor. A range site is in *excellent* condition if 76 to 100 percent of the present composition is that of the climax plant cover for that site. It is in *good* condition if the percentage is 51 through 75, in *fair* condition if the percentage is 26 through 50, and in *poor* condition if the percentage is less than 26.

Decreasers are species in the climax plant community that decrease in abundance under continued excessive grazing use. *Increasers* are species in the climax plant community that usually increase in abundance under continued excessive grazing use. *Invaders,* which are not part of the climax plant community, invade the range site as a result of various kinds of disturbance.

The primary purpose in determining range condition is to provide a measure of changes that have occurred in the plant cover. This information, in turn, provides a basis in predicting changes to be expected in the plant community of a site under good management, including proper grazing use, deferred grazing, furrowing, pitting, range seeding, fencing, and locating water facilities.

Descriptions of range sites

The soils of Dewey County are grouped into 14 range sites, which are described in the following paragraphs. Each description lists important soil characteristics, principal plants, and estimates of annual air-dry forage yields on the site. On a site in excellent condition, grasses that provide the major source of forage for cattle make up 70 to 90 percent of the total annual yield.

Total yields of forage vary from year to year, depending on the amount of rainfall. In favorable years, or years of high rainfall, yields are above average. In unfavorable, or dry years, yields are below average.

To find the range site to which a given soil is assigned, refer to the Guide to Mapping Units. The boundaries of the site then can be determined from the soil map in the back of this soil survey.

SUBIRRIGATED RANGE SITE

In this site are deep, very poorly drained loamy soils along sluggish drainageways and in basins in the uplands. These soils have a surface layer of fine sandy loam over layers of loam, fine sandy loam, and loamy fine sand. The soil is sufficiently aerated for grasses, such as big bluestem, and has abundant moisture to produce luxuriant stands of tall and mid grasses. The water table is within a depth of 3 feet during much of the growing season.

If the site is in excellent condition, the main grasses are big bluestem, prairie cordgrass, switchgrass, and perennial forbs, such as sunflower. Western wheatgrass, inland saltgrass, and sedges are the main increasers and replace the taller grasses when the site is closely grazed. Foxtail barley and Kentucky bluegrass are the main invaders. Under continued close use, foxtail barley, Kentucky bluegrass, inland saltgrass, sedges, and annuals become dominant.

Mechanical measures, such as furrowing and pitting, are not feasible on this site.

On a site in excellent condition, the total annual air-dry yield per acre ranges from 3,500 pounds in an unfavorable year to 4,500 pounds in a favorable year.

OVERFLOW RANGE SITE

This site consists of deep, moderately well drained to well drained loamy and clayey soils on bottom land and low terraces. It receives additional moisture from the overflow of streams and drainageways and the runoff from adjacent sites. With the additional moisture, this site has the potential for producing dense stands of tall and mid grasses.

The climax plant cover is mainly big bluestem, western wheatgrass, and green needlegrass. Less important are switchgrass, side-oats grama, needleandthread, blue grama, buffalograss, and inland saltgrass. Under continued overuse, blue grama, buffalograss, Kentucky bluegrass, sageworts, and annuals become dominant.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 2,500 pounds in an unfavorable year to 3,700 pounds in a favorable year.

SALINE LOWLAND RANGE SITE

This site consists of deep, poorly drained loamy soils along drainageways and in basins in the uplands. The soils have a claypan subsoil and are high in salts. The fluctuating water table causes salts to accumulate within 10 inches of the surface.

The climax plant cover is mainly Nuttall alkaligrass, prairie cordgrass, and western wheatgrass and small amounts of inland saltgrass, sedges, and forbs. Under close grazing, western wheatgrass and inland saltgrass increase and replace the taller grasses. Under continued overuse, inland saltgrass, foxtail barley, annual saltbush, pursh seepweed, and annuals become dominant.

Mechanical measures, such as furrowing and pitting, are not feasible on this site.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 2,600 pounds in an unfavorable year to 3,500 pounds in a favorable year.

CLOSED DEPRESSION RANGE SITE

Heil soils, the only mapping unit in this site, are deep, poorly drained silty soils that have a claypan subsoil. They are in flat-bottomed depressions in the uplands. Runoff is ponded, and water remains on the surface until it evaporates. Early in the growing season the soil is wet or moist, but it is dry and droughty by late summer in most years.

The climax plant cover is mainly western wheatgrass. Small amounts of sedges, blue grama, and buffalograss are in some areas. Foxtail barley, smartweed, and annual weeds become dominant in areas that are in poor condition. Grazing the soils when they are wet encourages the increase of less desirable vegetation.

Mechanical measures, such as furrowing and pitting, are not feasible on this site.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 2,500 pounds in an unfavorable year to 3,400 pounds in a favorable year.

SANDS RANGE SITE

In this site are deep, somewhat excessively drained

sandy soils on low terraces and bottom land. These soils have a surface layer of loamy fine sand over loose fine sand and sand. Permeability is rapid.

The climax plant cover is mainly a mixture of tall warm-season grasses. Sand bluestem and big bluestem are dominant. Other warm-season decreasers are indiangrass and switchgrass. Cool-season grasses are not abundant, but there is some Canada wildrye and prairie junegrass. The principal increaser is prairie sandreed.

Under continuous overuse, the bluestems decrease and are replaced by prairie sandreed. If prairie sandreed is grazed too closely, bare areas become common and soil blowing is a serious hazard.

Mechanical measures, such as furrowing and pitting, are not feasible on this site.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 2,200 pounds in an unfavorable year to 3,200 pounds in a favorable year.

SANDY RANGE SITE

This site consists of deep and moderately deep, well-drained loamy soils on uplands. These soils have a surface layer and subsoil of fine sandy loam. They take in water readily, and most have moderately rapid permeability. Available water capacity is moderate or low.

The climax plant cover is little bluestem, prairie sandreed, big bluestem, western wheatgrass, switchgrass, needleandthread, and blue grama. If the site is overused, prairie sandreed, western wheatgrass, and needleandthread increase and replace the bluestem grasses. Under continued close use, these grasses decrease and are replaced by blue grama. Annual bromes, plantains, three-awn, and six-weeks fescue are invaders if the site is closely grazed.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 1,900 pounds in an unfavorable year to 3,000 pounds in a favorable year.

SILTY RANGE SITE

This site consists of deep and moderately deep, well-drained silty and loamy soils on uplands and terraces. These soils have a surface layer of loam, silt loam, or silty clay loam and a subsoil ranging from loam to silty clay loam. Permeability is moderate or moderately slow. Available water capacity is moderate or high in most soils. The soil-water-plant relationship is favorable.

The climax plant cover is mainly green needlegrass, western wheatgrass, and blue grama and lesser amounts of needleandthread (fig. 17). Little bluestem and leadplant amorpha also are in the plant community. Under close grazing use, side-oats grama and blue grama increase and replace the mid grasses. If overuse continues the less desirable species, such as sedges, three-awn, tumblegrass, curlycup gumweed, and fringed sagewort, invade.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 1,600 pounds in an unfavorable year to 2,800 pounds in a favorable year.

CLAYEY RANGE SITE

This site consists of deep and moderately deep loamy, silty, and clayey soils on uplands and terraces. These soils have a clayey subsoil that takes in water slowly and releases it slowly to plants. Available water capacity is low or moderate in most soils.

The climax plant cover is mainly western wheatgrass and green needlegrass. The understory is short grasses, mainly blue grama, along with lesser amounts of buffalograss and hairy grama. These short grasses increase under continuous overgrazing and replace the green needlegrass and western wheatgrass. Weeds and forbs also become prominent under continuous close grazing.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 1,500 pounds in an unfavorable year to 2,600 pounds in a favorable year.

THIN UPLAND RANGE SITE

This site consists of moderately deep, well-drained silty soils on uplands. These soils have a thin surface layer and commonly are calcareous at or near the surface. Permeability is moderate, and available water capacity is low. Runoff is medium to rapid.

The climax plant cover is chiefly needleandthread, plains muhly, and little bluestem and some western wheatgrass. Side-oats grama, blue grama, hairy grama, and threadleaf sedge are increasers that become dominant under continuous close grazing. Broom snakeweed, curlycup gumweed, sweetclover, and annuals invade.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 1,400 pounds in an unfavorable year to 2,400 pounds in a favorable year.

SHALLOW RANGE SITE

This site consists of shallow, well-drained to excessively drained silty, sandy, and clayey soils on uplands. Fertility is low, and available water capacity is very low or low. Runoff is rapid or very rapid on much of the acreage.

The climax plant cover is mainly little bluestem, prairie sandreed, plains muhly, western wheatgrass, and leadplant amorpha. Under close grazing these decreasers are replaced by increasers, such as side-oats grama, needleandthread, blue grama, and hairy grama. Under continuous close grazing, side-oats grama and needleandthread decrease but are replaced by the short grasses and threadleaf sedge. Invaders are annual bromes, broom snakeweed, and sweetclover.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 1,200 pounds in an unfavorable year to 1,900 pounds in a favorable year.

CLAYPAN RANGE SITE

This site consists of deep, well drained and moderately well drained loamy and silty soils that have a claypan subsoil. The surface layer is more than 4 inches thick over the claypan subsoil. The claypan subsoil takes in water slowly or very slowly and releases it very slowly to plants. Available water capacity is low or moderate.

The climax plant cover is mainly green needlegrass, needleandthread, and western wheatgrass. Under continuous overgrazing, increasers such as blue grama, hairy grama, pricklypear, and sedges replace the decreasers. Annual bromes, six-weeks fescue, plantains, and broom snakeweed are the main invaders.

If the site is in excellent condition, the total annual

Figure 17.—**Silty range site in excellent condition.**

air-dry yield per acre ranges from 1,300 pounds in an unfavorable year to 1,800 pounds in a favorable year.

DENSE CLAY RANGE SITE

This site consists of shallow and deep, moderately well drained and well drained clayey soils on uplands and terraces. These soils have a dense clay subsoil that restricts roots. Permeability is very slow, and available water capacity is very low or low.

The climax plant cover is mainly western wheatgrass. It also includes small amounts of green needlegrass and little or no understory of short grasses. Increasers in the plant community are mainly Sandberg bluegrass and sedges. Under continuous close grazing, the grass becomes sparse and invaders, such as sweetclover, broom snakeweed, pricklypear, and curlycup gumweed, become dominant.

If the site is in excellent condition, the total annual air-dry yield per acre ranges from 900 pounds in an unfavorable year to 1,800 pounds in a favorable year.

THIN CLAYPAN RANGE SITE

This site consists of deep and moderately deep, well drained and moderately well drained silty and loamy soils on terraces and uplands. These soils have a thin surface layer over a claypan subsoil that takes in water very slowly and restricts roots. Available water capacity ranges from very low to moderate.

The climax plant cover is mainly western wheatgrass and blue grama (fig. 18). Under continuous close grazing, it is replaced by pricklypear and annuals and bare areas are common.

Mechanical measures, such as pitting and furrowing, are not feasible on this site.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 700 pounds in an unfavorable year to 1,400 pounds in a favorable year.

VERY SHALLOW RANGE SITE

This site consists of well-drained to excessively drained soils that are very shallow over sand and gravel. Available water capacity is very low or low, and the site is droughty.

The climax plant cover is needleandthread, blue grama, hairy grama, and sedges and small amounts of bigtop dalea, skunkbush, and leadplant amorpha. Un-

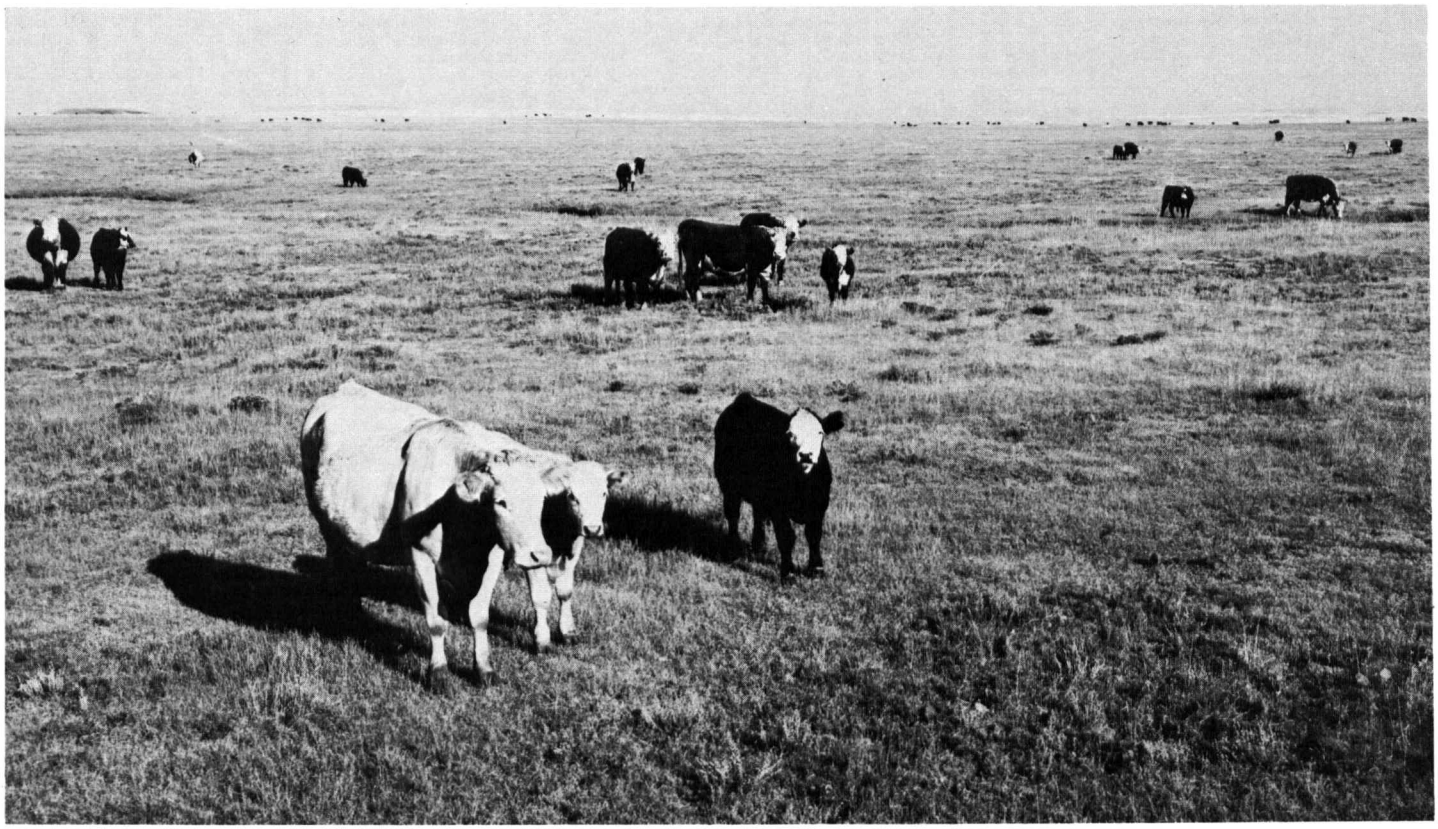

Figure 18.—Thin Claypan range site.

der continued close grazing, these grasses are replaced by annuals.

Mechanical measures are not feasible on this site, and the chance for success of range seeding is very poor.

If this site is in excellent condition, the total annual air-dry yield per acre ranges from 600 pounds in an unfavorable year to 1,200 pounds in a favorable year.

Crops [4]

About 12 percent of Dewey County is cropped. Most of this acreage is in the Belfield-Daglum, Morton-Reeder, Regent-Ridgeview, and Vebar-Flasher associations. Wheat, alfalfa, oats, and corn are the main crops.

The successful, long-term cultivation of any soil depends on managing that soil according to its capabilities for crops. Management needs are chiefly conserving moisture, controlling erosion and soil blowing, and maintaining the levels of organic matter, fertility, and tilth.

Basic to meeting these needs is a suitable cropping system. Some soils can be used for a single crop for many years. Others deteriorate rapidly under such use. A cropping system based on soil properties maintains tilth; reduces insect, disease, and weed infestations; helps control erosion and blowing; and usually conserves moisture and maintains fertility.

Conserving moisture generally means evenly distributing snow cover, reducing evaporation, limiting runoff, and controlling weeds. Among the effective measures are minimum tillage, stubble mulching, crop residue management, wind stripcropping, field windbreaks, contour farming, terracing, and timely tillage. These measures also help in controlling erosion and soil blowing. Grassed waterways and diversions are additional erosion control measures, and emergency tillage is effective in controlling soil blowing. A combination of such measures usually is needed.

Effective in maintaining soil tilth are stubble mulching, crop residue management, minimum tillage, timely tillage, green manure crops, and grasses and legumes in the cropping system. These measures and applying animal manures and chemical fertilizers improve fertility. The level of fertility also depends on controlling erosion and soil blowing.

Improved drainage is needed on a few soils in the county that commonly are too wet for farming early in the growing season. Reducing the runoff from nearby soils is essential if these soils are to be cropped.

Capability grouping

Capability grouping shows, in a general way, the suitability of soils for most kinds of field crops. The grouping is based on limitations of the soils when used for field crops, the risk of damage when they are used,

[4] By PAUL M. BODEN, conservation agronomist, Soil Conservation Service.

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 horticultural or other crops requiring special management.

Those familar 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 soils for range, for windbreaks, or for engineering.

In the capability system, all kinds of soil are grouped at three levels, the capability class, the subclass, and the unit. These levels are described 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 Dewey County.)

Class II soils have moderate limitations that reduce the choice of plants or 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. (None in Dewey County.)

Class VI soils have severe limitations that make them generally unsuitable for cultivation and limit their use largely to pasture or range, woodland, and wildlife.

Class VII soils have very severe limitations that make them unsuitable for cultivation and that restrict their use largely to pasture or range, woodland, or wildlife.

Class VIII soils and landforms have limitations that preclude their use for commercial crop production and restrict their use to recreation, wildlife, or water supply, or to esthetic uses.

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 only some parts of the United States, shows that the chief limitation is climate that is too cold or too dry.

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 (*7*). 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–1 or IIIs–3. 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; and the Arabic numeral specifically identifies the capability unit within each subclass.

Capability units

In the following pages each of the capability units in Dewey County is described, and the use and management of the soils in each unit is suggested. The capability units within a capability subclass are not numbered consecutively because not all of the units in the statewide system are used in this county.

Not all the soils in a given soil series are in the same unit. Also, a soil that is a part of a soil complex can be assigned to a different capability unit from the one designated for it when mapped alone. Ordinarily, a complex of soils is treated as a whole in crop management. The capability classification of each soil in Dewey County is given in 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, silty and loamy soils on uplands and terraces. Slopes are mostly gently sloping, but some are nearly level. In most soils the subsoil ranges from loam to silty clay loam, but in some it is silty clay or clay.

These soils are medium in fertility. Most have good tilth and are easy to work. Permeability is moderate in most of the soils, but is moderately slow or slow in some. Available water capacity is dominantly moderate or high. Runoff is medium. Controlling water erosion and soil blowing is the main concern in management. Maintaining fertility and tilth and conserving moisture are also important.

These soils are well suited to all crops commonly grown in the county. Wheat, alfalfa, corn, and oats are the main crops. Some areas are in native grass and are used as range.

Stubble mulching or crop residue management along with minimum tillage help control erosion and soil blowing and conserve moisture. Contour farming and terraces also help control erosion and ordinarily are needed if row crops are in the cropping system. Wind stripcropping and field windbreaks help control soil blowing. Grassed waterways help prevent the forming of gullies.

CAPABILITY UNIT IIc–1

This unit consists of deep, moderately well drained and well drained, nearly level, calcareous loamy and clayey soils on bottom land and low terraces. The underlying material ranges from loam to clay and in most soils is thinly stratified with sand.

These soils are low in fertility and have moderate or high available water capacity. Permeability is moderate to slow, and runoff is slow. These soils commonly receive additional moisture in the form of runoff from nearby upland soils or from overflow, but in dry years crops lack adequate moisture. Conserving moisture is

the main concern in management. Maintaining fertility and tilth also are important.

Most of the acreage is in native vegetation and is used for range. The soils are well suited to cultivated crops and tame grasses. Alfalfa and oats are the main crops.

Crop residue management or stubble mulching conserves moisture and improves fertility and tilth. Timely tillage improves tilth on the clayey soils. Diversions that carry excess runoff from nearby upland soils are desirable in some areas.

CAPABILITY UNIT IIc–2

This unit consists of deep and moderately deep, well-drained, nearly level loamy and silty soils on uplands and terraces. In most soils the subsoil ranges from loam to silty clay loam, but in some it is silty clay or clay.

These soils are medium in fertility. Most have good tilth and are easy to work. Permeability is moderate in most soils, but is moderately slow or slow in some. Available water capacity is dominantly moderate or high. Runoff is slow, and the hazards of erosion and soil blowing are slight. Conserving moisture is the main concern in management. Controlling soil blowing and maintaining fertility and tilth also are important.

These soils are well suited to all crops commonly grown in the county. Wheat, alfalfa, corn, and oats are the main crops. Some areas are in native grass and are used for range.

Stubble mulching or crop residue management, minimum tillage, and grasses and legumes in the cropping system are the chief management needs. Wind stripcropping and field windbreaks are needed on the larger acreages where there is some risk of soil blowing.

CAPABILITY UNIT IIIe–1

This unit consists of moderately deep, well-drained, sloping and undulating silty and loamy soils on uplands. The subsoil ranges from loam to silty clay and is underlain by soft sandstone, siltstone, or shale at moderate depths. Also in this unit are clayey soils and calcareous silty soils. In cultivated areas the soils commonly are slightly to moderately eroded.

The dominant soils are easy to work and are medium in fertility. Permeability is moderate in most soils, but is slow in some. Available water capacity is moderate or low, and runoff is medium. Controlling erosion is the main concern in cultivated areas. Controlling soil blowing, conserving moisture, and maintaining fertility and tilth also are management needs.

Many areas are in native grass and are used for range. The soils are well suited to most crops if erosion is controlled. Small grain and alfalfa are the main crops.

Stubble mulching, crop residue management, contour farming, and terraces help control erosion and soil blowing and conserve moisture. On slopes that are too short and irregular for contour farming and terraces, close-sown crops alternated with grasses and legumes in the cropping system help in controlling erosion. Grassed waterways help prevent the forming of gullies.

CAPABILITY UNIT IIIe–3

Belfield-Reeder loams, 2 to 6 percent slopes, are the only soils in this unit. The dominant Belfield soil has a subsoil of clay loam and silty clay, and the Reeder soil has a subsoil of loam. Part of the cultivated acreage is slightly eroded.

These soils are medium in fertility, but the clayey subsoil of the Belfield soil takes in water slowly and releases it slowly to plants. Available water capacity is moderate in the Belfield soil, but is low or moderate in the Reeder soil. Runoff is medium. Controlling erosion and improving water intake in the Belfield soil are the main concerns in cultivated areas. Controlling soil blowing, conserving moisture, and maintaining fertility and tilth are also important.

Many areas are cultivated. Wheat, other small grain, and alfalfa are the main crops. Some areas are in native grass and are used for range.

Stubble mulching or crop residue management along with contour farming and terraces help control erosion and soil blowing and conserve moisture. Wind stripcropping and field windbreaks also help control soil blowing and conserve moisture. Chiseling or subsoiling and grasses and legumes in the cropping system improve water intake, tilth, and fertility.

CAPABILITY UNIT IIIe–4

This unit consists of moderately deep and deep, well-drained clayey soils on uplands. The long, smooth slopes are mostly gentle, but some are sloping. Cultivated acreages are slightly or moderately eroded.

These soils are medium in fertility, but have poor tilth and are difficult to work. Permeability is very slow or slow, and the clayey subsoil releases moisture slowly to plants. Available water capacity is moderate to very low. Runoff is medium. Controlling erosion and soil blowing and improving water intake and tilth are the main concerns of management in cultivated areas.

Many areas are in native grass and are used for range. Wheat and alfalfa are the main crops in cultivated areas.

Stubble mulching or crop residue management along with terraces and contour farming help control erosion and soil blowing. Wind stripcropping helps control soil blowing on large acreages that are farmed. Timely tillage, minimum tillage, chiseling or subsoiling, and grasses and legumes in the cropping system improve tilth and water intake. Grassed waterways help prevent the forming of gullies.

CAPABILITY UNIT IIIe–7

This unit consists of deep, well-drained, nearly level loamy soils on bottom land, terraces, and uplands. The surface layer and subsoil are fine sandy loam.

These soils are easy to work, but are subject to blowing. Most are medium in fertility and have moderate available water capacity. Permeability is slow in the claypan soils but moderately rapid in the rest. Runoff is slow. Controlling soil blowing is the main concern in cultivated areas. Conserving moisture and maintaining or improving fertility, tilth, and content of organic matter also are important.

Many areas are in native grass and are used for range and hay. Small grain, alfalfa, and corn are the main crops in cultivated areas. Spring-sown small grain is better suited than winter wheat because of the soil blowing hazard.

Stubble mulching, crop residue management, wind stripcropping, field windbreaks, and minimum tillage help control soil blowing and conserve moisture. Green manure crops and grasses and legumes in the cropping system improve fertility and content of organic matter.

CAPABILITY UNIT IIIe-10

Vebar fine sandy loam, 0 to 6 percent slopes, is the only soil in this unit. This moderately deep, well-drained, nearly level to gently undulating soil has a surface layer and subsoil of fine sandy loam. It is underlain by soft sandstone.

This soil is easy to work, but it blows easily and is droughty. Permeability is moderately rapid, and runoff is slow to medium. Controlling soil blowing and erosion is the main concern if this soil is farmed. Conserving moisture and maintaining fertility and the content of organic matter are also important.

Many areas are cultivated. Small grain, alfalfa, and corn are the main crops. Spring-sown small grain is better suited than winter wheat because of the soil blowing hazard. Some areas are in native grass and are used for range.

Stubble mulching, crop residue management, wind stripcropping, field windbreaks, and minimum tillage help control soil blowing and erosion. Contour stripcropping and terraces also help control erosion and conserve moisture. Grasses and legumes in the cropping system improve fertility and the content of organic matter.

CAPABILITY UNIT IIIs-1

This unit consists mainly of deep, well-drained, nearly level loamy soils on uplands. These soils have a subsoil of clay loam and silty clay. Also in this unit if mapped with these soils is a soil that has a claypan subsoil and a soil that has a loam subsoil.

These soils are medium in fertility, but the clayey subsoil of the dominant soils takes in water slowly and releases it slowly to plants. Available water capacity is dominantly moderate. Runoff is slow. Improving water intake and conserving moisture are the main concerns if these soils are farmed. Controlling soil blowing and maintaining fertility and tilth are other management needs.

Many areas are cultivated. Wheat, other small grain, and alfalfa are the main crops. Some areas are in native grass and are used for range and hay.

Stubble mulching, crop residue management, chiseling or subsoiling, and grasses and legumes in the cropping system improve water intake, fertility, and tilth and conserve moisture. Wind stripcropping and field windbreaks help control soil blowing.

CAPABILITY UNIT IIIs-2

Canning loam, 0 to 2 percent slopes, the only soil in this unit, has a subsoil of clay loam. The depth to sand and gravel ranges from 20 to 40 inches.

This soil is medium in fertility and is easy to work, but it is somewhat droughty. Permeability is moderate in the subsoil and rapid in the underlying sand and gravel. Runoff is slow. Conserving moisture and controlling blowing are the main concerns if these soils are farmed.

Small grain, corn, and alfalfa are the main crops. Small grain is better suited than corn. About half the acreage is in native grass and is used for range and hay.

Stubble mulching, crop residue management, minimum tillage, and wind stripcropping are the chief management needs.

CAPABILITY UNIT IIIs-3

This unit consists of moderately deep and deep, well-drained clayey soils on uplands and terraces. Most of these soils are nearly level. Some are gently sloping.

These soils are medium in fertility, but have poor tilth and are difficult to work. Permeability is very slow, and the clayey subsoil releases moisture slowly to plants. Available water capacity is moderate to very low. Runoff is slow or medium. The soils dry slowly in spring. Improving tilth and water intake, controlling soil blowing, and conserving moisture are the major concerns in management.

Some areas are in native grass and are used for range and hay. Others are cultivated. Wheat, other small grain, and alfalfa are the main crops.

Stubble mulching, crop residue management, wind stripcropping, grasses and legumes in the cropping system, chiseling or subsoiling, timely tillage, and minimum tillage improve tilth and water intake, control soil blowing, and conserve moisture.

CAPABILITY UNIT IVe-7

Belfield-Reeder loams, 6 to 9 percent slopes, are the only soils in this unit. The dominant Belfield soil has a subsoil of clay loam and silty clay, and the Reeder soil has a subsoil of loam. In cultivated areas the soils are slightly to moderately eroded.

These soils are medium in fertility, but the clayey subsoil of the Belfield soil takes in water slowly and releases it slowly to plants. Available water capacity is moderate in the Belfield soil. Runoff is medium. Controlling erosion and improving water intake are the main concerns if these soils are farmed. Controlling soil blowing, conserving moisture, and maintaining fertility and tilth are also important.

Small grain and alfalfa are the main crops. Many areas are in native grass and are used for range.

Stubble mulching, crop residue management, contour farming, terraces, chiseling or subsoiling, and grasses and legumes in the cropping system are the chief management needs. Grassed waterways prevent the forming of gullies.

CAPABILITY UNIT IVe-8

The Vebar part of Vebar-Flasher complex, 2 to 9 percent slopes, the only soil in this unit, is moderately deep, well drained, and gently undulating to undulating. It has a surface layer and subsoil of fine sandy loam and is underlain by soft sandstone. In cultivated areas it is commonly slightly to moderately eroded.

This soil is easy to work, but it blows easily and is droughty. Permeability is moderately rapid, and runoff is medium. Controlling soil blowing and erosion is the main concern if this soil is farmed. Conserving moisture and maintaining fertility and content of organic matter are also important.

Stubble mulching, crop residue management, wind stripcropping, field windbreaks, minimum tillage, and close-sown crops help in controlling soil blowing and

erosion. Grasses and legumes in the cropping system improve fertility and the content of organic matter.

CAPABILITY UNIT IVe–13

Ekalaka fine sandy loam, 0 to 6 percent slopes, the only soil in this unit, is deep, well drained, and nearly level to gently sloping. This soil is on uplands. It has a thick surface layer of fine sandy loam and a claypan subsoil.

This soil is medium in fertility and is easy to work, but it blows easily. It takes in water readily until the surface layer is saturated, but is slowly permeable in the subsoil. Available water capacity is moderate or low. Runoff is slow. Control of soil blowing is the main concern if this soil is farmed. Improving water intake in the subsoil also is important.

Spring wheat, oats, and alfalfa are the main crops; some areas are in native grass and are used for range.

Stubble mulching, crop residue management, wind stripcropping, field windbreaks, and minimum tillage help control soil blowing. Use of legumes in the cropping system improves water intake in the claypan subsoil.

CAPABILITY UNIT IVs–2

Daglum silt loam, 0 to 2 percent slopes, is the only soil in this unit. This deep, moderately well drained, nearly level soil has a thin surface layer of silt loam and a claypan subsoil.

This soil has poor tilth and takes in water very slowly. The claypan subsoil restricts roots. Available water capacity is low or moderate. Runoff is slow. Improving tilth and water intake and conserving moisture are the main concerns if this soil is farmed. Control of soil blowing also is important.

Small grain and alfalfa are the main crops in cultivated areas. Small grain is better suited to this soil than corn. Many areas are in native grass and are used for range.

Stubble mulching, crop residue management, chiseling or subsoiling, timely tillage, and grasses and legumes in the cropping system improve soil tilth and water intake and conserve moisture. Wind stripcropping helps control soil blowing.

CAPABILITY UNIT VIe–3

The Lantry part of Lantry-Morton silt loams, 6 to 15 percent slopes, is the only soil in this unit. It is a moderately deep, well-drained, sloping to strongly sloping silty soil that has a thin surface layer.

This soil is not suitable for cultivation. It is low in fertility and in available water capacity. Permeability is moderate, and runoff is medium to rapid. The erosion hazard is very severe.

Many areas are in native grass and are used for range, but some are cultivated. Small grain and alfalfa are the main crops. Proper range use is essential in controlling erosion and conserving moisture. Cultivated areas should be seeded to native grass.

CAPABILITY UNIT VIe–4

This unit consists mainly of moderately deep, well-drained, sloping to strongly sloping clayey soils on uplands and shallow clayey soils that are mapped with these soils.

These soils are not suitable for cultivation. Available water capacity is low or very low. Permeability is slow or very slow. Runoff is medium to rapid, and the hazard of erosion is severe.

Most areas are in native grass and are used for range. Proper range use is essential in controlling erosion. Cultivated areas should be seeded to native grass.

CAPABILITY UNIT VIe–6

Ekalaka fine sandy loam, 6 to 9 percent slopes, is the only soil in this unit. This deep, well-drained, sloping to undulating soil has a claypan subsoil.

This soil is not suitable for cultivation. It is easy to work, but is highly susceptible to soil blowing and is subject to water erosion if it is cultivated. The claypan subsoil takes in water slowly and releases it slowly to plants. Runoff is medium.

Most areas are in native grass and are used for range. Proper range use is essential in controlling soil blowing and erosion. Cultivated areas should be seeded to native grass.

CAPABILITY UNIT VIe–8

This unit consists of deep, somewhat excessively drained, nearly level sandy soils on low terraces and bottom land.

These soils are low in fertility and content of organic matter and are droughty. They are highly susceptible to soil blowing and are not suitable for cultivation. Permeability is rapid, and runoff is slow.

Almost all areas are in native grass and are used for range. Scattered native trees and shrubs provide winter protection for livestock and wildlife. Proper range use is essential in controlling soil blowing.

CAPABILITY UNIT VIe–9

The Archin part of Archin-Slickspots complex, 2 to 9 percent slopes, is the only soil in this unit. It is a deep, well-drained, gently sloping to sloping soil that has a surface layer of fine sandy loam and a claypan subsoil.

This soil is not suitable for cultivation. It is low in fertility and is subject to soil blowing and erosion. The claypan subsoil takes in water slowly and releases it slowly to plants. Runoff is slow to medium.

Almost all areas are in native grass and are used for range. Proper range use is essential in controlling soil blowing and erosion.

CAPABILITY UNIT VIe–10

This unit consists of shallow, somewhat excessively drained, gently undulating to rolling sandy soils on uplands. These soils are underlain by soft sandstone. Also in this unit are moderately deep loamy soils that are mapped with the shallow sandy soils.

The shallow soils are low in fertility and in content of organic matter and are highly susceptible to soil blowing. Available water capacity is very low. Permeability is rapid, and runoff is slow to medium. These soils are not suitable for cultivation.

Most areas are in native grass and are used for range. Proper range use is essential in controlling soil blowing. Cultivated areas should be seeded to native grass.

CAPABILITY UNIT VIw–1

This unit consists of deep, nearly level to gently

sloping clayey and claypan soils along creeks and drainageways and in upland swales. Areas are long and narrow and are dissected by vertical-walled channels.

These soils are subject to flooding in some years. Cultivation is not practical because channels have cut most areas into small parcels. Streambank erosion is a hazard in some areas.

Most areas are in native grass and are used for range. Some small grain and alfalfa are grown, but fields are very small and irregularly shaped. These soils are best suited to range and wildlife.

CAPABILITY UNIT VIw–4

This unit consists of deep, poorly drained and very poorly drained, nearly level soils. These soils have a surface layer of fine sandy loam and a subsoil of fine sandy loam or sandy clay loam.

The soils in this unit have a high water table and are too wet for cultivation. They also contain salts, and some have a claypan subsoil.

Most areas are in native vegetation and are used for range. Proper range use is essential in maintaining a stand of grass that is suitable for grazing.

CAPABILITY UNIT VIs–1

This unit consists of deep and moderately deep, well drained to poorly drained, level to sloping silty and loamy soils that have a claypan subsoil. Most of these soils have a thin surface layer.

These soils are not suitable for cultivation. They have poor tilth and are low in fertility. The claypan subsoil takes in water very slowly and severely restricts roots. Available water capacity ranges from very low to moderate.

Almost all areas are in native grass and are used for range. Proper range use is essential in maintaining an adequate grass cover for control of soil blowing and erosion.

CAPABILITY UNIT VIs–3

This unit consists mainly of shallow, well-drained, gently sloping to strongly sloping clayey soils. Shale is within a depth of 20 inches. Also in this unit are moderately deep clayey soils that are mapped with the shallow soils.

The dominant shallow soils are low in fertility and have very low available water capacity. The soils are not suitable for cultivation. In disturbed areas they are subject to erosion. Permeability is slow or very slow, and runoff is rapid.

Almost all areas are in native grass and are used for range. Proper range use is essential in conserving moisture and controlling erosion.

CAPABILITY UNIT VIs–4

Schamber gravelly sandy loam, 3 to 15 percent slopes, is the only soil in this unit. It is a well-drained to excessively drained, gently undulating to rolling soil that is very shallow over sand and gravel.

This soil is too droughty for cultivation. It is low in fertility and content of organic matter. Available water capacity is very low or low. Permeability is rapid, and runoff is slow to medium. In disturbed areas the soil blows easily.

All areas are in native grass and are used for range. Proper range use is essential in conserving moisture and controlling soil blowing.

CAPABILITY UNIT VIs–5

This unit consists of shallow and deep, well drained and moderately well drained clayey soils on uplands and terraces. These soils have a thin surface layer and a dense clay subsoil that is extremely hard when dry. Accumulations of salts commonly are within a depth of 10 inches.

These soils are not suitable for cultivation. They have very poor tilth and are low in fertility. Permeability is very slow, and the dense clay subsoil restricts roots. Runoff is medium or rapid.

All areas are in native grass and are used for range.

CAPABILITY UNIT VIIe–4

This unit consists mainly of shallow, somewhat excessively drained, hilly to steep sandy soils on uplands. These soils are underlain by soft sandstone. Also in this unit are moderately deep loamy soils that are mapped with the shallow sandy soils.

These soils are not suitable for cultivation. The dominant shallow soils are low in fertility and in content of organic matter. Permeability is rapid, and available water capacity is very low. The hazards of soil blowing and erosion are severe.

All areas are in native grass and are used for range. Proper range use is essential in controlling soil blowing and erosion.

CAPABILITY UNIT VIIs–1

This unit consists mainly of shallow, somewhat excessively drained, moderately steep to steep silty soils on uplands. Soft sandstone or siltstone is within a depth of 20 inches. Also in this unit are moderately deep silty soils that are mapped with the shallow soils.

These soils are not suitable for cultivation. They are low in fertility and have low or very low available water capacity. Runoff is rapid.

All areas are in native grass and are used for range. Proper range use is essential in conserving moisture and controlling erosion.

CAPABILITY UNIT VIIs–2

This unit consists mainly of shallow, well-drained and excessively drained, strongly sloping to very steep clayey soils on uplands. Shale is within a depth of 20 inches. Also in this unit are moderately deep clayey soils that are mapped with these shallow soils.

These soils are not suitable for cultivation. The shallow soils are low in fertility and have very low available water capacity. Runoff is rapid, and the erosion hazard is very severe.

All areas are in native grass and are used for range. Proper range use is essential in conserving moisture and controlling erosion.

CAPABILITY UNIT VIIs–4

The soils in Schamber-Sansarc complex, 15 to 40 percent slopes, are the only soils in this unit. The dominant Schamber soils are well drained to excessively drained, hilly to steep soils that are very shallow over sand and gravel. The shallow Sansarc soil is in this unit only where mapped with the Schamber soils.

These soils are not suitable for cultivation. They are low in fertility and have very low or low available water capacity. In disturbed areas they are subject to soil blowing and erosion.

All areas are in native grass and are used for range. Proper range use is essential in conserving moisture and controlling soil blowing and erosion.

CAPABILITY UNIT VIIIw–1

Intermittent lakes, which are shallow lakes that fill with runoff in spring and early in summer but commonly dry up during part of the year, are the only mapped areas in this unit.

A narrow ring of tall grasses grows at the edge of the lakes, but most of the lake bottom is bare or nearly bare when dry. Aquatic species suitable for wildlife grow during wet years. This unit is best suited to wildlife.

CAPABILITY UNIT VIIIs–2

This unit consists of Mine pits and dumps and Shale land. Mine pits and dumps are excavations and spoil banks of strip mines. Shale land is mainly outcrops of shale intermingled with shaly clay soils that are less than 6 inches deep over bedded shale. Slopes generally are short, but range from gently sloping to very steep.

Runoff is rapid, but water collects in excavations in the Mine pits and dumps. Most areas support little or no vegetation and are of little value for grazing domestic livestock. This unit is best suited to wildlife.

CAPABILITY UNIT VIIIs–3

This unit consists of Slickspots mapped with several soils in the county. The surface layer commonly is clay or silty clay, and accumulations of salts are at or near the surface.

Slickspots support little or no vegetation and have little value for grazing domestic livestock. Some spots provide small amounts of browse for wildlife.

Predicted yields

Table 2 lists, for each soil in the county suitable for crops, the predicted average yields per acre of corn, winter wheat, spring wheat, oats, and alfalfa. The predictions are for dryfarmed crops under two levels of management.

Figures in columns A are yields that can be expected under the management customarily practiced in the county. Under this management, the cropping system is 1 year of wheat followed by a year of summer fallow or corn; some legumes or tame grasses are grown, but not in regular sequence; crop residue is returned to the soil, but not in adequate amounts to control erosion and soil blowing; weeds are only partly controlled; fallow fields commonly are bare in summer; and chemical fertilizer, animal manure, and green manure crops are not systematically used.

Figures in columns B represent yields that can be expected under improved management. Under improved management, the cropping system selected is the one best suited to the soils in a given field; erosion and soil blowing are controlled and moisture is conserved; high-quality seeds of adapted crop varieties are planted; tillage is timely; weeds are controlled; and chemical fertilizer is applied in amounts indicated by soil tests and field trials.

Tame Pasture [5]

Tame pasture is only about 1 percent of the land area in the county, but it is important to the livestock industry. It supplements the grazing provided by native range.

Sustained high production from tame pasture depends on management that maintains a vigorous stand of adapted plants. Proper pasture use, maintenance of fertility, and control of weeds are essential in maintaining a vigorous stand of pasture plants.

Grazing should be delayed until the pasture plants attain a good growth. The pasture should never be grazed excessively close. Additional management needs are rotation grazing, grazing during the season of optimum growth, periodic resting of the pasture, and clipping to encourage uniform grazing.

Tame pasture requires a fertility level adequate to obtain optimum yields. Use of legumes in the pasture mixture and of chemical fertilizer maintains an adequate fertility level. Controlling weeds by clipping or by spraying conserves the amount of moisture available for desirable pasture plants.

In the following paragraphs, the pasture suitability groups in Dewey County are described. Pasture groups are designated only for the soils suitable for tame pasture. They are not designated by consecutive letters of the alphabet because not all of the groups in the statewide system are used in the county. To find the pasture group of a given soil, turn to the "Guide to Mapping Units."

PASTURE GROUP B

Heil soils, the only mapping unit in this group, are deep, poorly drained soils in depressions in uplands. These soils have a thin surface layer of silt loam and a claypan subsoil of clay. Runoff ponds, and water remains on the surface until it evaporates. The choice of pasture plants is limited because of wetness early in the growing season and dryness late in summer.

Western wheatgrass is the only grass suitable for pasture seeding on these soils.

PASTURE GROUP C

This group consists of deep, moderately well drained, nearly level to gently sloping soils that have a claypan subsoil. These soils have a surface layer of silt loam and a subsoil of silty clay. The lower part of the subsoil and the underlying material commonly are high in salts. Runoff is slow to medium, and permeability is very slow. The dense claypan restricts roots and affects the choice of plants and forage yields.

Suitable pasture plants are alfalfa, crested wheatgrass, green needlegrass, intermediate wheatgrass, pubescent wheatgrass, and western wheatgrass.

PASTURE GROUP D

Canning loam, 0 to 2 percent slopes, the only soil in this group, is a well-drained, nearly level loamy soil that is moderately deep over gravel and sand. Fertility is medium. Available water capacity is low or moderate. The choice of plants and yields of forage are limited by droughtiness.

Suitable pasture plants are alfalfa, crested wheat-

[5] By PAUL M. BODEN, conservation agronomist, Soil Conservation Service.

TABLE 2.—*Predicted average yields per acre of principal dryfarmed crops*

[Figures in columns A are the yields to be expected under average prevailing management; those in columns B can be expected under improved management. Only soils suitable for crops are listed. Absence of a figure indicates the crop is not commonly grown on the soil or the soil is not suitable for that crop. Yields for soil complexes are based on the weighted average yields of the soil in that complex]

Soil	Corn		Winter wheat		Spring wheat		Oats		Alfalfa	
	A	B	A	B	A	B	A	B	A	B
	Bu	*Bu*	*Bu*	*Bu*	*Bu*	*Bu*	*Bu*	*Bu*	*Tons*	*Tons*
Agar silt loam, 2 to 6 percent slopes	29	35	24	31	20	25	38	48	1.2	1.7
Belfield-Daglum silt loams, 0 to 2 percent slopes	16	21	18	25	16	22	28	35	.8	1.3
Belfield-Reeder loams, 0 to 2 percent slopes	22	27	20	26	18	24	32	42	1.0	1.5
Belfield-Reeder loams, 2 to 6 percent slopes	21	26	19	24	17	23	31	40	1.0	1.4
Belfield-Reeder loams, 6 to 9 percent slopes			17	22	14	19	27	35	.9	1.3
Canning loam, 0 to 2 percent slopes	23	29	21	31	15	20	34	42	.9	1.2
Daglum silt loam, 0 to 2 percent slopes			17	20	13	17	23	31	.6	.8
Dupree-Opal clays, 2 to 9 percent slopes			14	17	10	13	17	21	.5	.7
Ekalaka fine sandy loam, 0 to 6 percent slopes			18	22	13	18	29	34	.9	1.3
Farland silt loam, 0 to 2 percent slopes	28	34	24	33	21	28	39	48	1.2	1.8
Farland silt loam, 2 to 6 percent slopes	26	33	22	30	20	25	37	46	1.1	1.7
Lantry-Morton silt loams, 6 to 15 percent slopes			17	22	14	18	24	32	.7	1.0
Lohler silty clay	28	34	26	33	20	25	38	47	1.4	2.0
Lohler and Havrelon soils	29	35	25	32	19	25	38	47	1.3	1.9
Lowry silt loam, 0 to 2 percent slopes	28	35	23	33	17	22	38	48	1.2	1.8
Lowry silt loam, 2 to 6 percent slopes	26	33	22	31	16	21	36	45	1.1	1.7
Morton silt loam, 2 to 6 percent slopes	26	32	23	29	20	25	34	46	1.1	1.7
Morton-Belfield complex, 0 to 2 percent slopes	24	30	24	30	21	26	34	45	1.1	1.6
Morton-Belfield complex, 2 to 6 percent slopes	23	29	22	28	19	25	32	43	1.0	1.6
Morton-Farland silt loams, 0 to 2 percent slopes	28	34	24	32	22	28	37	47	1.2	1.7
Morton-Lantry silt loams, 2 to 9 percent slopes	20	25	20	27	17	22	29	39	.9	1.2
Opal clay, 2 to 9 percent slopes	16	21	21	27	13	19	26	36	.9	1.3
Opal-Hurley complex, 0 to 9 percent slopes			16	20	13	16	22	27	.7	1.1
Opal-Promise clays, 1 to 4 percent slopes	19	25	24	31	16	20	30	39	1.0	1.4
Opal-Slickspots complex, 2 to 6 percent slopes			14	17	11	14	18	22	.6	.8
Parshall fine sandy loam	28	35	22	31	18	23	32	42	1.3	1.9
Parshall-Ekalaka fine sandy loams	24	30	21	29	16	21	30	39	1.2	1.7
Promise clay, 0 to 2 percent slopes	20	28	27	36	18	24	36	48	1.1	1.5
Promise clay, 2 to 6 percent slopes	19	26	24	32	17	23	35	46	1.0	1.5
Promise-Slickspots complex, 0 to 2 percent slopes			15	19	12	15	20	25	.7	.9
Reeder loam, 0 to 2 percent slopes	28	33	23	29	22	28	37	46	1.2	1.7
Reeder loam, 2 to 6 percent slopes	27	32	22	27	21	26	36	45	1.1	1.6
Reeder loam, 6 to 9 percent slopes			19	23	18	22	30	40	1.0	1.5
Regent silty clay loam, 6 to 9 percent slopes	19	25	19	25	16	22	28	35	.9	1.4
Regent-Moreau complex, 2 to 9 percent slopes	18	24	17	21	15	20	28	35	.9	1.4
Regent-Ridgeview silty clay loams, 0 to 2 percent slopes	23	29	22	29	20	27	34	43	1.1	1.5
Regent-Ridgeview silty clay loams, 2 to 6 percent slopes	22	28	21	27	18	25	32	42	.9	1.4
Reliance silty clay loam, 0 to 2 percent slopes	30	37	30	39	23	29	38	50	1.7	2.1
Reliance silty clay loam, 2 to 6 percent slopes	29	36	29	37	21	27	37	48	1.6	2.0
Ridgeview silty clay loam, 0 to 2 percent slopes	20	26	18	26	18	25	34	43	1.5	2.3
Shambo loam					22	28	38	46	1.2	1.7
Tally fine sandy loam	20	26			18	24	30	40	.9	1.4
Trembles-Havrelon complex	25	32			20	25	35	45	1.2	1.7
Trembles and Banks soils:										
Trembles soil	24	31			19	24	34	44	1.2	1.6
Banks soil										
Vebar fine sandy loam, 0 to 6 percent slopes	22	30			16	24	28	37	.9	1.3
Vebar-Flasher complex, 2 to 9 percent slopes	15	19			11	15	18	23	.7	1.0

grass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass.

PASTURE GROUP E

In this group are deep, well-drained, nearly level to sloping loamy and silty soils that have a clayey subsoil. Permeability is slow in the clayey subsoil. Available water capacity is moderate or high. The clayey subsoil restricts the movement of moisture and the development of roots.

Suitable pasture plants are alfalfa, crested wheatgrass, green needlegrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass. Bunch grasses are not suitable for planting on sloping soils unless planted with sod-forming grasses.

PASTURE GROUP F

This group consists of deep and moderately deep, well drained and moderately well drained, nearly level to sloping soils on uplands, terraces, and bottom land. The surface layer and subsoil range from loam to silty clay. Permeability is moderate to slow, and available

water capacity is dominantly moderate or high. The main limitation is lack of rainfall in some years.

Suitable pasture plants are alfalfa, crested wheatgrass, green needlegrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass. Bunch grasses are not suitable on the sloping soils unless planted with sod-forming grasses.

PASTURE GROUP G

This group consists of moderately deep and deep, nearly level to undulating, calcareous silty and loamy soils. These soils are low in fertility. Permeability is moderate. Available water capacity ranges from low to high. Plants commonly lack moisture late in summer.

Suitable pasture plants are alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, and smooth bromegrass. Bunch grasses are not suitable on the undulating soils unless seeded with sod-forming grasses.

PASTURE GROUP H

This group consists of deep and moderately deep, well-drained, nearly level to undulating soils. These soils have a surface layer and subsoil of fine sandy loam. They take in water readily and have moderate or low available water capacity. The hazards of soil blowing and erosion are moderate to severe.

Suitable pasture plants are alfalfa, crested wheatgrass, intermediate wheatgrass, pubescent wheatgrass, sand bluestem, and smooth bromegrass.

PASTURE GROUP I

This group consists of moderately deep and deep, well-drained, nearly level to sloping clayey soils. Permeability is slow or very slow, and available water capacity is very low to moderate. The clay subsoil restricts the movement of moisture and the development of roots.

Suitable pasture plants are alfalfa, crested wheatgrass, green needlegrass, intermediate wheatgrass, pubescent wheatgrass, smooth bromegrass, and western wheatgrass. Bunch grasses are not suitable on sloping soils unless planted with sod-forming grasses.

PASTURE GROUP J

The Regan soil in Glenross-Regan fine sandy loams is the only soil in this group. It is a deep, very poorly drained, nearly level, calcareous soil that has a high water table. Choice of plants is limited by wetness and a high content of salts near the surface.

Suitable pasture plants are tall wheatgrass and western wheatgrass.

Windbreaks [6]

About 2,000 acres of Dewey County is native woodland and brush. Most of the native trees and shrubs are on bottom land (fig. 19), in natural draws, and on steep, north-facing slopes.

The principal species of native trees and shrubs are American elm, boxelder, buffaloberry, bur oak, chokecherry, eastern redcedar, gooseberry, green ash, hawthorne, juneberry, plains cottonwood, poison ivy, skunkbrush, snowberry, Virginia creeper, wild grape, wild plum, wild rose, and willow. Eastern redcedar is mainly in small patches in the breaks bordering the Moreau River.

The native woodland and brush in the county are of value mainly for livestock shelter, wildlife habitat, recreation, esthetics, erosion control, and watershed protection.

Windbreaks have been planted in the county since the time of settlement. Most plantings were for the protection of farmsteads and feedlots. In recent years a few field windbreaks have been established. Additional windbreaks of all kinds are still needed. Supplementary plantings would make many of the existing windbreaks more effective.

Windbreaks return many economic and environmental benefits to the landowner. They prevent snow from accumulating on the farmstead; they protect the home and livestock from wintery winds, thereby reducing fuel and feed costs; and they protect field crops, gardens, and orchards from damaging winds. Windbreaks also reduce evaporation of moisture, provide favorable habitat for birds and other wildlife, help control soil blowing, and enhance the beauty of a rural home and its surroundings.

Items to consider in planning a windbreak are the purpose of the planting, the suitability of the soils for windbreaks, the selection of trees and shrubs adapted to the site, and the site location in relation to buildings and roads.

Establishment of a properly designed windbreak and continued tree growth depend on adequate site preparation before planting and adequate maintenance after planting. Grass and weeds should be eliminated before planting, and the regrowth of ground cover controlled during the life of a windbreak. Some replanting usually is needed after the first and second years of the planting.

The soils in Dewey County have been assigned to windbreak groups according to their suitability for trees and shrubs. The most important factors to be considered in grouping the soils are soil properties affecting the availability of moisture for tree growth and the susceptibility of the soil to erosion and soil blowing. As a rule, only the soils suitable for cultivation are suited to windbreaks planted with machinery.

Table 3 lists most of the trees and shrubs suitable for windbreaks in Dewey County. It also lists the estimated height of each species at 20 years of age for each windbreak suitability group.

The windbreak suitability groups in Dewey County are described in the following paragraphs. These groups are not numbered consecutively because not all of the groups in the statewide system are recognized in this county. Only those soils suitable for windbreak plantings are assigned to windbreak groups 1 through 9. Soils that are not suitable for windbreaks but can be used for other types of plantings are in windbreak group 10. To find the windbreak group of a given soil, refer to the "Guide to Mapping Units."

WINDBREAK GROUP 1

This group consists of deep, moderately well drained and well drained, nearly level loamy and clayey soils. These soils are on bottom land and low terraces in

[6] By DAVID L. HINTZ, woodland conservationist, Soil Conservation Service.

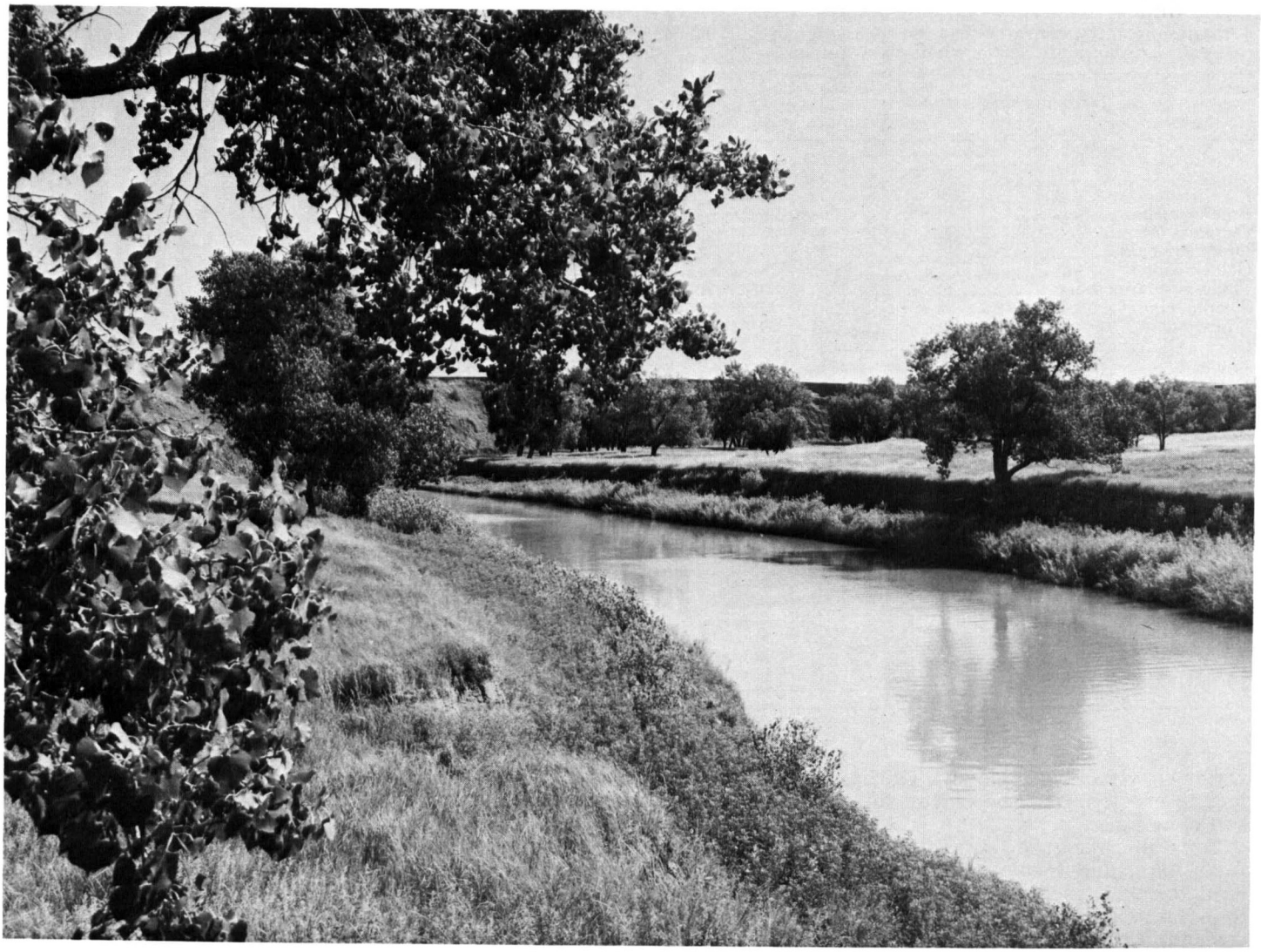

Figure 19.—**Cottonwood trees on Trembles and Banks soils along the Moreau River.**

stream valleys and in swales on uplands. The surface layer and subsoil range from fine sandy loam to clay.

These soils are medium or low in fertility, but have moderate or high available water capacity. Most areas receive additional moisture in the form of runoff from adjacent soils or from stream overflow. The moisture required on these soils is the most favorable in the county for planting trees.

Soils of this group are well suited to plantings for the protection of fields, farmsteads, and feedlots. The soils that have a fine sandy loam surface layer are susceptible to soil blowing and need special care until the planting is established.

WINDBREAK GROUP 3

This group consists of deep and moderately deep, well-drained, nearly level to sloping silty and loamy soils on uplands and terraces. These soils have a surface layer of loam or silt loam and a subsoil that ranges from loam to silty clay.

These soils are medium in fertility. Permeability is dominantly moderate, but in places is slow or moderately slow. Most soils have moderate or high available water capacity. In all but the dry years soil moisture is favorable for tree growth. Sloping soils are subject to erosion.

Soils of this group are well suited to windbreak plantings for the protection of fields, farmsteads, and feedlots, and to plantings for beautification, recreation, and wildlife. At least 1 year of fallow before planting is essential in site preparation. Contour plantings help control erosion on the sloping soils.

WINDBREAK GROUP 4

This group consists of deep and moderately deep, well-drained, nearly level to sloping loamy, silty, and clayey soils on uplands. These soils have a clayey subsoil.

These soils are medium in fertility, but are difficult to work. Available water capacity ranges from moderate to very low in most soils. The dense clayey subsoil restricts the growth of tree roots and takes in

TABLE 3.—*Estimated height of trees and shrubs at 20 years of age by windbreak suitability groups*

[Absence of entry indicates that the species is not suitable for the specified group. Windbreak group 10 is not listed because the soils are not suitable for windbreaks and onsite investigation is needed to determine species for other kinds of plantings]

Trees and shrubs	Group 1	Group 3	Group 4	Group 5	Group 6	Group 7	Group 8	Group 9
	Ft	*Ft*	*Ft*	*Ft*	*Ft*	*Ft*	*Ft*	*Ft*
American elm	23–25	18–20	18–20	18–20				
Chinkota elm	25–30	24–26	23–25	22–24	11–13		10–12	10–20
Dropmore elm	25–30	24–26	23–25	22–24	11–13		10–12	10–12
Golden willow	28–32							
Plains cottonwood	30–35							
Siberian elm	25–30	24–26	23–25	22–24	11–13		10–12	10–12
White willow	28–32							
Black Hills spruce	20–24	17–19						
Blue spruce	20–24	17–19						
Boxelder	15–17	15–17						
Green ash	18–22	14–16	14–16	14–16	9–11		8–10	9–11
Hackberry	16–18	12–14	12–14	16–18	11–13			
Ponderosa pine	20–24	18–20	15–17	18–20	11–13	10–14	12–14	9–11
Russian-olive	14–16	15–17	12–14	15–17	7–9		8–9	8–9
Common chokecherry	10–12	8–11	8–10	8–11				
Eastern redcedar	13–15	10–12	13–15	11–13	7–9	8–10	6–8	5–7
Harbin pear	12–14	11–13	9–11	11–13			4–5	4–6
Rocky Mountain juniper	13–15	10–12	13–15	11–13	7–9	8–10	6–8	5–7
Siberian crabapple	12–14	11–13	10–12	11–13				
Siberian peashrub	8–10	8–9	6–8	8–10	4–5		4–5	4–5
American plum	7–8	7–8	4–5	5–6				
Lilac	5–6	6–7	4–5	4–5	3–4		3–4	3–4
Nanking cherry	4–5	4–5	4–5					
Peking cotoneaster	4–5	4–5	4–5	4–5				
Silver buffaloberry	6–8	5–7	5–7	5–6			3–4	3–4
Tartarian honeysuckle	6–8	6–8	5–7	4–6				

water slowly or very slowly. The sloping soils are subject to erosion, and the clayey soils are susceptible to soil blowing.

Soils in this group are moderately suited to field, farmstead, and feedlot windbreaks. They also can be used for beautification, recreation, and wildlife plantings, although the height of growth may be less than is desired. At least 1 year of fallow before planting is necessary in site preparation. Contour plantings help control erosion on sloping soils.

WINDBREAK GROUP 5

This group consists of deep and moderately deep, well-drained, nearly level to sloping loamy soils on uplands. These soils have a surface layer and subsoil of fine sandy loam.

These soils are medium in fertility, are easy to work, and take in water readily. They release moisture readily to growing trees, but are subject to soil blowing. Available water capacity is moderate or low. The sloping soils also are subject to erosion.

Soils in this group are well suited to field (fig. 20), farmstead, and feedlot windbreaks. They also are suited to plantings for beautification, recreation, and wildlife. Special management usually is needed during site preparation to help control soil blowing.

WINDBREAK GROUP 6

Canning loam, 0 to 2 percent slopes, is the only soil in this group. This well-drained, nearly level loamy soil has a clay loam subsoil and is moderately deep over sand and gravel.

This soil is medium in fertility, but it is droughty. The underlying sand and gravel restricts the development of roots.

This soil is poorly suited to field windbreaks and to all other types of tree plantings, but it can be used if height of growth is not critical or if supplementary water is available at the site. At least 1 year of fallow before planting is necessary in site preparation. The amount of water stored is limited by the underlying sand and gravel.

WINDBREAK GROUP 7

The Banks part of Trembles and Banks soils, the only soil in this group, is a deep, somewhat excessively drained, nearly level sandy soil on low terraces and bottom land. The surface layer is loamy fine sand, and the underlying material is fine sand and sand.

This soil is low in fertility and has low available water capacity. Permeability is rapid. Droughtiness limits tree growth, and the soil is highly susceptible to blowing.

This soil is poorly suited to field windbreaks, but it can be used for farmstead and feedlot windbreaks and for beautification, recreation, and wildlife plantings. Fallowing before planting and cultivating after planting increase the hazard of soil blowing. Scalp planting in furrows or directly into the sod is suggested.

WINDBREAK GROUP 8

The Lantry part of Morton-Lantry silt loams, 2 to 9 percent slopes, is the only soil in this group. It is mod-

Figure 20.—**A clean, cultivated windbreak on Vebar fine sandy loam, 0 to 6 percent slopes. The evergreens add longevity to this windbreak and enhance the beauty of the farmstead.**

erately deep, well-drained, sloping, calcareous silty soil on uplands. The subsoil and underlying material are mildly alkaline.

This soil is low in fertility. Permeability is moderate, and available water capacity is low or moderate. The high content of lime and the droughtiness of this soil limit tree growth. This soil is subject to erosion and blowing.

This soil is moderately well suited to windbreak plantings. It also can be used for beautification, recreation, and wildlife plantings. Special care is needed during site preparation to control erosion and soil blowing. Contour plantings help in erosion control.

WINDBREAK GROUP 9

This group consists of deep, moderately well drained, nearly level to gently sloping silty soils that have a claypan subsoil.

These soils are medium in fertility. The claypan subsoil takes in water very slowly and releases it slowly to roots. Available water capacity is low or moderate. Sodium and other salts in the subsoil and underlying material are unfavorable for many trees.

These soils are poorly suited to windbreaks, but can be used for beautification, recreation, and wildlife plantings if response and vigor are less critical.

WINDBREAK GROUP 10

Many of the soils in this group are too stony or too steep for windbreaks planted with machinery. Other soils are too wet, too high in salts, or are too droughty for good survival and growth of trees.

Some soils in this group are not suitable for plantings of any kind. Others can support recreation and wildlife plantings if the trees are hand planted and special care is given. The trees or shrubs selected must tolerate the unfavorable soil properties at a given site.

Wildlife [7]

The level of wildlife production depends on essential habitat containing both food and cover. The kind and adequacy of habitat plantings, introduced and native, is closely associated with suitability of the soil.

Suitability of the major soils in the 10 associations in Dewey County for producing habitat appropriate for four particular kinds of wildlife is given in table 4. The kinds of wildlife in the county are described in the following paragraphs.

Farmland wildlife frequents cropped areas, pastures, meadows, and planted woodland. Farmland wildlife also frequents other areas, such as natural woodland and heavily vegetated marshes, but it is most closely associated with cultivated areas. Examples of farm

[7] By JOHN B. FARLEY, biologist, Soil Conservation Service.

TABLE 4.—*Wildlife habitat, by soil associations*

Soil associations	Percent	Suitability for wildlife of:			
		Farmland	Woodland	Wetland	Rangeland
Rhoades-Ekalaka:					
Rhoades	35	Very poor	Very poor	Very poor	Poor.
Ekalaka	15	Poor	Very poor	Very poor	Good.
Belfield-Daglum:					
Belfield	40	Fair	Very poor	Very poor	Good.
Daglum	35	Poor	Very poor	Very poor	Poor.
Vebar-Flasher:					
Vebar	55	Fair	Very poor	Very poor	Good.
Flasher	20	Very poor	Very poor	Very poor	Fair.
Morton-Reeder:					
Morton	45	Good	Very poor	Very poor	Good.
Reeder	20	Good	Very poor	Very poor	Good.
Wayden-Cabba:					
Wayden	35	Very poor	Very poor	Very poor	Fair.
Cabba	20	Very poor	Very poor	Very poor	Fair.
Regent-Ridgeview:					
Regent	50	Good	Very poor	Very poor	Good.
Ridgeview	40	Fair	Very poor	Very poor	Good.
Opal-Sansarc-Promise:					
Opal	40	Fair	Very poor	Very poor	Good.
Sansarc	20	Very poor	Very poor	Very poor	Fair.
Promise	15	Fair	Very poor	Very poor	Good.
Sansarc-Opal:					
Sansarc	30	Very poor	Very poor	Very poor	Fair.
Opal	28	Fair	Very poor	Very poor	Good.
Sansarc-Dupree:					
Sansarc	45	Very poor	Very poor	Very poor	Fair.
Dupree	35	Very poor	Very poor	Very poor	Poor.
Trembles-Havrelon:					
Trembles	35	Fair	Fair	Very poor	Fair.
Havrelon	15	Good	Good	Very poor	Good.

wildlife are pheasant, gray partridge, bobwhite, mourning dove, cottontail, jackrabbit, fox, raccoon, and whitetailed deer.

Woodland wildlife inhabits naturally wooded areas, bordered by and frequently a part of farms, range, and pasture. Suitability ratings in table 4 are for natural woodland. Planted woodland is not considered. Examples of woodland wildlife are mule deer, whitetailed deer, cottontail, tree squirrels, raccoon, coyote, turkey, ruffed grouse, thrushes, vireos, and scarlet tanager.

Wetland wildlife requires natural wetland or improved natural wetland for all or part of their breeding habitat. Ducks, herons, shorebirds, coot, redwinged blackbird, mink, muskrat, and beaver are examples.

Rangeland wildlife occurs on extensive areas of range that in many places includes wooded draws, wooded alluvial land, farm areas, and some planted woodland. Mule deer, whitetailed deer, antelope, jackrabbit, coyote, sharptailed grouse, sage grouse, prairie chicken, magpie, horned lark, lark bunting, and mourning dove are examples of rangeland wildlife.

The ratings in table 4 are described as follows:

GOOD: The habitat can be easily established, constructed, improved, or maintained. Few or no soil limitations occur in habitat management, and satisfactory results are generally assured.

FAIR: The habitat usually can be established, constructed, improved, or maintained, but there are moderate soil limitations that affect habitat construction or management. A moderate intensity of management and fairly frequent attention may be required if results are satisfactory.

POOR: The habitat can frequently be established, constructed, improved, or maintained on these soils, but there are rather severe soil limitations. Establishment, construction, or management of habitat can be difficult, expensive, or require intensive effort. Results are questionable.

VERY POOR: Naturally occurring habitat can

sometimes be maintained under specific management, but establishing, constructing, or improving habitat is generally not possible or feasible.

Engineering [8]

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 commissioners, town and city managers, sanitarians, land developers, engineers, contractors, and farmers and ranchers.

Among the properties important in engineering are permeability, shear strength, compaction characteristics, soil drainage, shrink-swell potential, grain size, plasticity, and soil reaction. Also important are depth to water table, depth to bedrock, and soil slope. These properties, in various degrees and combinations, affect construction and maintenance of roads, airports, pipelines, foundations for small buildings, irrigation systems, ponds and small dams, and systems for disposal of sewage and refuse.

Information in this section can be helpful to those who—

1. Select potential residential, industrial, commercial, and recreational areas.
2. Evaluate alternate routes for roads, highways, airports, pipelines, and underground cables.
3. Seek sources of gravel, sand, or road fill.
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, to predict the 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 5, 6, 7, and 8. Tables 5 and 6 show, respectively, estimates of physical and chemical soil properties and interpretations for various engineering uses. Tables 7 and 8 show the results of engineering laboratory tests on soil samples.

This information, along with the soil map and other parts of this publication, can be used to make interpretations in addition to those given in tables 5 and 6. It also can be used to make other useful maps.

This information, however, does not eliminate need for further investigation of sites selected for engineering works, especially works that involve heavy loads or that require excavations to depths greater than those shown in the tables, generally depths greater than 6 feet. Also, inspection of sites, especially small ones, is needed because many delineated areas of a given soil mapping unit can 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 special meanings in soil science that may not be familiar to all engineers. The Glossary defines many of these terms commonly used in soil science.

Engineering soil classification systems

The two systems most commonly used in classifying samples of soils for engineering are the Unified system (*2*), used by SCS engineers, the Department of Defense, and others, and the AASHO system (*1*) adopted by the American Association of State Highway Officials.

In the Unified system soils are classified according to particle-size distribution, plasticity, liquid limit, and organic matter. Soils are grouped into 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, MG, 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.

In the AASHO system soils are classified according to those properties that affect use in highway construction and maintenance. The groups range from A–1 through A–7, based on grain-size distribution, liquid limit, and plasticity index. In group 1 are gravelly soils, which have high bearing strength and are the best soils for subgrade (foundation). In group A–7 are clay soils, which have the lowest strength when wet and are the poorest mineral soils for subgrade. If 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. Within each group the engineering value of a soil material can be indicated by a group index number. Group indexes range from 0 for the best material to 20 or more for the poorest. The AASHO classification for tested soils, with group indexes in parentheses, is shown in tables 7 and 8. The estimated classifications for all soils mapped in this county are shown in table 5.

Estimated properties significant in engineering

Estimates of physical and chemical soil properties significant in engineering are shown in table 5. Evaluations are made for the representative profile of each soil series, by layers sufficiently different to have significance in soil engineering. The estimates are based on field observations made in the course of mapping, on test data for specified soils 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 5.

Depth to bedrock is the distance from the surface of the soil to the upper surface of the rock layer. *Depth to seasonal water table* is distance from the surface downward to the highest level reached by ground water in most years.

The *dominant soil texture* is expressed in standard terms used by the United States Department of Agriculture. These terms are based on the percentages of sand, silt, and clay in soil material that is less than

[8] By ROBERT L. BARTHOLIC, agricultural engineer, Soil Conservation Service.

TABLE 5.—*Estimated physical*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. fully the instructions for referring to other series that appear in the first

Soil series and map symbols	Depth to—		Depth from surface	Dominant USDA texture	Classification		Percentage less than 3 inches passing sieve—	
	Bedrock	Seasonal high water table			Unified	AASHO	No. 4 (4.7 mm)	No. 10 (2.0 mm)
	In	*In*	*In*					
Absher: AbA, AcA—No valid estimates can be made for Slickspots part of AcA.	>60	>60	0–21	Silty clay	CH	A–7	100	100
			21–60	Clay	CH	A–7	100	100
Agar: AgB	>60	>60	0–6	Silt loam	ML or CL	A–4 or A–6	100	100
			6–16	Silty clay loam	CL or ML–CL	A–6 or A–7	100	100
			16–60	Silt loam	ML or CL	A–4 or A–6	100	100
Archin: ArB—No valid estimates can be made for Slickspots part.	>60	>60	0–8	Fine sandy loam	SM or ML	A–4	100	100
			8–22	Sandy clay loam	SC or CL	A–6	100	100
			22–60	Fine sandy loam	SM or ML	A–4	100	100
Arvada: AsA—No valid estimates can be made for Slickspots part.	>60	>60	0–60	Clay	CH	A–7	100	100
Banks—Mapped only with Trembles soils.	>60	>60	0–5	Loamy fine sand	SM	A–2	100	100
			5–30	Fine sand	SM	A–2	100	100
			30–60	Sand	SM	A–3 or A–2	100	100
*Belfield: BdA, BrA, BrB, BrC. For Daglum part of BdA, see Daglum series; for Reeder part of BrA, BrB, and BrC, see Reeder series.	>60	>60	0–11	Loam	ML–CL or CL	A–6	100	100
			11–22	Silty clay	CH	A–7	100	100
			22–60	Clay loam	CH or CL	A–6 or A–7	100	100
*Cabba: CbE, CbF—For Lantry part of CbE and CbF, see Lantry series.	10–20	>60	0–7	Silt loam	ML–CL or CL	A–4 or A–6	100	100
			7–17	Very fine sandy loam.	ML–CL or ML	A–4	100	100
			17–60	Sandstone.				
Canning: CdA	>60	>60	0–6	Loam	ML–CL or CL	A–6 or A–4	100	100
			6–14	Clay loam	ML–CL or CL	A–6	100	100
			14–26	Clay loam	ML–CL or CL	A–6	100	100
			26–60	Gravel and coarse sand.	SP–SM or SM	A–1 or A–2	50–85	40–75
*Chantier: ChB, CsC. For Shale land part of CsC, see Shale land.	10–20	>60	0–16	Clay	CH or MH	A–7	100	100
			16–60	Shale	CH	A–7	100	100
Daglum: DaA	>60	>60	0–7	Silt loam	ML–CL or CL	A–6	100	100
			7–16	Silty clay	CH	A–7	100	100
			16–60	Silty clay	CH or CL	A–7	100	100

and chemical properties

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow care-
column of this table. Symbol > means more than. Symbol < means less than]

Percentage less than 3 inches passing sieve—continued		Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Risk of corrosion	
No. 40 (0.42 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
				In/hr	*In/in of soil*	*pH*	*Mmhos/cm*			
95–100	90–95	50–75	25–55	<0.06	0.08–0.13	7.4–9.5	2–8	High	High	Moderate.
90–100	75–95	55–80	25–60	<0.06	0.08–0.13	7.4–9.0	4–12	High	High	Moderate.
90–100	70–90	30–39	6–18	0.6–2.0	0.19–0.22	6.6–7.3	<2	Low	Low	Low.
95–100	85–95	35–45	11–22	0.6–2.0	0.17–0.20	6.6–7.3	<2	Moderate	High	Low.
90–100	70–100	25–35	6–15	0.6–2.0	0.17–0.20	6.6–8.4	<2	Moderate	High	Low.
70–85	40–55	25–30	4–7	2.0–6.0	0.12–0.15	5.1–7.3	<2	Low	Low	Low.
80–90	35–55	28–35	11–17	0.06–0.2	0.13–0.15	7.4–8.4	2–4	Moderate	High	Moderate.
70–85	40–55	25–30	4–7	2.0–6.0	0.09–0.12	7.4–8.4	2–4	Low	High	Moderate.
90–100	75–95	55–75	30–55	<0.06	0.08–0.13	6.6–9.5	4–8	High	High	Moderate.
50–75	15–30	<25	[1]NP–4	2.0–6.0	0.08–0.10	6.6–7.8	<2	Low	Moderate	Low.
65–80	20–35	<5	NP	6.0–20.0	0.06–0.08	6.6–7.8	<2	Low	Moderate	Low.
50–70	5–15	<5	NP	6.0–20.0	0.06–0.08	6.6–7.8	<2	Low	Moderate	Low.
85–95	60–75	30–35	11–15	0.6–2.0	0.18–0.20	6.1–7.3	<2	Low	Low	Low.
95–100	90–95	50–65	22–40	0.06–0.2	0.08–0.13	6.6–8.4	<2	High	High	Low.
90–100	70–80	35–58	12–33	0.2–0.6	0.11–0.14	7.4–9.0	2–4	High	High	Moderate.
90–100	70–90	22–33	4–12	0.6–2.0	0.17–0.20	6.6–7.3	<2	Low	Moderate	Low.
85–95	50–65	22–30	4–10	0.6–2.0	0.15–0.17	7.4–7.8	<2	Low	Moderate	Low.
85–95	60–75	27–35	5–15	0.6–2.0	0.18–0.20	6.1–6.5	<2	Low	Low	Low.
90–100	70–80	30–39	11–16	0.6–2.0	0.19–0.22	6.6–7.3	<2	Moderate	Moderate	Low.
90–100	70–80	30–39	11–16	0.6–2.0	0.17–0.20	6.6–7.8	<2	Moderate	Moderate	Low.
30–60	5–35	<20	NP–4	6.0–20.0	0.03–0.06	7.4–7.8	<2	Low	Low	Low.
90–100	85–100	60–90	28–63	<0.06	0.05–0.09	6.6–9.0	4–8	High	High	High.
95–100	90–100	75–115	50–80	<0.02		6.6–9.0	0–4	High	High	High.
90–100	70–90	30–40	11–22	0.6–2.0	0.19–0.22	5.1–6.5	<2	Low	Low	Low.
95–100	90–95	50–65	22–40	<0.06	0.10–0.15	6.6–7.8	<2	High	High	Low.
95–100	90–95	45–60	19–35	0.02–0.2	0.08–0.13	7.4–8.4	2–8	High	High	Moderate.

TABLE 5.—*Estimated physical*

Soil series and map symbols	Depth to—		Depth from surface	Dominant USDA texture	Classification		Percentage less than 3 inches passing sieve—	
	Bedrock	Seasonal high water table			Unified	AASHO	No. 4 (4.7 mm)	No. 10 (2.0 mm)
	In	*In*	*In*					
*Dupree: DoB, DsE—For Opal part of DoB, see Opal series; for Sansarc part of DsE, see Sansarc series.	10–20	>60	0–16	Clay	CH or MH	A–7	100	100
			16–60	Shale	CH	A–7	100	100
Ekalaka: EkA, EkC	>60	>60	0–14	Fine sandy loam	SM or ML	A–4	100	100
			14–18	Loamy fine sand	SM	A–2	100	100
			18–26	Fine sandy loam	SM or ML	A–4	100	100
			26–38	Loamy fine sand	SM	A–2	100	100
			38–60	Fine sandy loam	SM or ML	A–4	100	100
Farland: FaA, FaB	>60	>60	0–8	Silt loam	ML or CL	A–6 or A–4	100	100
			8–19	Clay loam	ML–CL or CL	A–6 or A–7	100	100
			19–44	Loam	ML–CL or CL	A–6	100	100
			44–60	Very fine sandy loam.	ML–CL or ML	A–4	100	100
*Flasher: FbF, FvD, FvE—For Vebar part of FvD and FvE, see Vebar series.	10–20	>60	0–11	Loamy fine sand	SM	A–2	100	100
			11–60	Sandstone.				
*Glenross: Gb, Gr—For Regan part of Gr, see Regan series.	>60	12–36	0–42	Sandy clay loam	SC or SM	A–4 or A–2	100	95–100
			42–60	Loamy fine sand	SM or SM–SC	A–2	100	100
Havrelon—Mapped only with Lohler soils.	>60	>60	0–38	Loam	CL	A–6	100	100
			38–60	Clay loam	CL	A–6 or A–7	100	100
Heil: Hc	>60	>60	0–60	Clay	CH or CL	A–7	100	100
Hurley: HsB—No valid estimates can be made for Slickspots part.	30–40	>60	0–3	Silty clay loam	CH or CL	A–7	100	100
			3–10	Clay	CH	A–7	100	100
			10–34	Clay	CH	A–7	100	100
			34–60	Shale	CH	A–7	100	100
Intermittent lakes: In. No valid estimates can be made.								
*Lantry: LmD—For Morton part of LmD, see Morton series.	20–40	>60	0–30	Loam	ML or CL	A–4 or A–6	100	100
			30–60	Sandstone				
*Lohler: Lo, Lp—For Havrelon part of Lp, see Havrelon series.	>60	>60	0–22	Silty clay	CL or CH	A–7	100	100
			22–60	Silty clay loam	CL	A–7	100	100
Lowry: LwA, LwB	>60	>60	0–18	Silt loam	CL or ML	A–4 or A–6	100	95–100
			18–55	Silt loam	CL or ML	A–4 or A–6	100	95–100
			55–60	Gravelly loam	SM or ML	A–4	80–100	70–100

and chemical properties—Continued

Percentage less than 3 inches passing sieve—continued		Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Risk of corrosion	
No. 40 (0.42 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
				In/hr	*In/in of soil*	*pH*	*Mmhos/cm*			
95–100	95–100	60–90	31–60	<0.06	0.08–0.12	5.6–7.8	<2	High	High	Moderate.
90–100	90–100	65–110	36–80	<0.02			<2	High	High	Moderate.
70–85	40–55	22–30	4–7	2.0–6.0	0.14–0.17	5.6–6.5	<2	Low	Low	Low.
50–75	15–30	<25	NP–4	2.0–6.0	0.08–0.10	7.4–7.8	<2	Low	Low	Low.
70–85	40–55	22–30	4–7	0.06–0.2	0.09–0.12	7.9–8.4	2–4	Low	High	Moderate.
50–75	15–30	<25	NP–4	2.0–6.0	0.05–0.07	7.9–9.0	2–4	Low	High	Moderate.
70–85	40–55	22–30	4–7	2.0–6.0	0.09–0.12	7.9–9.0	2–4	Low	High	Moderate.
90–100	70–90	26–39	5–15	0.6–2.0	0.19–0.22	6.1–7.3	<2	Low	Low	Low.
90–100	70–80	30–45	11–22	0.6–2.0	0.17–0.20	6.6–7.8	<2	Moderate	Moderate	Low.
85–95	60–75	30–40	11–20	0.6–2.0	0.16–0.18	6.6–7.8	<2	Low	Moderate	Low.
85–95	50–65	20–30	4–10	0.6–2.0	0.15–0.17	7.4–7.8	<2	Low	Moderate	Low.
50–75	15–30	<25	NP–4	6.0–20.0	0.08–0.10	6.6–7.8	<2	Low	Low	Low.
80–100	25–55	27–35	5–15	0.06–0.2	0.13–0.15	8.5–9.5	8–16	Moderate	High	High.
50–75	15–30	<25	NP–4	6.0–20.0	0.05–0.07	9.0–9.5	8–16	Low	High	High.
85–95	60–75	30–40	11–20	0.6–2.0	0.16–0.18	6.6–7.8	<2	Low	Low	Low.
90–100	70–80	30–45	11–22	0.6–2.0	0.17–0.20	7.4–8.4	<2	Moderate	Moderate	Low.
90–100	75–95	45–70	22–40	<0.06	0.07–0.11	5.6–9.0	2–4	High	High	High.
95–100	85–95	45–55	19–33	0.2–0.6	0.19–0.22	6.1–6.5	<2	Moderate	Moderate	Low.
90–100	75–95	60–90	30–63	<0.06	0.07–0.11	7.4–9.0	4–8	High	High	High.
90–100	75–95	50–80	22–50	<0.06	0.05–0.09	7.4–9.0	4–16	High	High	High.
95–100	90–100	60–100	33–65	<0.02		6.6–7.8	<2	High	High	Moderate.
90–100	85–100	25–35	6–12	0.6–2.0	0.17–0.20	6.6–7.8 7.4–8.4	<2	Low or moderate.	Low	Low.
95–100	90–95	45–60	19–40	0.06–0.6	0.11–0.16	6.6–7.8	<2	High	High	Low.
90–100	75–95	41–50	15–30	0.06–0.6	0.14–0.17	7.4–7.8	<2	High	High	Low.
90–100	70–100	25–35	4–11	0.6–2.0	0.19–0.22	6.6–7.8	<2	Low	Low	Low.
90–100	70–100	25–37	4–12	0.6–2.0	0.17–0.20	7.4–8.4	<2	Low	Low	Low.
60–75	35–65	20–30	4–10	2.0–6.0	0.16–0.18	7.9–8.4	<2	Low	Low	Low.

TABLE 5.—*Estimated physical*

Soil series and map symbols	Depth to—		Depth from surface	Dominant USDA texture	Classification		Percentage less than 3 inches passing sieve—	
	Bedrock	Seasonal high water table			Unified	AASHO	No. 4 (4.7 mm)	No. 10 (2.0 mm)
	In	*In*	*In*					
Mine pits and dumps: Ma. No valid estimates can be made.								
*Moreau: MbD----- For Wayden part of MbD, see Wayden series.	20–40	>60	0–7 7–29 29–60	Silty clay---------- Clay---------- Shale.	CH CH	A–7 A–7	100 100	100 100
*Morton: McB, MdA, MdB, MfA, MgB. For Belfield part of MdA and MdB, see Belfield series; for Farland part of MfA, see Farland series; for Lantry part of MgB, see Lantry series.	20–40	>60	0–5 5–11 11–37 37–60	Silt loam---------- Loam---------- Loam---------- Sandstone----------	ML–CL or CL ML–CL or CL ML–CL or CL ----------	A–4 or A–6 A–6 or A–7 A–4 or A–6 ----------	100 100 100 ----------	100 100 95–100 ----------
Natriborolls, channeled: Na. No valid estimates can be made.								
*Opal: OaB, OhB, OpA, OsC, OtB. For Hurley part of OhB, see Hurley series; for Promise part of OpA, see Promise series; for Sansarc part of OsC, see Sansarc series. No valid estimates can be made for Slickspots part of OtB.	20–40	>60	0–14 14–33 33–60	Clay---------- Clay---------- Shale----------	CH CH CH	A–7 A–7 A–7	100 100 100	100 100 100
*Parshall: Pa, Pe----- For Ekalaka part part of Pe, see Ekalaka series.	>60	>60	0–36 36–60	Fine sandy loam---- Loamy fine sand----	SM or ML SM	A–4 A–2 or A–4	100 100	100 100
*Promise: PrA, PrB, PsA, Pw. For Swanboy part of Pw, see Swanboy series. No valid estimates can be made for Slickspots part of PsA.	>60	>60	0–10 10–31 31–60	Clay---------- Clay---------- Silty clay----------	CH CH CH	A–7 A–7 A–7	100 100 100	100 100 100

and chemical properties—Continued

Percentage less than 3 inches passing sieve—continued		Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Risk of corrosion	
No. 40 (0.42 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
				In/hr	*In/in of soil*	*pH*	*Mmhos/cm*			
95–100	90–95	50–65	22–45	0.06–0.2	0.13–0.18	7.4–7.8	<2	High	High	Moderate.
90–100	75–95	50–70	22–45	0.06–0.2	0.11–0.16	7.4–9.0	2–4	High	High	Moderate.
90–100	85–100	27–40	6–17	0.6–2.0	0.19–0.22	6.1–7.3	<2	Low	Low	Low.
90–100	85–100	30–42	11–19	0.6–2.0	0.18–0.20	6.6–7.3	<2	Moderate	Moderate	Low.
90–100	85–100	27–35	6–15	0.6–2.0	0.16–0.18	6.6–7.8	<2	Low or moderate.	Moderate	Low.
						7.9–8.4				
90–100	85–100	50–85	22–50	<0.06	0.10–0.14	6.6–7.8	<2	High	High	Low.
90–100	85–100	55–90	26–60	<0.06	0.08–0.12	6.6–8.4	<2	High	High	Moderate.
95–100	90–100	60–90	25–60	<0.02		6.6–7.8	<2	High	High	Moderate.
70–85	40–55	25–30	4–7	2.0–6.0	0.14–0.17	6.1–7.3	<2	Low	Low	Low.
65–80	25–45	<25	NP–4	2.0–6.0	0.08–0.10	6.6–7.3	<2	Low	Low	Low.
90–100	80–100	50–70	22–40	0.02–0.2	0.10–0.14	5.6–7.3	<2	High	High	Low.
90–100	80–100	55–85	26–55	0.02–0.2	0.08–0.12	7.4–7.8	<2	High	High	Low.
90–100	90–100	50–65	22–35	0.06–0.2	0.08–0.12	7.4–7.8	<2	High	High	Low.

TABLE 5.—*Estimated physical*

Soil series and map symbols	Depth to—		Depth from surface	Dominant USDA texture	Classification		Percentage less than 3 inches passing sieve—	
	Bedrock	Seasonal high water table			Unified	AASHO	No. 4 (4.7 mm)	No. 10 (2.0 mm)
	In	*In*	*In*					
Reeder: RaA, RaB, RaC	20–40	>60	0–12	Loam	ML or CL	A–4 or A–6	100	100
			12–26	Loam	ML or CL	A–6	100	100
			26–36	Fine sandy loam	ML–CL or ML	A–4	100	100
			36–60	Sandstone				
Regan	>60	12–36	0–5	Fine sandy loam	SM or ML	A–4	100	100
Mapped only with Glenross soils.			5–17	Loam	CL or ML	A–4 or A–6	100	100
			17–26	Fine sandy loam	SM or ML	A–4 or A–6	100	100
			26–42	Loam	CL or ML	A–4 or A–6	100	100
			42–60	Loamy fine sand	SM	A–2	100	100
*Regent: RbC, RmB, RpA, RpB. For Moreau part of RmB, see Moreau series; for Ridgeview part of RpA and RpB, see Ridgeview series.	20–40	>60	0–6	Silty clay loam	CH or CL	A–7	100	100
			6–14	Silty clay	CH	A–7	100	100
			14–38	Silty clay	CH	A–7	100	100
			38–60	Shale				
Reliance: RsA, RsB	>40	>60	0–8	Silty clay loam	CL or CH	A–7 or A–6	100	100
			8–41	Silty clay loam	CL or CH	A–7 or A–6	100	100
			41–60	Shale				
*Rhoades: RtB For Daglum part of RtB, see Daglum series.	>30	>60	0–4	Loam	ML–CL or CL	A–6 or A–4	100	100
			4–14	Silty clay	CH or MH	A–7	100	100
			14–60	Silty clay	CH or MH	A–7	100	100
Ridgeview: RvA	>60	>60	0–5	Silty clay loam	CL or CH	A–7	100	100
			5–10	Silty clay	CH	A–7	100	100
			10–17	Clay	CH	A–7	100	100
			17–60	Clay	CH	A–7	100	100
*Sansarc: SaE, SbC, SbE, ScF. For Dupree part of SaE, see Dupree series; for Opal part of SbC and SbE, see Opal series; for Shale land part of ScF, see Shale land.	6–20	>60	0–10	Clay	MH or CH	A–7	100	100
			10–60	Shale	CH	A–7	100	100
*Schamber: SdC, SfF For Sansarc part of SfF, see Sansarc series.	>60	>60	0–5	Gravelly loamy sand.	SM, SM–SC	A–2	85–100	80–95
			5–60	Coarse sand and gravel.	SW–SM, SW	A–1 or A–2	50–90	40–80
Shale land: Sh	<6	>60	0–60	Shale	CH	A–7	100	100
Shambo: Sm	>60	>60	0–10	Loam	ML–CL or ML	A–4 or A–6	100	100
			10–60	Loam	ML–CL or ML	A–4 or A–6	100	100

and chemical properties—Continued

Percentage less than 3 inches passing sieve—continued		Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Risk of corrosion	
No. 40 (0.42 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
				In/hr	*In/in of soil*	*pH*	*Mmhos/cm*			
85–95	60–75	27–35	7–13	0.6–2.0	0.18–0.20	5.6–6.5	<2	Low	Moderate	Low.
85–95	50–75	30–40	8–18	0.6–2.0	0.16–0.18	6.1–7.3	<2	Moderate	Moderate	Low.
70–85	50–60	25–30	4–7	2.0–6.0	0.12–0.15	7.4–7.8	<2	Low	Moderate	Low.
						7.4–7.8				
70–85	40–55	25–30	4–7	2.0–6.0	0.14–0.17	7.4–7.8	<2	Low	Low	Low.
85–95	60–75	27–35	6–13	0.6–2.0	0.13–0.15	7.4–8.4	8–16	Moderate	High	Moderate.
70–85	40–55	25–30	4–7	0.6–2.0	0.09–0.12	7.4–8.4	8–16	Low	High	Moderate.
85–95	60–75	27–35	6–13	0.6–2.0	0.13–0.15	7.4–8.4	8–16	Moderate	High	Moderate.
55–80	15–35	<25	NP–4	6.0–20.0	0.08–0.10	6.6–7.8	4–8	Low	High	Moderate.
95–100	85–100	45–60	19–35	0.6–2.0	0.19–0.22	6.1–6.5	<2	Moderate or high.	Low	Low.
95–100	90–100	55–70	26–40	0.06–0.2	0.13–0.18	6.6–7.3	<2	High	High	Low.
95–100	90–100	55–70	26–40	0.06–0.2	0.11–0.16	7.4–8.4	<2	High	High	Moderate.
						7.4–7.8				
95–100	85–95	35–55	11–28	0.6–2.0	0.19–0.22	6.1–7.3	<2	Moderate or high.	Moderate	Low.
95–100	85–95	35–60	11–35	0.2–0.6	0.14–0.17	6.6–7.8	<2	Moderate or high.	High	Low.
						6.6–7.3				
85–100	60–75	27–35	6–15	0.6–2.0	0.18–0.20	6.1–6.5	<2	Low	Low	Low.
95–100	90–95	60–85	28–50	<0.06	0.10–0.15	6.6–7.3	<2	High	High	Moderate.
95–100	90–95	60–85	28–50	<0.06	0.08–0.13	7.4–8.4	4–8	High	High	Moderate.
95–100	85–95	41–56	15–33	0.2–0.6	0.19–0.22	6.1–6.5	<2	High	Moderate	Low.
95–100	90–95	50–74	22–50	0.2–0.6	0.13–0.18	6.1–6.5	<2	High	High	Moderate.
90–100	85–95	50–82	22–50	0.06–0.2	0.11–0.16	6.6–7.8	<2	High	High	Moderate.
90–100	85–95	50–82	22–50	0.06–0.2	0.11–0.16	7.4–8.4	2–4	High	High	Moderate.
95–100	85–100	60–90	28–55	0.06–0.2	0.11–0.16	7.4–7.8	<2	High	High	Moderate.
95–100	85–100	60–120	31–85	<0.02		6.6–7.3	<2	High	High	Moderate.
25–70	10–25	<25	NP–5	2.0–6.0	0.08–0.10	6.6–7.3	<2	Low	Low	Low.
15–30	0–15	<20	NP–4	6.0–20.0	0.03–0.06	7.4–7.8	<2	Low	Moderate	Low.
95–100	90–100	60–160	40–120	>0.02		6.1–7.3	<2	High	High	Moderate.
85–95	60–75	27–35	6–13	0.6–2.0	0.18–0.20	6.1–7.3	<2	Low	Low	Low.
85–95	60–75	27–36	6–13	0.6–2.0	0.16–0.18	7.4–7.8	<2	Low	Moderate	Low.

TABLE 5.—*Estimated physical*

Soil series and map symbols	Depth to—		Depth from surface	Dominant USDA texture	Classification		Percentage less than 3 inches passing sieve—	
	Bedrock	Seasonal high water table			Unified	AASHO	No. 4 (4.7 mm)	No. 10 (2.0 mm)
	In	*In*	*In*					
Swanboy: Sw, Sy—No valid estimates can be made for Slickspots part of Sy.	>60	>60	0–60	Clay	CH	A–7	100	100
Tally: Ta	>60	>60	0–13	Fine sandy loam	SM or ML	A–4	100	100
			13–29	Fine sandy loam	SM or ML	A–4	100	100
			29–60	Loamy fine sand	SM	A–2	100	100
*Trembles: Th, Tr—For Havrelon part of Th, see Havrelon series; for Banks part of Tr, see Banks series.	>60	>60	0–4	Fine sandy loam	SM or ML	A–4	100	100
			4–60	Fine sandy loam	SM or ML	A–4	100	100
*Vebar: VeB, VfB—For Flasher part of VfB, see Flasher series.	20–40	>60	0–7	Fine sandy loam	SM	A–4	100	100
			7–24	Fine sandy loam	SM	A–4	100	100
			24–32	Loamy fine sand	SM	A–2 or A–4	95–100	95–100
			32–60	Sandstone.				
*Wayden: WaF—For Moreau part of WaF, see Moreau series.	10–20	>60	0–16	Clay	CH	A–7	100	100
			16–60	Shale	----------	----------	----------	----------

[1] Nonplastic.

2 millimeters in diameter. "Loam," for example, is soil material that is 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," "clay," and some of the other terms used in the USDA textural classification are defined in the Glossary.

Liquid limit and *plasticity index* pertain to the effect of water on the strength and consistence of soil material. As the moisture content of a clayey soil is increased from a dry state, the material changes from a semisolid to a plastic state. If the moisture content is further increased, the material changes from a plastic to a liquid state. The plastic limit is the moisture content at which the soil material changes from the semisolid to the plastic state, and the liquid limit from the plastic to the liquid state. The plasticity index is the numerical difference between the liquid limit and the plastic limit. It is the range of moisture content within which a soil material is plastic. Liquid limit and plasticity index in table 5 are estimates, but the data given in tables 7 and 8 are based on laboratory test samples.

Permeability is the quality that enables a soil to transmit water or air. It is estimated on the basis of soil characteristics observed, particularly structure and texture. The estimates do not take into account lateral seepage or transient soil features, such as plowpans and surface crusts.

Available water capacity is the capacity of a soil 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 crops.

Reaction is the degree of acidity or alkalinity of a soil, expressed in pH values. The pH value and terms describing soil reaction are explained in the Glossary.

Salinity refers to the amount of soluble salts in the soil. It is expressed as the electrical conductivity of the saturated soil extract in millimhos per centimeter at 25° C. Salinity affects the suitability of a soil for crop production, its stability when used as construction material, and its corrosivity to metals and concrete. The salinity rating and the corresponding salinity in millimhos per centimeter are as follows:

and chemical properties—Continued

Percentage less than 3 inches passing sieve—continued		Liquid limit	Plasticity index	Permeability	Available water capacity	Reaction	Salinity	Shrink-swell potential	Risk of corrosion	
No. 40 (0.42 mm)	No. 200 (0.074 mm)								Uncoated steel	Concrete
				In/hr	*In/in of soil*	*pH*	*Mmhos/cm*			
90–100	75–95	60–100	30–70	<0.06	0.05–0.09	7.4–9.0	4–8	High	High	High.
70–85	40–55	20–30	4–7	2.0–6.0	0.14–0.17	6.6–7.3	<2	Low	Low	Low.
70–85	40–55	20–30	4–7	2.0–6.0	0.12–0.15	6.6–7.3	<2	Low	Moderate	Low.
50–80	15–35	<25	NP–4	2.0–6.0	0.08–0.10	7.4–7.8	<2	Low	Moderate	Low.
75–100	40–55	20–30	4–7	2.0–6.0	0.14–0.17	7.4–7.8	<2	Low	Moderate	Low.
75–100	40–55	20–30	4–7	2.0–6.0	0.12–0.15	7.4–8.4	<2	Low	Moderate	Low.
80–100	35–50	20–30	4–7	2.0–6.0	0.14–0.17	6.1–7.3	<2	Low	Low	Low.
80–100	30–50	20–30	4–7	2.0–6.0	0.12–0.15	6.1–7.3	<2	Low	Moderate	Low.
75–100	20–40	<25	NP–4	2.0–6.0	0.08–0.10	6.1–7.3	<2	Low	Moderate	Low.
90–100	75–95	50–70	22–40	0.06–0.2	0.11–0.16	6.6–7.8 7.4–8.4	<2	High	High	Moderate.

Salinity rating	*Salinity in millimhos per centimeter*
None	Less than 2.0
Low	2.0 to 4.0
Moderate	4.0 to 8.0
High	8.0 to 16.0
Very high	More than 16.0

Shrink-swell potential is an indication of the volume change in the soil material to be expected with changes in moisture content. Shrinking and swelling of soils cause much damage to building foundations, roads, and other structures. A high shrink-swell potential indicates a hazard to the maintenance of structures constructed in, on, or with such material.

As used in table 5, *risk of corrosion* 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, total acidity, texture, and electrical conductivity of the soil material. Risk of corrosion for concrete is influenced mainly by the content of sodium or magnesium sulfate but also by soil texture and acidity. Corrosion is more likely to damage installations of uncoated steel that intersect soil boundaries or soil horizons than installations entirely in one kind of soil or in one soil horizon. A corrosivity rating of *low* means that the probability of self-induced corrosion damage is low; *high* means that there is a high probability of damage so that protective measures for steel and more resistant concrete need to be used in avoiding or minimizing damage.

Engineering interpretations

Interpretations in table 6 are based on the engineering properties of soils shown in table 5, on test data in tables 7 and 8, and on the experience of engineers and soil scientists with the soils of Dewey County. In table 6, ratings summarize the limitation or suitability of the soils for all listed purposes other than drainage of cropland and pasture, irrigation, pond reservoirs, embankments, and terraces and diversions. For these uses, table 6 lists the 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 favorable for the rated use. *Moderate* means that some soil properties are unfavorable but can be over-

TABLE 6.—*Engineering*

[An asterisk in the first column indicates that at least one mapping unit in this series is made up of two or more kinds of soil. fully the instructions for referring to other series

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill	Local roads and streets
Absher: AbA, AcA No valid interpretations can be made for Slickspots part of AcA.	Severe: very slow permeability.	Slight	Severe: silty clay and clay textures.	Severe: high shrink swell.	Severe: silty clay and clay textures.	Severe: high shrink swell.
Agar: AgB	Moderate: moderate permeability.	Moderate: moderate permeability.	Slight	Moderate: moderate shrink swell.	Slight	Severe: AASHO group index more than 8.
Archin: ArB No valid interpretations can be made for Slickspots part.	Slight if tile is placed in substratum; severe if placed in subsoil.	Severe: moderately rapid permeability in substratum.	Moderate: compact claypan subsoil.	Moderate: moderate shrink swell.	Severe: moderately rapid permeability in substratum.	Moderate: moderate shrink swell in subsoil.
Arvada: AsA No valid interpretations can be made for Slickspots part.	Severe: very slow permeability.	Slight	Severe: clay texture.	Severe: high shrink swell.	Severe: clay texture.	Severe: high shrink swell.
Banks Mapped only with Trembles soils.	Severe: subject to flooding.[2]	Severe: subject to flooding; rapid permeability.	Severe: loamy sand and sand textures.	Severe: subject to flooding.	Severe: subject to flooding; rapid permeability.	Moderate: subject to flooding.
*Belfield: BdA, BrA, BrB, BrC. For Daglum part of BdA, see Daglum series; for Reeder part of BrA, BrB, and BrC, see Reeder series.	Severe: slow permeability.	Slight if slope is less than 2 percent, moderate if 2 to 7, severe if 7 to 9.	Moderate: clay loam and silty clay textures.	Severe: high shrink swell.	Moderate: clay loam and silty clay textures.	Severe: CH or CL material; plasticity index more than 15.
*Cabba: CbE, CbF For Lantry part of CbE and CbF, see Lantry series.	Severe: less than 20 inches to sandstone; more than 15 percent slopes.	Severe: less than 20 inches to sandstone; more than 15 percent slopes.	Severe: slopes more than 15 percent.	Severe: slopes more than 15 percent; less than 20 inches to sandstone.	Severe: less than 20 inches to sandstone.	Severe: more than 15 percent slopes.
Canning: CdA	Slight[2]	Severe: rapid permeability in substratum.	Severe: sand and gravel at 20 to 40 inches.	Slight	Severe: rapid permeability in substratum.	Moderate: moderate shrink swell; AASHO group index 5 to 8 in soil above sand and gravel.

interpretations

The soils in such mapping units may have different properties and limitations, and for this reason it is necessary to follow care-
that appear in the first column of this table]

Suitability as source of—			Soil features affecting—				
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: claypan near surface.	Possible seepage in substratum.	High compressibility; fair to poor stability.	Very slow permeability; claypan subsoil. [1]	Claypan subsoil; very slow permeability.	Claypan subsoil; very slow permeability.
Poor: mostly CL material with plasticity index more than 15.	Unsuited: no sand or gravel.	Good to a depth of 8 inches, fair below; silty clay loam texture below 8 inches.	Moderate permeability.	Poor resistance to piping in substratum.	Moderate permeability; gently sloping.	High available water capacity; deep root zone; moderately slow water intake rate.	Moderate permeability; long, smooth slopes.
Fair: moderate shrink swell in subsoil; good below a depth of 22 inches.	Unsuited: fines.	Poor: 8 inches of fine sandy loam over claypan subsoil.	Possible seepage in substratum.	Poor stability; poor resistance to piping.	Slow permeability; claypan subsoil. [1]	Claypan subsoil; slow permeability.	Claypan subsoil; slow permeability; susceptible to soil blowing.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: 2 inches of silt loam over claypan subsoil.	Very slow permeability.	High volume change; difficult to vegetate.	Very slow permeability; claypan subsoil. [1]	Claypan subsoil; very slow permeability.	Claypan subsoil; very slow permeability.
Good	Poor: fines	Poor: loamy sand and sand textures.	Highly permeable material; high seepage.	Sandy material; high seepage; poor resistance to piping.	Subject to flooding. [1]	Low available water capacity; very rapid water intake rate.	([1]).
Poor: high shrink swell.	Unsuited: no sand or gravel.	Good to a depth of 11 inches, fair to poor below; clay loam and silty clay textures.	Moderately slow permeability in substratum; low seepage.	High shrink swell; medium or high compressibility.	Moderately slow permeability in substratum; nearly level to sloping. [1]	Slow water intake rate; moderate or high available water capacity; deep root zone.	Slow permeability; most slopes are long and smooth.
Fair if slope is less than 25 percent, poor if more than 25.	Unsuited: no sand or gravel.	Poor: less than 20 inches to bedrock.	High seepage; less than 20 inches to soft sandstone.	Limited material; poor resistance to piping.	([1])	Shallow to sandstone; hilly and steep slopes; very low or low available water capacity.	Shallow to sandstone; hilly and steep, short slopes; erosive.
Fair: moderate shrink swell in soil above sand and gravel; good below 26 inch depth.	Good or fair: some fines.	Good to a depth of 6 inches, fair to a depth of 6 to 22 inches; clay loam below 6 inches.	Sand and gravel substratum; high seepage.	Fair to good stability; possible piping hazard.	Rapid permeability in substratum; nearly level.	Low or moderate available water capacity; moderate water intake rate.	20 to 40 inches to sand and gravel.

TABLE 6.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill	Local roads and streets
*Chantier: ChB, CsC—For Shale land part of CsC, see Shale land.	Severe: very slow permeability; less than 20 inches to shale.	Moderate if slope is 2 to 7 percent, severe if more than 7; less than 20 inches to nearly impervious shale.	Severe: clay texture; less than 20 inches to shale.	Severe: high shrink swell; less than 20 inches to shale.	Severe: clay texture; less than 20 inches to shale.	Severe: high shrink swell; less than 20 inches to shale.
Daglum: DaA	Severe: very slow permeability.	Slight	Severe: silty clay texture.	Severe: high shrink swell.	Severe: silty clay texture.	Severe: high shrink swell.
*Dupree: DoB, DsE—For Opal part of DoB, see Opal series; for Sansarc part of DsE, see Sansarc series.	Severe: very slow permeability; less than 20 inches to shale.	Moderate if slope is 2 to 7 percent, severe if more than 7; less than 20 inches to nearly impervious shale.	Severe: clay texture; less than 20 inches to shale.	Severe: high shrink swell; less than 20 inches to shale.	Severe: clay texture; less than 20 inches to shale.	Severe: high shrink swell; less than 20 inches to shale.
Ekalaka: EkA, EkC	Slight if tile is placed below 26 inches.	Severe: moderately rapid permeability in substratum.	Moderate: compact claypan subsoil.	Slight	Severe: moderately rapid permeability in substratum.	Slight
Farland: FaA, FaB	Moderate: moderate permeability.	Moderate: moderate permeability.	Moderate: clay loam subsoil.	Moderate: moderate shrink swell in subsoil.	Moderate: clay loam subsoil; possible seepage below depth of 5 feet.	Moderate: ML or CL material; moderate shrink swell in subsoil.
*Flasher: FbF, FvD, FvE. For Vebar part of FvD and FvE, see Vebar series.	Severe: less than 20 inches to soft sandstone.	Severe: rapid permeability.	Moderate if slope is less than 15 percent, severe if more than 15; less than 20 inches to rippable sandstone.	Moderate if slope is less than 15 percent, severe if more than 15; less than 20 inches to rippable bedrock.	Severe: rapid permeability.	Moderate if slope is less than 15 percent, severe if more than 15; less than 20 inches to rippable bedrock.
*Glenross: Gb, Gr—For Regan part of Gr, see Regan series.	Severe: high water table.	Severe: high water table.	Severe: poorly drained; high water table.	Severe: poorly drained; high water table.	Severe: poorly drained; high water table.	Severe: poorly drained.

interpretations—Continued

Suitability as source of—			Soil features affecting—				
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
Poor: high shrink swell; less than 20 inches to shale.	Unsuited: no sand or gravel.	Poor: clay texture; salts.	Very slow permeability; less than 20 inches to nearly impervious shale.	Limited material; high volume change; susceptible to sliding.	(1)----------	Less than 20 inches to shale; very slow permeability; high concentrations of salt; very low available water capacity.	Less than 20 inches to shale; clay texture; very slow permeability.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: 7 inches of silt loam over claypan subsoil.	Very slow permeability; low seepage.	High shrink swell; medium to high compressibility.	Very slow permeability; claypan subsoil. [1]	Claypan subsoil; very slow permeability.	Very slow permeability; claypan subsoil.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: clay texture.	Very slow permeability; less than 20 inches to nearly impervious shale.	Limited material; high volume change; susceptible to sliding.	(1)----------	Less than 20 inches to shale; very low available water capacity; gently sloping to very steep.	Clay texture; very slow permeability; less than 20 inches to shale.
Fair: SM or ML material; more than 30 percent fines.	Poor: fines, no gravel.	Good to a depth of 14 inches, poor below; claypan subsoil.	High seepage; moderately rapid permeability in substratum.	Sandy material; poor resistance to piping.	Slow permeability; claypan subsoil. [1]	Susceptible to soil blowing; low or moderate available water capacity; claypan subsoil.	Claypan subsoil; slow permeability.
Fair: moderate shrink swell.	Unsuited: no sand or gravel.	Good to a depth of 8 inches, fair below; clay loam texture.	Moderate permeability.	Medium to high compressibility; moderate shrink swell; possible piping in substratum material.	Moderate permeability; nearly level or gently sloping.	High available water capacity; deep root zone; moderately slow water intake rate.	Long, smooth, nearly level to gently sloping areas; moderate permeability.
Good if slope is less than 15 percent, fair if 15 to 25, poor if more than 25.	Unsuited: less than 20 inches to soft sandstone; fines, no gravel.	Poor: loamy fine sand; less than 20 inches to bedrock.	High seepage; less than 20 inches to soft sandstone.	Limited material; poor resistance to piping; high seepage.	(1)----------	Very low available water capacity; less than 20 inches to soft sandstone; undulating to steep areas.	Sandy texture; less than 20 inches to soft sandstone; susceptible to soil blowing; undulating to steep, short slopes.
Poor: poorly drained.	Poor: fines; no gravel; high water table.	Poor: poorly drained; thin surface layer; salts.	High water table; good dugout site.	Good stability in subsoil; poor stability and poor resistance to piping in substratum.	High water table; wet areas lower than available outlets.	High water table; high salt concentrations.	(1).

TABLE 6.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill	Local roads and streets
Havrelon Mapped only with Lohler soils.	Moderate or severe: moderate permeability; some areas subject to flooding.	Moderate or severe: moderate permeability; some areas subject to flooding.	Moderate or severe: some areas subject to flooding; clay loam texture below 38 inches.	Moderate or severe: moderate shrink swell; some areas subject to flooding.	Moderate or severe: some areas subject to flooding; clay loam texture below 38 inches.	Moderate or severe: moderate shrink swell; some areas subject to flooding.
Heil: Hc	Severe: very slow permeability; frequent flooding.	Severe: frequent flooding; slight if water not likely to enter or damage lagoon.	Severe: frequent flooding; clay texture.	Severe: frequent flooding; high shrink swell.	Severe: frequent flooding; clay texture.	Severe: poorly drained; frequent flooding; high shrink swell.
Hurley: HsB No valid interpretations can be made for Slickspots part.	Severe: very slow permeability.	Moderate if slope is 2 to 7 percent, severe if more than 7.	Severe: clay texture.	Severe: high shrink swell.	Severe: clay texture.	Severe: high shrink swell.
Intermittent lakes: In. Severe limitations for most uses.						
*Lantry: LmD For Morton part of LmD, see Morton series.	Severe: 20 to 40 inches to sandstone.	Severe: 20 to 40 inches to sandstone.	Moderate if slope is less than 15 percent, severe if more than 15; 20 to 40 inches to bedrock.	Moderate if slope is less than 15 percent, severe if more than 15; ML or CL material; rippable bedrock.	Severe: 20 to 40 inches to sandstone.	Moderate if slope is less than 15 percent, severe if more than 15; ML or CL material; 20 to 40 inches to soft bedrock.
*Lohler: Lo, Lp For Havrelon part of Lp, see Havrelon series.	Severe: moderately slow to slow permeability; subject to flooding.	Severe: subject to flooding.	Severe: silty clay texture in upper 22 inches; subject to flooding.	Severe: high shrink swell; subject to flooding.	Severe: subject to flooding; silty clay and silty clay loam texture.	Severe: high shrink swell.
Lowry: LwA, LwB	Slight[2]	Severe: moderately rapid permeability below a depth of 55 inches.	Slight	Slight	Severe: moderately rapid permeability below a depth of 55 inches.	Moderate: AASHO group index of 5 to 10; moderate frost-action potential.
Mine pits and dumps: Ma. Severe limitations for most uses.						

interpretations—Continued

Suitability as source of—			Soil features affecting—				
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
Fair: moderate shrink swell.	Unsuited: possible source of sand and gravel below 60 inches.	Good	Some areas subject to flooding; nearly level; moderate permeability.	Fair to good stability and compaction characteristics.	Moderate permeability; some areas subject to flooding.	High available water capacity; some areas subject to flooding.	(1).
Poor: poorly drained; high shrink swell.	Unsuited: no sand or gravel.	Poor: poorly drained.	Good dugout site; frequent ponding.	Clayey material; high volume change; fair to poor stability and compaction characteristics.	Very slow permeability; clay texture; frequent ponding.	Frequent ponding; poorly drained; claypan subsoil.	(1).
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: 3 inches of silty clay loam over claypan subsoil.	Very slow permeability; 20 to 40 inches to nearly impervious shale.	High volume change; fair to poor stability and compaction characteristics.	Very slow permeability; clay texture; shale at a depth of 20 to 40 inches. [1]	Claypan subsoil; very slow permeability.	Claypan subsoil; very slow permeability.
Fair if slope is less than 25 percent, severe if more than 25; ML or CL material.	Unsuited: no sand or gravel.	Poor: thin layer.	20 to 40 inches to bedrock; possible seepage in fractures of bedrock.	Limited material; medium or high compressibility; poor or good resistance to piping.	20 to 40 inches to bedrock; gently undulating to steep areas. [1]	20 to 40 inches to bedrock; low or moderate available water capacity; gently sloping to steep areas.	20 to 40 inches to bedrock; gently undulating to steep areas; mostly short, irregular slopes.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: silty clay texture.	Subject to flooding; nearly level.	High volume change; fair to poor stability and compaction characteristics.	Moderately slow or slow permeability; subject to flooding.	Moderate or high available water capacity; subject to flooding; slow water intake rate.	(1).
Fair: AASHO group index of 5 to 10.	Unsuited: possible source below a depth of 60 inches.	Good	Moderate permeability; possible seepage in substratum.	Poor stability and compaction characteristics; poor resistance to piping.	Moderate permeability; moderately rapid permeability below a depth of 55 inches.	High available water capacity; moderate water intake rate; deep root zone.	Long, smooth slopes; erosive; moderate permeability.

TABLE 6.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill	Local roads and streets
*Moreau: MbD. For Wayden part of MbD, see Wayden series.	Severe: slow permeability; 20 to 40 inches to shale.	Severe: 20 to 40 inches to shale.	Severe: silty clay and clay textures.	Severe: high shrink swell.	Severe: silty clay and clay textures; 20 to 40 inches to rippable bedrock.	Severe: high shrink swell.
*Morton: McB, MdA, MdB, MfA, MgB. For Belfield part of MdA and MdB, see Belfield series; for Farland part of MfA, see Farland series; for Lantry part of MgB, see Lantry series.	Severe: less than 40 inches to bedrock.	Severe: less than 40 inches to bedrock.	Moderate: less than 40 inches to rippable bedrock.	Moderate: moderate shrink swell; less than 40 inches to rippable bedrock.	Moderate: less than 40 inches to rippable bedrock.	Moderate or severe: AASHO group index of 5 to 15.
Natriborolls, channeled: Na. Too variable to be rated.						
*Opal: OaB, OhB, OpA, OsC, OtB. For Hurley part of OhB, see Hurley series; for Promise part of OpA, see Promise series; for Sansarc part of OsC, see Sansarc series. No valid interpretations can be made for Slickspots part of OtB.	Severe: very slow permeability; 20 to 40 inches to shale.	Slight if slope is 0 to 2 percent, moderate if 2 to 7, severe if more than 7; nearly impervious shale.	Severe: clay texture.	Severe: high shrink swell.	Severe: clay texture.	Severe: high shrink swell.
*Parshall: Pa, Pe. For Ekalaka part of Pe, see Ekalaka series.	Slight [2]	Severe: moderately rapid permeability.	Severe: subject to run-in water; loamy fine sand and fine sand textures in substratum.	Severe: subject to run-in water.	Severe: moderately rapid permeability. [2]	Moderate: subject to run-in water.
*Promise: PrA, PrB, PsA, Pw. For Swanboy part of Pw, see Swanboy series. No valid interpretations can be made for Slickspots part of PsA.	Severe: very slow or slow permeability.	Slight if slope is less than 2 percent, moderate if 2 to 6.	Severe: clay and silty clay textures.	Severe: high shrink swell.	Severe: clay and silty clay textures.	Severe: high shrink swell.

interpretations—Continued

Suitability as source of—			Soil features affecting—				
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: silty clay and clay textures.	20 to 40 inches to shale; possible lateral seepage.	High volume change; limited material; fair to poor stability.	Slow permeability; 20 to 40 inches to shale.[1]	Low available water capacity; 20 to 40 inches to shale; mostly sloping to steep areas.	Slow permeability; 20 to 40 inches to shale; gently undulating to steep areas; short, irregular slopes.
Fair or poor: ML–CL or CL material; AASHO group index of 5 to 15.	Unsuited: no sand or gravel.	Good	Moderate permeability; possible seepage in fractures of bedrock.	Limited material; medium or high compressibility.	Moderate permeability; 20 to 40 inches to bedrock.	Moderate available water capacity; moderately slow water intake rate; 20 to 40 inches to bedrock.	Moderate permeability; 20 to 40 inches to bedrock.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: clay texture.	Very slow permeability; 20 to 40 inches to nearly impervious shale.	High volume change; fair to poor stability and compaction characteristics.	Very slow permeability; 20 to 40 inches to shale; clay texture.[1]	20 to 40 inches to shale; very slow permeability; low or very low available water capacity.	20 to 40 inches to shale; very slow permeability.
Fair: SM or ML material; more than 30 percent fines.	Poor: fines; no gravel.	Good	Moderately rapid permeability; high seepage.	Poor resistance to piping; moderate permeability when compacted.	Subject to run-in water; moderately rapid permeability.	Subject to run-in water; moderate available water capacity; moderately rapid water intake rate.	Moderately rapid permeability.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: clay texture.	Very slow or slow permeability; low seepage.	High volume change; fair to poor stability and compaction characteristics; erosive.	Very slow or slow permeability.	Low or moderate available water capacity; very slow water intake rate; deep root zone.	Very slow or slow permeability; clay texture; long, smooth slopes.

TABLE 6.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill	Local roads and streets
Reeder: RaA, RaB, RaC	Severe: 20 to 40 inches to sandstone.	Severe: 20 to 40 inches to sandstone.	Moderate: 20 to 40 inches to rippable sandstone.	Moderate: 20 to 40 inches to rippable sandstone.	Moderate: 20 to 40 inches to rippable sandstone.	Moderate: AASHO group index mostly 5 to 8.
Regan Mapped only with Glenross series.	Severe: high water table.[2]	Severe: high water table.	Severe: very poorly drained; high water table.	Severe: very poorly drained; high water table.	Severe: very poorly drained; high water table.	Severe: very poorly drained.
*Regent: RbC, RmB, RpA, RpB. For Moreau part of RmB, see Moreau series; for Ridgeview part of RpA and RpB, see Ridgeview series.	Severe: slow permeability; 20 to 40 inches to shale.	Slight if slope is less than 2 percent, moderate if 2 to 7, severe if more than 7.	Severe: silty clay texture.	Severe: high shrink swell.	Severe: silty clay texture.	Severe: high shrink swell.
Reliance: RsA, RsB	Severe: moderately slow permeability.	Slight if slope is less than 2 percent, moderate if 2 to 6; 40 to 60 inches to nearly impervious shale.	Slight	Severe or moderate: moderate or high shrink swell.	Moderate: silty clay loam texture.	Severe: CL or CH material; plasticity index more than 15.
*Rhoades: RtB For Daglum part of RtB, see Daglum series.	Severe: very slow permeability.	Moderate: 2 to 6 percent slopes.	Severe: silty clay texture.	Severe: high shrink swell.	Severe: silty clay texture.	Severe: high shrink swell.
Ridgeview: RvA	Severe: slow permeability.	Slight if slope is less than 2 percent, moderate if 2 to 6.	Severe: silty clay and clay textures.	Severe: high shrink swell.	Severe: silty clay and clay textures.	Severe: high shrink swell.

interpretations—Continued

Suitability as source of—			Soil features affecting—				
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
Fair: AASHO group index mostly 5 to 8.	Unsuited: no sand or gravel.	Good	20 to 40 inches to sandstone; possible seepage in substratum.	Limited material; poor stability; poor resistance to piping.	Moderate permeability; 20 to 40 inches to soft sandstone.	Low or moderate available water capacity; moderately slow water intake rate; 20 to 40 inches to bedrock.	20 to 40 inches to bedrock; moderate permeability.
Poor: very poorly drained.	Poor for sands: fines; seasonal water table; no gravel.	Poor: very poorly drained.	Fluctuating water table; good dugout site.	Poor stability; poor resistance to piping.	High water table; areas generally lower than available outlets.	Fluctuating water table; difficult to drain; salts.	[1].
Poor: high shrink swell.	Unsuited: no sand or gravel.	Fair to a depth of 6 inches, poor below; silty clay loam and silty clay textures.	Slow permeability; 20 to 40 inches to shale; possible lateral seepage in shale.	High shrink swell; fair to poor stability and compaction characteristics.	Slow permeability; 20 to 40 inches to shale.	Low or moderate available water capacity; slow water intake rate; 20 to 40 inches to shale; nearly level to sloping areas.	Long, convex slopes; 20 to 40 inches to shale.
Poor: CL or CH material; plasticity index more than 15.	Unsuited: no sand or gravel.	Fair: silty clay loam texture.	Moderately slow permeability.	Moderate or high shrink swell; fair to poor stability and compaction characteristics.	Moderately slow permeability; nearly level to gently sloping.	Moderate or high available water capacity; slow water intake rate; nearly level to gently sloping.	Long, smooth, nearly level to gently sloping areas; moderately slow permeability.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: less than 4 inches of loam over claypan subsoil.	Very slow permeability; low seepage.	High shrink swell; fair to poor stability and compaction characteristics.	Very slow permeability; claypan subsoil. [1]	Claypan subsoil; very slow permeability; possible salt accumulation.	Claypan subsoil; very slow permeability.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: less than 8 inches of silty clay loam over silty clay and clay textures.	Slow permeability; low seepage.	Clayey material; high volume change; fair or poor stability and compaction characteristics.	Slow permeability; nearly level or gently sloping.	Moderate or high available water capacity; very slow water intake rate; nearly level to gently sloping.	Slow permeability; clayey texture; nearly level to gently sloping; mostly long slopes.

TABLE 6.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill	Local roads and streets
*Sansarc: SaE, SbC, SbE, ScF. For Dupree part of SaE, see Dupree series; for Opal part of SbC and SbE, see Opal series; for Shale land part of ScF, see Shale land.	Severe: slow permeability; less than 20 inches to nearly impervious shale.	Severe: most slopes more than 7 percent.	Severe: clay texture.	Severe: high shrink swell.	Severe: clay texture.	Severe: high shrink swell.
*Schamber: SdC, SfF. For Sansarc part of SfF, see Sansarc series.	Slight [2] if slope is less than 8 percent, moderate if 8 to 15, severe if more than 15.	Severe: rapid permeability.	Severe: very gravelly material.	Slight if slope is less than 8 percent, moderate if 8 to 15, severe if more than 15.	Severe: rapid permeability.	Slight if slope is less than 8 percent, moderate if 8 to 15, severe if more than 15.
Shale land: Sh	Severe: very slow permeability.	Severe: most slopes more than 7 percent.	Severe: bedded shale.	Severe: high shrink swell.	Severe: clay shales.	Severe: high shrink swell.
Shambo: Sm	Slight or moderate: moderate permeability.	Moderate: moderate permeability.	Slight	Slight	Slight	Moderate: moderate frost-action potential.
Swanboy: Sw, Sy. No valid interpretations can be made for Slickspots part of Sy.	Severe: very slow permeability.	Slight	Severe: clay texture.	Severe: high shrink swell.	Severe: clay texture.	Severe: high shrink swell.
Tally: Ta	Slight [2]	Severe: moderately rapid permeability.	Severe: loamy fine sand texture in substratum.	Slight	Severe: moderately rapid permeability.	Slight
*Trembles: Th, Tr. For Havrelon part of Th, see Havrelon series; for Banks part of Tr, see Banks series.	Slight or severe: some areas subject to flooding. [2]	Severe: moderately rapid permeability.	Slight or severe: some areas subject to flooding.	Slight or severe: some areas subject to flooding.	Severe: moderately rapid permeability.	Slight or severe: some areas subject to flooding.

interpretations—Continued

Suitability as source of—			Soil features affecting—				
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: clay texture.	Slow permeability; less than 20 inches to shale; possible lateral seepage in shale.	Limited material; high volume change; fair to poor stability and compaction characteristics.	Well drained. [1]	Very low available water capacity; less than 20 inches to shale; mostly sloping to steep.	Less than 20 inches to shale; sloping to steep.
Good if slope is less than 15 percent, fair if 15 to 25, poor if more than 25.	Good or fair depending on amount of fines.	Poor: gravelly surface layer; coarse textured below.	Rapid permeability; high seepage.	High seepage; high permeability if compacted.	([1])	Very shallow to sand and gravel; rapid permeability; very low or low available water capacity.	Very shallow to sand and gravel; short, irregular slopes; rapid permeability.
Severe: high shrink swell.	Unsuited	Unsuited: shale at a depth of less than 6 inches.	Very slow permeability; very shallow to shale; mostly steep slopes.	Poor stability and compaction characteristics.	([1])	Unsuited	([1]).
Fair: ML–CL or ML material; plasticity index less than 15.	Unsuited: no sand or gravel.	Good	Moderate permeability; possible seepage in substratum.	Poor stability, compaction characteristics, and resistance to piping.	Moderate permeability; nearly level areas.	High available water capacity; deep root zone; moderately slow water intake rate.	Moderate permeability; nearly level.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: clay texture.	Very slow permeability; low seepage.	High volume change; fair to poor stability and compaction characteristics.	Very slow permeability; salts; clayey material.	Very slow permeability; high salt concentrations.	Very slow permeability; clay texture.
Good	Poor: fines; no gravel.	Good	Moderately rapid permeability; high seepage.	Poor resistance to piping; moderate permeability if compacted.	Moderately rapid permeability; nearly level.	Moderate available water capacity; moderately rapid water intake rate; deep root zone.	Moderately rapid permeability; nearly level.
Fair: SM or ML material; more than 30 percent fines.	Poor or unsuited: fines; possible source below 60 inches.	Good	Moderately rapid permeability; high seepage.	Poor resistance to piping; moderate permeability if compacted.	Moderately rapid permeability; some areas subject to flooding.	Moderate or high available water capacity; moderately rapid water intake rate; deep root zone.	([1]).

TABLE 6.—*Engineering*

Soil series and map symbols	Degree and kind of limitation for—					
	Septic tank absorption fields	Sewage lagoons	Shallow excavations	Dwellings with basements	Sanitary landfill	Local roads and streets
*Vebar: VeB, VfB---------- For Flasher part of VfB, see Flasher series.	Severe: 20 to 40 inches to sandstone.	Severe: moderately rapid permeability; 20 to 40 inches to sandstone.	Moderate: 20 to 40 inches to rippable sandstone.	Moderate: 20 to 40 inches to rippable sandstone.	Severe: moderately rapid permeability.	Slight if slope is less than 8 percent, moderate if 8 to 15, severe if more than 15.
*Wayden: WaF---------- For Moreau part of WaF, see Moreau series.	Severe: slow permeability; less than 20 inches to shale; slopes more than 8 percent.	Severe: less than 20 inches to shale; slopes more than 7 percent.	Severe: silty clay and clay textures; less than 20 inches to rippable shale.	Severe: high shrink swell.	Severe: silty clay and clay textures; less than 20 inches to rippable shale.	Severe: high shrink swell.

[1] Generally not applicable.

come by special planning or design. *Severe* means that soil properties are so unfavorable and so difficult to correct or overcome that major soil reclamation and special designs are required.

Soil suitability is expressed as *good, fair,* and *poor,* which have respectively meanings that are similar to the terms slight, moderate, and severe.

Septic tank absorption fields are affected by the kind of soil material within a depth of 18 inches to 6 feet. Permeability, depth to water table, depth to bedrock, and susceptibility to flooding are soil properties that affect the absorption of effluent. Soil slope affects difficulty of layout and construction and also increases the risk of soil erosion, lateral seepage, and downslope flow of effluent.

Sewage lagoons are affected by such soil properties as permeability, soil slope, depth to water table, depth to bedrock, and susceptibility to flooding.

Shallow excavations, less than 6 feet deep, refer to those made for basements, graves, open ditches, pipelines, sewer lines, and underground cables. The ratings are affected by depth to water table, depth to bedrock, soil slope, soil texture, and susceptibility to flooding.

Dwellings with basements given ratings are affected by properties that relate to the ability of the soil to support load and resist settlement under load and to ease of excavation. The soil properties rated are shrink-swell potential, potential frost action, soil slope, depth to bedrock, and wetness resulting from a water table or from flooding.

Sanitary landfill is a method for disposing of solid wastes on or in the soil by spreading the waste in thin layers, compacting it to the smallest volume, and covering it with soil in a manner that provides maximum protection of the environment. The best soils are deep, well-drained soils that are moderately slowly permeable or moderately permeable, can withstand heavy traffic, and are easy to excavate.

Local roads and streets have an all-weather surface that is expected to carry automobile traffic all year, but no fast-moving heavy trucks. Ratings are based on soil drainage, soil slope, the AASHO and Unified classifications of soil material, shrink-swell potential, susceptibility to frost action, and depth to bedrock.

Road fill is soil material used in embankments for roads. The suitability ratings reflect the ease of excavating the material at borrow areas and the predicted performance of soil after it has been placed in an embankment that has been properly compacted and provided adequate drainage.

Ratings for *sand and gravel* are based on the probability that a soil is a source of sand and gravel. These areas are identified on the soil map. They provide guidance as to where to look for sand and gravel, but the ratings indicate source, not the size of the deposit.

Topsoil is soil material to be used in topdressing an area where vegetation is to be established and maintained. Suitability of a soil as a source of topsoil is affected by soil texture, slope, thickness of the material, coarse fragments, and the presence or absence of soluble salts or other toxic substances that affect fertility.

Pond reservoir areas are affected by soil features that influence seepage and storage potential. Those considered are permeability, depth to bedrock or other unfavorable material affecting seepage, depth to water table, and soil slope.

Embankments, dikes, and levees require soil material that is resistant to seepage and piping and is of favorable stability, shrink-swell potential, shear strength, and compactibility.

Drainage for crops and pasture is affected by soil

interpretations—Continued

Suitability as source of—			Soil features affecting—				
Road fill	Sand and gravel	Topsoil	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions
Fair: SM material; more than 30 percent fines.	Poor: fines; no gravel.	Good	Moderately rapid permeability; high seepage.	Poor resistance to piping; moderate permeability if compacted.	Moderately rapid permeability; 20 to 40 inches to soft sandstone.	Low available water capacity; moderately rapid water intake rate; 20 to 40 inches to bedrock.	20 to 40 inches to bedrock; subject to soil blowing; moderately rapid permeability.
Poor: high shrink swell.	Unsuited: no sand or gravel.	Poor: silty clay and clay textures.	Slow permeability; less than 20 inches to shale; possible lateral seepage in shale.	High volume change; limited material; fair to poor stability and compaction characteristics.	[1]	Very low available water capacity; less than 20 inches to shale; mostly rolling to steep.	Less than 20 inches to shale; short, convex, rolling to steep slopes; erosive.

[1] Possible source of pollution for domestic water supplies.

properties that affect the installation and performance of surface and subsurface drainage systems. These are soil permeability, depth to water table, stability in ditchbanks, flooding, and availability of outlets.

Irrigation is influenced by water intake rate, permeability, available water capacity, depth of rooting zone, salinity, soil slope, depth to water table, susceptibility to flooding, and the hazard of erosion and soil blowing.

Terraces and diversions are affected by features affecting their stability or hindering layout and construction. Other hazards are sedimentation in channels and the difficulty of establishing and improving a plant cover. Features that affect the suitability of a soil are the uniformity and steepness of soil slope, permeability, depth to bedrock or other unfavorable material, and susceptibility to erosion and soil blowing.

Engineering test data

Tables 7 and 8 contain engineering test data for some of the major soils in Dewey County. These tests were made to help evaluate the soils for engineering uses. The engineering classifications shown in these tables are based on data obtained by mechanical analysis and by tests to determine liquid limits and plastic limits. The mechanical analyses were made by combined sieve and hydrometer methods. All tests were made by the South Dakota Department of Highways.

Table 7 contains data on soil samples collected from 11 selected soil profiles at specific locations in the county. The depths from which each sample was taken and the horizon designation are given. All columns in this table have been previously explained except for moisture density.

Compaction, or moisture density, data are important in earthwork. If a soil material is compacted at successively higher moisture content, 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 compaction 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.

Table 8 is a summary of engineering tests made on samples collected along proposed highway routes in Dewey County and adjacent counties. The samples were taken at depths that reflected changes in color and texture. Therefore, some samples may include material from more than one major soil horizon. As a result, the range in properties shown in table 8 may differ from those shown for the same series in table 5.

Table 8 has one column not previously explained, the estimated CBR or *California bearing ratio*, defined as a ratio of the load-supporting capacity of a soil as compared to that of a standard crushed limestone. A soil having a CBR of 16 supports 16 percent of the load that would be supported by the standard crushed limestone, per unit area, and with the same degree of distortion.

Formation and Classification of the Soils

This section tells how the factors of soil formation have affected the soils in Dewey County. It also explains the system of soil classification currently used and classifies each soil series according to that system.

Factors of Soil Formation

Soil forms through the physical and chemical weath-

TABLE 7.—*Engineering test data on soil*

[Tests performed by the South

Soil and location	Parent material	Report number	Depth	Moisture-density[1]	
				Maximum dry density	Optimum moisture
			In	*Lb per cu ft*	*Pct*
Belfield loam: 1,700 feet south of northeast corner sec. 36, T. 17 N., R. 22 E.	Clayey shale of the Hell Creek Formation.	445 446	10–18 31–44	93 100	24 21
Dupree clay: 400 feet west of northeast corner sec. 18, T. 10 N., R. 27 E.	Clay from the Pierre Shale Formation.	453 454	3–13 [5]18–60	89 87	28 29
Glenross fine sandy loam: 1,160 feet north and 600 feet east of southwest corner sec. 31, T. 17 N., R. 24 E.	Sandy alluvium from Hell Creek and Fox Hills Formations.	441 442	1–4 9–26	106 107	17 18
Morton loam: 950 feet north and 1,850 feet east of southwest corner sec. 15, T. 12 N., R. 24 E.	Silt loams and loams weathered in place from loamy shale.	457 458	6–15 29–46	108 104	14 18
Reeder loam: 150 feet southwest of center sec. 5, T. 12 N., R. 22 E.	Sandy material from Fox Hills Formation.	462	9–24	104	17
Regent silty clay loam: 2,730 feet north and 225 feet west of southeast corner sec. 6, T. 13 N., R. 22 E.	Clayey beds of the Fox Hills Formation.	455 456	6–18 [5]38–60	89 88	26 28
Rhoades loam: 350 feet north of southwest corner sec. 26, T. 17 N., R. 22 E.	Clayey shale of the Hell Creek Formation.	444	[5]32–60	85	27
Sansarc clay: Northwest corner sec. 5, T. 11 N., R. 28 E.	Clay from Pierre Shale.	447 448	4–10 16–60	83 84	31 33
Schamber gravelly sandy loam: 3,150 feet east and 1,700 feet south of northwest corner sec. 34, T. 10 N., R. 27 E.	Old alluvium along Cheyenne River.	451 452	17–28 28–63	120 112	10 15
Trembles loam: 1,950 feet north and 790 feet east of southwest corner sec. 8, T. 14 N., R. 24 E.	Alluvium.	449 450	9–36 36–60	109 106	15 16
Vebar fine sandy loam: 360 feet west and 150 feet north of southeast corner sec. 35, T. 17 N., R. 24 E.	Loamy sand weakly consolidated material from Fox Hills Formation.	439 440	7–17 24–48	109 102	15 16

[1] Based on AASHO designation: T 99, Method A (*1*).

[2] Mechanical analysis according to AASHO Designation: T 88. Results by this procedure frequently may differ somewhat from results that would have been obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by the hydrometer method and the various grain-size fractions are calculated on the basis of all the material, including that 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 soil.

ering of deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by (1) the physical and mineral 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 and plant and animal life, chiefly plants, are active factors of soil formation. They act on the parent material that has accumulated through the

samples taken from 11 soil profiles

Dakota Department of Highways]

Mechanical analysis [2]						Liquid limit	Plasticity index	Classification	
Percentage passing sieve—					Percentage smaller than—			AASHO [3]	Unified [4]
3/8 inch	No. 4 (4.7 mm)	No. 10 (2.0 mm)	No. 40 (0.42 mm)	No. 200 0.074 mm)	0.005 mm				
						Pct			
		100	99	83	44	58	27	A–7–5(18)	MH–CH
			100	80	40	56	32	A–7–6(19)	CH
		100	98	97	73	65	39	A–7–6(20)	CH
		100	96	93	72	68	39	A–7–6(20)	CH
		100	99	47	30	33	12	A–6(3)	SC
	100	99	97	27	14	30	3	A–2–4(0)	SM
			100	77	32	36	16	A–6(11)	CL
	100	99	99	58	22	29	10	A–4(4)	CL
			99	52	29	33	10	A–4(3)	ML–CL
			100	98	58	63	36	A–7–6(20)	CH
			100	99	54	63	36	A–7–6(20)	CH
	100	99	99	94	57	72	39	A–7–5(20)	MH–CH
		100	99	98	72	77	40	A–7–5(20)	MH–CH
		100	97	95	70	80	42	A–7–5(20)	MH–CH
98	96	95	28	13	4	25	5	A–1–b(0)	SM–SC
93	86	70	19	4	2	19	1	A–1–b(0)	SW
			100	51	18	24	6	A–4(3)	ML–CL
			100	48	14	21	4	A–4(3)	SM–SC
		100	98	32	16	26	4	A–2–4(0)	SM–SC
100	99	98	94	22	13	26	7	A–2–4(0)	SM–SC

[3] Based on AASHO Designation M 145–49.
[4] Based on American Society for Testing Materials (*2*). 1974. Standard Method for Classification of Soils for Engineering Purposes. ASTM Stand. D2487. *In* 1974 Annual Book of ASTM Standards, Part 19.
[5] Soft bedrock.

weathering of rocks and slowly change it to soil material 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 profile that forms and, in some cases, determines it almost entirely. Finally, time is needed for changing the parent material into a soil profile. It may be much or little, but some time, usually a long time, is required for the formation 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

TABLE 8.—*Engineering test data on soil samples*

[Samples taken in Dewey County and surrounding counties.

Soil	Horizon	Number of samples tested	Mechanical analysis[1]					
			Percentage less than 3 inches passing sieve—					
			No. 10 (2.0 mm)		No. 40 (0.42 mm)		No. 200 (0.074 mm)	
			Range	Average	Range	Average	Range	Average
Absher.	A	2	----------	100	98–100	100	66–73	71
	B	22	99–100	100	98–100	100	62–100	81
	C	29	98–100	100	97–100	99	69–99	84
Agar.	A	26	98–100	100	94–100	98	75–100	90
	B	59	97–100	100	93–100	98	81–100	91
	C	90	95–100	100	90–100	97	75–100	90
Arvada.	B	6	79–100	94	71–100	90	57–100	82
	C	11	96–100	99	93–100	99	88–100	96
Belfield.	B	12	99–100	100	97–100	99	74–97	86
	C	3	----------	100	99–100	100	61–93	77
	C[6]	8	----------	100	87–100	97	59–100	84
Cabba.	C	5	97–100	99	96–100	98	52–100	80
	C[6]	7	99–100	100	93–100	98	49–100	82
Chantier.	A	2	98–100	100	94–100	98	90–97	94
	B	1	----------	100	----------	98	----------	96
	C	6	99–100	100	95–100	98	87–100	94
	C[6]	19	97–100	99	94–100	98	89–100	95
Daglum.	C	2	----------	100	----------	100	66–84	75
Dupree.	A	1	----------	100	----------	97	----------	94
	B	3	90–100	97	86–100	95	83–100	92
	C	4	98–100	100	96–100	99	89–98	94
	C[6]	30	99–100	100	94–100	98	86–100	95
Ekalaka.	A	17	98–100	100	97–100	98	34–84	59
	B	13	98–100	100	87–100	97	49–72	60
	C	39	94–100	99	83–100	96	31–77	54
Farland.	A	4	98–100	99	96–100	98	65–94	79
	B	8	96–100	99	93–100	97	68–90	79
	C	4	94–100	99	86–100	96	70–95	83
	2C	6	94–100	99	90–100	97	32–81	57
Flasher.	A	7	98–100	100	94–100	98	26–56	41
	C	51	86–100	98	78–100	95	17–58	37
	C[6]	42	96–100	99	92–100	98	16–91	54
Havrelon.	C	1	----------	99	----------	99	----------	60
	2C	4	95–100	99	93–100	98	26–89	58
Heil.	A	1	----------	97	----------	90	----------	68
	B	4	94–100	98	85–100	93	61–97	79
Hurley.	A	4	----------	100	93–100	96	74–99	87
	B	10	99–100	100	95–100	99	87–100	96
	C	29	97–100	99	94–100	98	74–100	91
	C[6]	18	96–100	99	86–100	98	79–100	94
Lowry.	A	6	82–100	96	74–100	94	63–100	89
	B	29	99–100	100	93–100	98	63–100	87
	C	31	91–100	99	73–100	95	51–100	85
	2C	9	38–100	83	0–100	59	0–96	40
Moreau.	B	6	----------	100	----------	100	93–99	96
	C	6	----------	100	99–100	100	95–100	98

taken along proposed highway routes

Tests performed by the South Dakota Department of Highways]

Liquid limit [2]		Plasticity index [3]		Classification			Estimated CBR
Range	Average	Range	Average	AASHO [4] (Old index)	AASHO [5] (New index)	Unified	
26–40	33	9–19	14	A–6(9)	A–6(8)	CL	7
23–80	51	5–56	30	A–7–6(18)	A–7–6(26)	CH	3
26–75	50	7–53	29	A–7–6(18)	A–7–6(26)	CL	3
34–47	41	12–19	15	A–7–6(10)	A–7–6(15)	ML–CL	5
35–46	41	12–27	19	A–7–6(12)	A–7–6(19)	CL	5
32–48	40	9–28	18	A–6(12)	A–6(17)	CL	5
27–91	59	6–66	36	A–7–6(20)	A–7–6(31)	CH	2
15–92	53	3–58	30	A–7–6(19)	A–7–6(33)	CH	3
37–68	52	19–40	29	A–7–6(18)	A–7–6(27)	CH	3
30–54	42	8–33	20	A–7–6(12)	A–7–6(15)	CL	5
45–59	52	18–39	28	A–7–6(18)	A–7–6(25)	CH	3
30–52	41	13–28	20	A–7–6(12)	A–7–6(16)	CL	5
26–69	48	4–34	18	A–7–6(13)	A–7–6(17)	ML–CL	4
66–69	60	36–53	44	A–7–6(20)	A–7–6(47)	CH	1
	83		49	A–7–6(20)	A–7–5(57)	MH–CH	1
70–93	82	41–62	51	A–7–5(20)	A–7–5(57)	CH	1
74–117	96	47–82	64	A–7–5(20)	A–7–5(72)	CH	1
26–61	44	8–46	27	A–7–6(16)	A–7–6(19)	CL	4
	69		38	A–7–5(20)	A–7–5(42)	MH–CH	1
79–99	89	42–64	53	A–7–5(20)	A–7–5(58)	MH–CH	1
68–90	79	46–59	52	A–7–6(20)	A–7–6(56)	CH	1
64–114	89	36–86	60	A–7–6(20)	A–7–6(67)	CH	1
23–50	37	0–30	15	A–6(7)	A–6(7)	CL	6
29–59	44	12–33	22	A–7–6(11)	A–7–6(11)	CL	4
18–62	40	3–37	20	A–6(8)	A–6(8)	CL	5
32–61	46	8–39	23	A–7–6(14)	A–7–6(19)	CL	4
34–52	43	13–32	22	A–7–6(14)	A–7–6(18)	CL	4
35–53	44	15–32	23	A–7–6(14)	A–7–6(20)	CL	4
19–57	38	0–36	17	A–6(8)	A–6(7)	CL	6
23–38	30	4–16	10	A–4(1)	A–4(1)	SC	8
20–34	27	0–15	7	A–4(0)	A–4(0)	SM–SC	10
5–68	37	0–44	15	A–6(6)	A–6(6)	CL	6
	32		14	A–6(7)	A–6(6)	CL	8
20–34	27	0–15	6	A–4(5)	A–4(2)	ML–CL	10
	48		19	A–7–6(12)	A–7–6(13)	ML–CL	4
38–45	42	19–27	23	A–7–6(14)	A–7–6(18)	CL	5
48–57	53	20–32	26	A–7–6(17)	A–7–6(25)	MH–CH	3
52–92	72	22–63	42	A–7–6(20)	A–7–6(49)	CH	1
40–81	61	20–54	36	A–7–6(20)	A–7–6(37)	CH	2
61–100	80	33–67	50	A–7–5(20)	A–7–5(55)	CH	1
31–43	37	5–16	10	A–4(8)	A–4(10)	ML–CL	6
26–39	33	5–14	9	A–4(8)	A–4(8)	ML–CL	7
20–48	34	3–23	12	A–6(9)	A–6(10)	CL	7
4–55	30	0–23	9	A–4(1)	A–4(1)	SC	8
51–65	58	29–45	36	A–7–6(20)	A–7–6(39)	CH	2
53–65	59	33–43	38	A–7–6(20)	A–7–6(42)	CH	2

TABLE 8.—*Engineering test data on soil samples*

Soil	Horizon	Number of samples tested	Mechanical analysis[1]					
			Percentage less than 3 inches passing sieve—					
			No. 10 (2.0 mm)		No. 40 (0.42 mm)		No. 200 (0.074 mm)	
			Range	Average	Range	Average	Range	Average
Morton.	A	38	97–100	100	96–100	99	60–94	77
	B	37	95–100	99	93–100	98	58–91	75
	C	79	97–100	100	95–100	99	61–96	98
	C[6]	42	98–100	100	96–100	99	56–100	80
Opal.	A	51	99–100	100	94–100	98	84–100	93
	B	87	96–100	99	91–100	98	83–100	94
	C	131	99–100	100	96–100	99	89–100	96
	C[6]	263	97–100	100	93–100	99	86–100	96
Promise.	A	37	96–100	99	93–100	98	84–100	93
	B	110	97–100	99	92–100	98	85–100	95
	C	237	99–100	100	93–100	98	86–100	95
	C[6]	46	98–100	100	96–100	99	91–100	96
Reeder.	A	1	----------	98	----------	95	----------	59
	B	3	91–100	98	72–100	90	26–86	56
	C	9	71–100	95	64–100	91	27–72	49
	C[6]	3	----------	100	----------	100	83–96	90
Regent.	A	21	99–100	100	96–100	99	72–97	99
	B	42	97–100	100	92–100	98	73–100	87
	C	40	98–100	100	95–100	99	76–100	88
	C[6]	11	99–100	100	98–100	99	48–100	80
Reliance.	A	12	98–100	99	87–100	96	64–100	85
	B	31	98–100	100	92–100	98	68–100	88
	C	30	96–100	99	91–100	97	66–100	87
	C[6]	11	99–100	100	98–100	99	90–100	95
Rhoades.	A	10	95–100	99	91–100	97	44–94	69
	B	18	99–100	100	93–100	98	76–99	88
	C	47	91–100	99	89–100	98	66–100	86
	2C	6	98–100	100	96–100	99	43–95	69
	C[6]	52	99–100	100	94–100	99	60–100	86
Sansarc.	A	7	99–100	100	80–100	94	57–100	80
	C	28	97–100	99	93–100	98	80–100	92
	C[6]	105	98–100	100	94–100	98	85–100	94
Schamber.	A	3	46–100	82	22–100	69	6–78	42
	C	45	30–100	69	10–100	55	0–54	29
	2C	20	9–100	63	0–100	55	0–74	32
	C[6]	20	87–100	96	77–100	93	51–100	81
Swanboy.	A	28	99–100	100	95–100	98	85–100	93
	B	11	97–100	99	83–100	96	70–100	90
	C	98	93–100	99	85–100	96	75–100	90
	C[6]	8	99–100	100	94–100	99	91–100	97
Trembles.	C	5	----------	100	98–100	99	35–70	52
Vebar.	A	8	97–100	100	93–100	98	31–67	49
	B	9	96–100	99	93–100	98	34–67	51
	C	30	86–100	98	82–100	97	18–73	46

[1] Mechanical analysis according to AASHO Designation: T 88. Results by this procedure may differ somewhat from the results obtained by the soil survey procedure of the Soil Conservation Service (SCS). In the AASHO procedure, the fine material is analyzed by hydrometer method and the various grain-size fractions are calculated on the basis of all the material, up to and including that 3 inches 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 the calculations of grain-size fractions. The mechanical analysis data in this table are not intended for naming textural classes of soil.

taken along proposed highway routes—Continued

Liquid limit [2]		Plasticity index [3]		Classification			Estimated CBR
Range	Average	Range	Average	AASHO [4] (Old index)	AASHO [5] (New index)	Unified	
29–40	35	5–17	11	A–6(8)	A–6(8)	ML–CL	6
26–58	42	3–35	19	A–7–6(12)	A–7–6(14)	CL	5
25–54	40	8–33	20	A–6(12)	A–6(15)	CL	5
23–69	46	4–46	25	A–7–6(15)	A–7–6(20)	CL	4
45–79	62	18–46	32	A–7–5(20)	A–7–5(35)	MH–CH	2
53–88	71	29–58	43	A–7–6(20)	A–7–6(47)	CH	1
55–93	74	29–61	44	A–7–6(20)	A–7–6(51)	CH	1
56–98	77	30–65	47	A–7–6(20)	A–7–6(54)	CH	1
45–71	58	18–39	28	A–7–5(19)	A–7–5(31)	MH–CH	2
49–87	68	26–56	41	A–7–6(20)	A–7–6(45)	CH	1
52–85	69	28–54	40	A–7–6(20)	A–7–6(45)	CH	1
56–103	80	32–66	48	A–7–5(20)	A–7–5(56)	CH	1
----------	33	----------	18	A–6(8)	A–6(7)	CL	7
25–49	37	13–25	19	A–6(8)	A–6(8)	CL	6
22–51	37	3–31	17	A–6(6)	A–6(5)	SC	6
59–63	61	36–42	39	A–7–6(20)	A–7–6(38)	CH	2
34–68	51	12–47	29	A–7–6(18)	A–7–6(26)	CH	3
43–68	56	20–48	34	A–7–6(19)	A–7–6(32)	CH	3
41–77	59	22–54	37	A–7–6(20)	A–7–6(36)	CH	2
37–78	58	20–52	36	A–7–6(20)	A–7–6(30)	CH	2
34–48	41	11–22	16	A–7–6(11)	A–7–6(15)	ML–CL	5
36–59	48	16–35	25	A–7–6(16)	A–7–6(24)	CL	4
35–59	47	17–35	26	A–7–6(16)	A–7–6(24)	CL	4
46–83	65	24–58	41	A–7–6(20)	A–7–6(45)	CH	2
23–45	34	0–25	12	A–6(8)	A–6(7)	CL	7
48–85	66	28–61	44	A–7–6(20)	A–7–6(42)	CH	2
37–83	60	17–59	38	A–7–6(20)	A–7–6(35)	CH	2
26–65	46	8–48	28	A–7–6(15)	A–7–6(18)	CL	4
36–93	65	15–70	42	A–7–6(20)	A–7–6(40)	CH	2
52–92	74	21–62	41	A–7–5(20)	A–7–5(20)	MH–CH	1
50–101	76	25–64	44	A–7–5(20)	A–7–5(20)	MH–CH	1
53–125	89	31–88	59	A–7–5(20)	A–7–5(20)	CH	1
9–68	39	0–25	12	A–6(2)	A–6(2)	SM–SC	5
7–54	30	0–29	12	A–2–6(0)	A–2–6(0)	SC	----------
13–51	32	0–30	12	A–2–6(0)	A–2–6(0)	SC	----------
36–95	66	16–62	39	A–7–6(20)	A–7–6(34)	CH	2
46–75	60	21–42	31	A–7–6(20)	A–7–6(34)	MH–CH	2
31–134	82	22–103	52	A–7–5(20)	A–7–5(54)	CH	1
49–105	77	24–76	50	A–7–6(20)	A–7–6(52)	CH	1
49–158	104	22–128	75	A–7–6(20)	A–7–6(85)	CH	1
26–34	30	0–18	8	A–4(3)	A–4(2)	ML–CL	8
23–37	30	2–15	8	A–4(3)	A–4(2)	SM–SC	8
26–44	35	5–25	15	A–6(5)	A–6(5)	CL	6
20–43	32	0–24	11	A–6(3)	A–6(2)	SM–SC	8

[2] Based on AASHO Designation: T 89–60.
[3] Based on AASHO Designation: T 90–61.
[4] Based on AASHO Designation: M 145–49.
[5] Based on AASHO Designation: M 145–66I.
[6] Soft bedrock.

factor unless conditions are specified for the other four. Many of the processes of soil formation are unknown.

Parent material

Parent material is the unconsolidated mass from which soil forms. Most soils in Dewey County formed in material weathered from three major geological formations: the Hell Creek Formation, the Fox Hills Formation, and the Pierre Shale Formation (fig. 21). Small areas of soils formed in alluvium of Recent age and in loess.

The youngest of the three major formations is the strongly alkaline Hell Creek Formation. It is a dull gray and brown clay shale interbedded with gray sandstone and thin bands of lignite coal. The material weathered from this formation contains sodium and other salts. Many soils that formed in material from this formation have a claypan subsoil because of the sodium content in the parent material. Absher, Belfield, Daglum, Ekalaka, and Rhoades soils are the principal soils formed in material weathered from the Hell Creek Formation.

The Fox Hills Formation is below the Hell Creek Formation and above the Pierre Shale Formation. It is olive-gray to brown sand and sandstone interbedded with silty to clayey shale. Flasher, Glenross, Reeder, and Vebar soils formed in material weathered from the more sandy members of the Fox Hills Formation. Cabba, Lantry, and Morton soils formed in material weathered from the more silty members of this formation. Regent and Ridgeview soils formed in material from silty to clayey shales in the lower part of the Fox Hills Formation.

Pierre Shale is the most extensive surface bedrock in the county. Four members of this formation are exposed in Dewey County (*4*). The uppermost member is the Elk Butte, which is underlain by the Mobridge, Virgin Creek, and Verendrye in that order. The Elk Butte is a noncalcareous, light olive-gray shale and claystone. The Mobridge is a calcareous gray shale that weathers to light yellowish-brown or buff colors. The Virgin Creek is a noncalcareous or only slightly calcareous, olive-gray claystone. Soils formed in clays weathered from the Pierre Shale Formation are those of the Chantier, Dupree, Hurley, Opal, Promise, Sansarc, and Swanboy series. Dupree soil is only in areas associated with the noncalcareous beds of the Elk Butte, Virgin Creek, and Verendrye Members of the Pierre Formation.

Soils formed in alluvium are those of the Banks, Canning, Farland, Havrelon, Lohler, Shambo, Tally, and Trembles series. Canning and Farland soils typically are on the higher and older terraces. Banks, Havrelon, Lohler, and Trembles soils, which formed in alluvium of Recent age, are on bottom land or low terraces.

Some terraces in the eastern part of the county are thinly mantled with silty loess. Agar, Lowry, and Reliance soils formed in this silty material.

No glacial deposits in the county are parent materials of any soil, but scattered boulders of glacial origin are on the surface in the eastern part of the county.

Climate

The climate of Dewey County is continental and is marked by extreme seasonal changes of temperature. Summers are hot and winters are cold. The average annual precipitation is about 17 inches. The climate is fairly uniform and is probably the climate under which the soils formed. Climate alone, therefore, does not account for differences among the soils in Dewey County. Its effects are modified by the other four factors of soil formation.

Plant and animal life

All living organisms, including plants, animals, bacteria, and fungi, are important in soil formation. Decomposing plant remains affect the amount of organic matter, the color of the surface layer, and the supply of plant nutrients. Earthworms, cicada, and burrowing animals help keep the soil open and porous. Bacteria and fungi help decompose plant remains, thus releasing nutrients for plant food.

Native prairie grasses have had more influence on soil formation in Dewey County than any other living organism. Consequently, the soils have moderate amounts of organic matter in the upper horizons. Soil reaction in most soils of the county is favorable to plant growth without the addition of lime.

Relief

Relief, or lay of the land, affects soil formation through its effects on drainage, erosion, plant cover, and soil temperature. Slopes in Dewey County range from nearly level on upland flats, terraces, and bottom land to more than 40 percent on the river breaks adjacent to Lake Oahe.

Cabba and Sansarc soils are examples of steep soils that lose much of the rainfall through runoff, which lessens the amount of moisture that enters the soil. The rapid runoff also affects the rate of soil material removed by erosion. As a result, these soils have a thin A horizon and are shallow over bedrock. Slopes of the Morton and Opal soils commonly are less steep. Because more moisture enters the soil and the rate of erosion is slower, these soils have a thicker A horizon and a more distinct B horizon and are deeper over bedrock than Cabba and Sansarc soils.

Time

Soil formation requires time, usually hundreds to thousands of years, for the factors of climate, plant and animal life, and relief to act on parent material. Soils that have weak or indistinct horizons are referred to as young or immature soils. Soils that have distinct A and B horizons are considered as mature soils. Banks and Havrelon soils, which formed in recent alluvium, are young soils. Sansarc soils formed in older parent material, but are immature because the rate of erosion has hindered soil formation. Morton, Regent, and Ridgeview soils, which have well-expressed horizons, are on stable landscapes.

Classification of 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

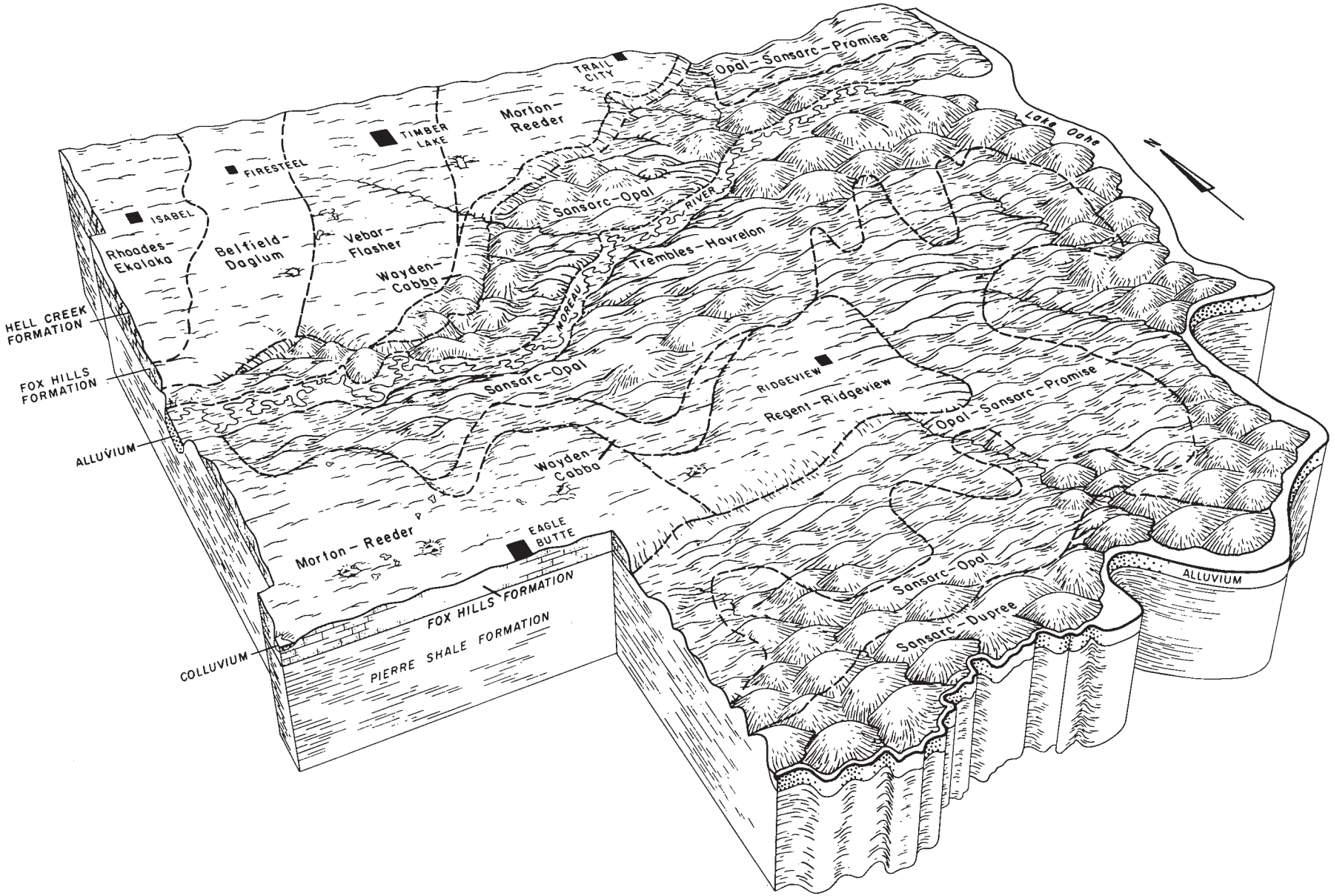

Figure 21.—**Soil associations and geologic formations in Dewey County.**

understand their behavior and their response to manipulation. First through classification, and then through use of soil maps, we can apply our knowledge of soils to specific fields and other tracts of land.

The narrow categories of classification, such as those used in detailed soil surveys, allow us to organize and apply knowledge about soils in managing farms and ranches, fields, and woodlands; in developing rural areas; in engineering work; and in many other ways. Soils are placed in broad classes to facilitate study and comparison in large areas, such as countries and continents.

The system of soil classification currently used was adopted by the National Cooperative Soil Survey in 1965 (*6*). Because this system is under continual study, readers interested in developments of the current system should search the latest literature available.

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 soils of similar genesis, or mode of origin, are grouped. The same property or subdivisions of this property may be used in several different categories. In table 9, the soil series of Dewey County are placed in four categories of the current system. Classes of the current system are briefly defined in the following paragraphs.

ORDER.—Ten soil orders are recognized. The properties used to differentiate among soil orders are those that tend to give broad climatic groupings of soils. Three exceptions to this are the Entisols, Histosols, and Vertisols, which occur in many different climates. Each order is named with a word of three or four syllables ending in *sol* as in Mollisol.

SUBORDER.—Each order is subdivided into suborders using those soil characteristics that seem to produce classes with the greatest genetic similarity. The suborders are more narrowly defined than are the orders. The soil properties used to separate suborders are mainly those that reflect either the presence or absence of a water table at a shallow depth, soil climate, the accumulation of clay, iron, or organic carbon in the upper solum, cracking of soils caused by a decrease in

TABLE 9.—*Classification of the soils*

Series	Family	Subgroup	Order
Absher	Fine, montmorillonitic	Borollic Natrargids	Aridisols.
Agar	Fine-silty, mixed, mesic	Typic Argiustolls	Mollisols.
Archin	Fine-loamy, mixed	Borollic Natrargids	Aridisols.
Arvada	Fine, montmorillonitic, mesic	Ustollic Natrargids	Aridisols.
Banks	Sandy, mixed, frigid	Typic Ustifluvents	Entisols.
Belfield	Fine, montmorillonitic	Glossic Natriborolls	Mollisols.
Cabba	Loamy, mixed (calcareous), frigid, shallow	Typic Ustorthents	Entisols.
Canning	Fine-loamy over sandy or sandy-skeletal, mixed, mesic	Typic Argiustolls	Mollisols.
Chantier	Clayey, montmorillonitic (calcareous), mesic, shallow	Ustic Torriorthents	Entisols.
Daglum	Fine, montmorillonitic	Typic Natriborolls	Mollisols.
Dupree	Clayey, montmorillonitic, mesic, shallow	Paralithic Vertic Ustochrepts	Inceptisols.
Ekalaka	Coarse-loamy, mixed	Typic Natriborolls	Mollisols.
Farland	Fine-silty, mixed	Typic Argiborolls	Mollisols.
Flasher	Mixed, frigid, shallow	Typic Ustipsamments	Entisols.
Glenross	Fine-loamy, mixed, frigid	Typic Natraqualfs	Alfisols.
Havrelon	Fine-loamy, mixed (calcareous), frigid	Typic Ustifluvents	Entisols.
Heil	Fine, montmorillonitic, frigid	Typic Natraquolls	Mollisols.
Hurley	Very-fine, montmorillonitic, mesic	Leptic Natrustolls	Mollisols.
Lantry	Fine-silty, mixed (calcareous), frigid	Typic Ustorthents	Entisols.
Lohler	Fine, montmorillonitic (calcareous), frigid	Typic Ustifluvents	Entisols.
Lowry	Coarse-silty, mixed, mesic	Typic Haplustolls	Mollisols.
Moreau	Fine, montmorillonitic	Typic Haploborolls	Mollisols.
Morton	Fine-silty, mixed	Typic Argiborolls	Mollisols.
Opal	Very-fine, montmorillonitic, mesic	Vertic Haplustolls	Mollisols.
Parshall	Coarse-loamy, mixed	Pachic Haploborolls	Mollisols.
Promise	Very-fine, montmorillonitic, mesic	Vertic Haplustolls	Mollisols.
Reeder	Fine-loamy, mixed	Typic Argiborolls	Mollisols.
Regan[1]	Fine-silty, frigid	Typic Calciaquolls	Mollisols.
Regent	Fine, montmorillonitic	Typic Argiborolls	Mollisols.
Reliance	Fine, montmorillonitic, mesic	Typic Argiustolls	Mollisols.
Rhoades	Fine, montmorillonitic	Leptic Natriborolls	Mollisols.
Ridgeview	Fine, montmorillonitic	Vertic Argiborolls	Mollisols.
Sansarc	Clayey, montmorillonitic (calcareous), mesic, shallow	Typic Ustorthents	Entisols.
Schamber	Sandy-skeletal, mixed, mesic	Ustic Torriorthents	Entisols.
Shambo	Fine-loamy, mixed	Typic Haploborolls	Mollisols.
Swanboy	Very-fine, montmorillonitic, mesic	Ustertic Camborthids	Aridisols.
Tally	Coarse-loamy, mixed	Typic Haploborolls	Mollisols.
Trembles	Coarse-loamy, mixed (calcareous), frigid	Typic Ustifluvents	Entisols.
Vebar	Coarse-loamy, mixed	Typic Haploborolls	Mollisols.
Wayden	Clayey, montmorillonitic (calcareous), frigid, shallow	Typic Ustorthents	Entisols.

[1] Regan soils in Dewey County are a taxadjunct to the Regan series because they have a fine-loamy control section.

soil moisture, and fine stratification. The names of suborders have two syllables. The last syllable indicates the order. An example is *Boroll* (*Bor,* meaning northern or cool, and *oll,* from Mollisol).

GREAT GROUP.—Soil suborders are separated into great groups on the basis of uniformity in the kinds and sequence of soil horizons and features. The horizons used to make separations are those in which clay, carbonates, and other constituents have accumulated or have been removed; and those that have pans that interfere with growth of roots, movement of water, or both. Some features used are soil acidity, soil climate, soil composition, and soil color. The names of great groups have three or four syllables and are made by adding a prefix to the name of the suborder. An example is Haploboroll (*Hapl,* meaning simple horizon, *bor* for northern or cool, and *oll* from Mollisols).

SUBGROUP.—Great groups are subdivided into subgroups, one representing the central (typic) segment of the group, and others called intergrades that have properties of the group and also one or more properties of another great group, suborder, or order. The names of the subgroups are derived by placing one or more adjectives before the name of the great group. An example is Typic Haploborolls (a typical Haploboroll).

FAMILY.—Soil families are separated within a subgroup primarily on the basis of properties important to the growth of plants or to the behavior of soils when used for engineering. Among the properties considered are texture, mineralogy, reaction, soil temperature, permeability, soil depth, and consistence. A family name consists of a series of adjectives preceding the subgroup name. The adjectives are the class names for texture, mineralogy, and so on, that are used as family differentiae as in table 9. An example is the coarse-loamy, mixed family of Typic Haploborolls.

SERIES.—Soil families contain one or more soil series. A soil series is a group of soils that have major horizons that, except for texture of the surface layer, are similar in important characteristics and in management in the profile.

General Nature of the County

Dewey County was created in 1883 by an act of the Dakota Territorial legislature. The boundaries were changed in 1952 as a result of the consolidation of the former Armstrong and Dewey Counties. Timber Lake, the largest town, is the county seat. Eagle Butte is the headquarters for the Cheyenne River Indian Reservation. Other towns and rural post offices are Firesteel, Glencross, Isabel, Lantry, LaPlant, Parade, Ridgeview, Trail City, and Whitehorse.

The 1970 census lists the population of Dewey County as 5,170. All the population is classified as rural, but only 35 percent is classified as rural farm. About 47 percent of the population is Indian.

U.S. Highway 212 and State Highways 20 and 63, the main motor routes, are supplemented by several, hard-surfaced and gravelled roads. Many parts of the county are accessible only by dry-weather roads and trails. One railroad serves all the county but the village of Whitehorse.

The county has very little industry. Stripmining for lignite coal in the area of Firesteel and Isabel has been inactive for several years. Eagle Butte, Isabel, and Timber Lake are the principal retail and community centers. Lake Oahe, on the east and south boundaries of the county, represents a potential for recreational development.

Climate [9]

The climate of Dewey County is semiarid and is characterized by cold winters, hot summers, and little winter precipitation. Growing season rainfall is marginal for adapted crops. The recently formed Lake Oahe extending along the eastern border of the county may have some small effect on the climate in its immediate vicinity. Elsewhere in the county, the climate is not affected by bodies of water or other physical features.

The climatic summary for this county is based on 42 years (1926–67) of weather observations at Timber Lake, which is at an elevation of 2,150 feet in the north-central part of the county. Climatic conditions at Timber Lake are typical of those throughout the county. On the average, the annual precipitation throughout the county is expected to be within 1 inch of that at Timber Lake, and the annual temperature within 1 degree of that at Timber Lake.

Temperature varies widely seasonally and occasionally differs significantly from day to day. Temperature readings above 100 degrees in summer and lower than 30 degrees below zero in winter have been recorded. Readings reach 100 degrees or higher on an average of 6 days per year. A reading of 30 degrees below zero or lower may be expected on an average of 2 days in 3 years. A temperature of 20 degrees below zero or lower can be expected on an average of 5 days per year. The average temperature can be expected to drop to zero or lower on about 34 days per year and fail to climb above zero on about 5 days per year.

Table 10 shows the probabilities of last freezing temperatures in spring and first in fall. For example, table 10 shows a 50 percent chance of a 32 degree temperature occurring after May 18. In about 5 years out of 10 a temperature of 32 degrees or lower can be expected after May 18, which is also the average date of occurrence.

Similarly, table 10 shows a 30 percent chance that a temperature of 32 degrees or lower will occur by September 11. These are air temperatures as measured in a standard instrument shelter. Plant temperatures may differ somewhat from the temperature of free air.

Data on temperature and precipitation are given in table 11.

The average annual precipitation at Timber Lake is 17.24 inches, 76 percent of which falls during the period April through September. The annual precipitation has ranged from 12.04 inches in 1926 to 25.44 inches in 1951. Thundershowers are the main source of rainfall during the growing season and produce a wide range in intensity and amount. About once a year, 0.9 inch or more of rain in a 1-hour period can be expected, and about once in 5 years, 1.6 inches or more. A rainfall of 2 inches or more in 24 hours can be

[9] By WALTER SPUHLER, State climatologist, National Weather Service, U.S. Department of Commerce.

TABLE 10.—*Probabilities of last freezing temperatures in spring and first in fall*

[Data recorded at Timber Lake, S. Dak., 1926–67. Prepared by William F. Lytle, South Dakota State University]

Probability	Dates for given probability and temperature					
	16° F	20° F	24° F	28° F	32° F	36° F
After a specified date in spring:						
90 percent	March 15	March 25	April 5	April 13	May 2	May 7
70 percent	March 24	April 3	April 13	April 21	May 8	May 14
50 percent	April 8	April 18	April 26	May 4	May 18	May 25
30 percent	April 23	May 2	May 9	May 16	May 27	June 5
10 percent	May 2	May 11	May 17	May 24	June 2	June 12
Before a specified date in fall:						
10 percent	October 12	September 28	September 21	September 13	September 4	August 25
30 percent	October 20	October 7	September 29	September 21	September 11	September 1
50 percent	November 2	October 22	October 11	October 3	September 22	September 13
70 percent	November 14	November 6	October 24	October 15	October 3	September 24
90 percent	November 22	November 15	November 1	October 22	October 10	October 1

TABLE 11.—*Temperature and precipitation*

[Data recorded at Timber Lake, S. Dak., 1926–67. Prepared by William F. Lytle, South Dakota State University]

Month	Temperature				Precipitation						Average number of days with—	
	Average daily maximum	Average daily minimum	Two years in 10 will have—		Average total	Record		One year in 10 will have—		Average snowfall	Snowfall of 1 inch or more	Snow cover of 1 inch or more
			Average daily maximum equal to or higher than—	Average daily minimum equal to or lower than—		Maximum total	Minimum total	Less than—	More than—			
	°F	°F	°F	°F	In	In	In	In	In	In		
January	24.2	2.5	35.5	−7.4	0.57	4.03	0.00	0.09	1.34	6.2	2	15
February	28.8	6.5	39.2	−3.6	.57	2.36	.03	.12	1.18	6.8	3	12
March	39.5	17.4	48.0	10.6	1.02	4.86	.01	.14	2.28	8.0	3	8
April	56.9	31.2	63.4	27.1	1.60	4.55	0	.41	3.26	2.6	1	2
May	69.3	42.7	76.1	38.2	2.60	6.81	0	.85	4.94	.6	0	0
June	78.2	52.6	84.4	49.2	3.87	9.02	.54	1.45	6.84	0	0	0
July	87.4	58.9	93.1	55.2	2.00	4.80	.08	.65	3.69	0	0	0
August	85.3	56.5	90.0	53.2	1.86	5.09	.16	.59	3.47	0	0	0
September	73.8	45.4	80.3	41.2	1.22	3.40	.11	.28	2.48	0	0	0
October	62.1	34.8	68.3	30.6	1.00	3.38	0	.14	2.29	1.0	0	0
November	42.2	20.0	49.2	14.7	.48	2.47	0	.06	1.14	3.3	1	4
December	30.1	9.0	38.5	1.5	.39	2.81	0	.06	.90	4.0	2	11
Year	56.5	31.5	59.1	29.5	17.24	[1]26.37	[2]5.82	11.12	24.02	32.5	12	53

[1] In 1953.
[2] In 1934.

expected about once in 2 to 3 years and of 4 inches or more about once in 25 years.

Seasonal snowfall averages 32.5 inches. Strong winds often accompany the snowfall and cause large drifts in and near sheltered areas, whereas open fields are nearly bare.

Sunshine, wind, and relative humidity are estimated for the county from data obtained at Bismarck, N. Dakota, and at Huron and Rapid City. The sun shines, on the average, about 65 percent of daylight hours. The greatest amount, 75 percent, occurs in July and the least, 50 percent, in December.

Relative humidity usually varies widely from early morning to afternoon and occasionally from day to day. It ranges from about 42 percent in afternoon to 82 percent in early morning in summer and from about 64 percent in afternoon to 77 percent in early morning in winter. A cold front with a much colder, drier air mass occasionally replaces a very warm and humid air mass.

Windspeed averages about 11 miles per hour. The prevailing winds are from the northwest in winter and from the south-southeast in summer. A windspeed of 50 miles per hour or more can occur any month, but is most likely in summer during thunderstorms. Thunderstorms can be expected about 10 times per month

in June and July, 9 in August, and 6 in May; the annual average is about 40.

Hail occasionally accompanies the thunderstorms and may occur at anywhere about 1 to 2 times per year. Hail is most likely in June and July, but can occur as early as March and as late as October.

Evaporation from a large pan indicates the potential water loss from soil, pastures, and crops. The average annual evaporation from the Weather Bureau Class A pan in this area is about 50 inches. An average of about 41 inches evaporates during the period May through October. The annual evaporation from lakes is about 36 inches. The water loss from soil and crops is usually less, depending upon the available soil moisture.

Farming

According to the 1969 Census of Agriculture there were 373 farms in Dewey County; farms numbered 488 in the 1964 census. The average size farm was 4,051 acres. The trend is toward larger units. Only 44 farms were fully tenant operated.

The principal crops are spring wheat, alfalfa, oats, corn, and winter wheat. In 1971 (*3*), 45,000 acres was in spring wheat, 45,000 acres in alfalfa, 22,500 acres in oats, 9,000 acres in corn, and 8,000 acres in winter wheat. A smaller acreage was in barley, durum wheat, flax, rye, and sorghum. Wild hay was harvested from about 36,000 acres of range.

According to the 1969 Census of Agriculture, more than 90 percent of the sales of farm products was derived from the sale of livestock and livestock products. In 1971 (*3*), there were 54,000 cattle of all kinds on Dewey County farms, 27,700 sheep, and 6,300 hogs.

Information about the past history of crops and livestock numbers can be obtained from the annual reports of the South Dakota Crop and Livestock Reporting Service.

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Glossary

Alluvium. Soil material, such as sand, silt, or clay, that has been deposited on land by streams.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern.

Available water capacity (also termed available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil.

Calcareous soil. A soil containing enough calcium carbonate (often with magnesium carbonate) to effervesce (fizz) visibly when treated with cold, dilute hydrochloric acid.

Chiseling. Tillage of soil with an implement having one or more soil penetrating points that loosen the subsoil and brings *clods* to the surface. A form of emerging tillage to control soil blowing.

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.

Claypan. A compact, slowly permeable soil horizon that contains more clay than the horizon above and below it. A claypan is commonly hard when dry and plastic or stiff when wet.

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 farming. Plowing, cultivating, planting, and harvesting in rows that are at right angles to the natural direction of the slope or that are parallel to terrace grade.

Crop residue. A system of retaining crop residue on land between harvest and replanting to prevent erosion and insure future crop production.

Emergency tillage. Cultivation by listing, ridging, duckfooting, chiseling, pitting, basin listing, or other means to roughen the soil surface for temporary control of soil blowing.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, and covered by grass for protection against erosion; used to conduct surface water away from cropland.

Green manure (agronomy). A crop grown for the purpose of being turned under in an early stage of maturity or soon after maturity for soil improvement.

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.

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.

Organic matter. A general term for plant and animal material, in or on the soil, in all stages of decomposition. Readily decomposed organic matter is often distinguished from the more stable forms that are past the stage of rapid decomposition.

Permeability. The quality that enables the soil to transmit water or air. Terms used in this survey to describe permeability and the rate of flow are as follows:

	Inches per hour
Very slow	Less than 0.06
Slow	0.06–0.2
Moderately slow	0.2–0.6
Moderate	0.6–2.0
Moderately rapid	2.0–6.0
Rapid	6.0–20
Very rapid	More than 20

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 of alkalinity are expressed thus:

	pH		*pH*
Extremely acid	Below 4.5	Neutral	6.6 to 7.3
Very strongly acid	4.5 to 5.0	Mildly alkaline	7.4 to 7.8
Strongly acid	5.1 to 5.5	Moderately alkaline	7.9 to 8.4
Medium acid	5.6 to 6.0	Strongly alkaline	8.5 to 9.0
Slightly acid	6.1 to 6.5	Very strongly alkaline	9.1 and higher

Runoff (hydraulics). The part of the precipitation upon a drainage area that is discharged from the area in stream channels. The water that flows off the land surface without sinking in is called surface runoff; that which enters the ground before reaching surface streams is called groundwater runoff or seepage flow from ground water.

Saline soil. A soil that contains soluble salts in amounts that impair growth of plants but that does not contain excess exchangeable sodium.

Sand. Individual rock or mineral fragments in a soil that range in diameter from 0.05 to 2.0 millimeters. Most sand grains consist of quartz, but they may be of any mineral composition. The textural class name of any soil that contains 85 percent or more sand and not more than 10 percent clay.

Silt. Individual mineral particles in a soil that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). Soil of the silt textural class is 80 percent or more silt and less than 12 percent clay.

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 grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering together without any regular cleavage, as in many claypans and hardpans).

Stubble mulch. Stubble or other crop residues left on the soil, or partly worked into the soil, to protect it from wind and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tillage of a soil below normal depth ordinarily to shatter a hardpan or claypan.

Surface soil. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, about 5 to 8 inches in thickness. The plowed layer.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that it may soak into the soil or flow slowly to a prepared outlet without harm. Terraces in fields are generally built so they can be farmed. Terraces intended mainly for drainage have a deep channel that is maintained in permanent sod.

Terrace (geological). An old alluvial plain, ordinarily flat or undulating, bordering a river, 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.

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.

Wind stripcropping. Growing crops in strips that run crosswise to the general direction of prevailing wind and without strict adherence to the contour of the land.

GUIDE TO MAPPING UNITS

Map symbol	Mapping unit	Page	Range site		Capability unit		Pasture group	Windbreak group
			Name	Page	Symbol	Page	Symbol	Number
AbA	Absher silt loam, 0 to 2 percent slopes	10	Thin Claypan	57	VIs-1	63	---	10
AcA	Absher-Slickspots complex, 0 to 2 percent slopes	12	----------	--	--------	--	---	---
	Absher soil	--	Thin Claypan	57	VIs-1	63	---	10
	Slickspots	--	----------	--	VIIIs-3	64	---	---
AgB	Agar silt loam, 2 to 6 percent slopes	12	Silty	56	IIe-1	59	F	3
ArB	Archin-Slickspots complex, 2 to 9 percent slopes	13	----------	--	--------	--	---	---
	Archin soil	--	Claypan	56	VIe-9	62	---	10
	Slickspots	--	----------	--	VIIIs-3	64	---	---
AsA	Arvada-Slickspots complex, 0 to 3 percent slopes	14	----------	--	--------	--	---	---
	Arvada soil	--	Thin Claypan	57	VIs-1	63	---	10
	Slickspots	--	----------	--	VIIIs-3	64	---	---
BdA	Belfield-Daglum silt loams, 0 to 2 percent slopes	16	----------	--	IIIs-1	61	---	---
	Belfield soil	--	Clayey	56	--------	--	E	4
	Daglum soil	--	Claypan	56	--------	--	C	9
BrA	Belfield-Reeder loams, 0 to 2 percent slopes	16	----------	--	IIIs-1	61	---	---
	Belfield soil	--	Clayey	56	--------	--	E	4
	Reeder soil	--	Silty	56	--------	--	F	3
BrB	Belfield-Reeder loams, 2 to 6 percent slopes	16	----------	--	IIIe-3	60	---	---
	Belfield soil	--	Clayey	56	--------	--	E	4
	Reeder soil	--	Silty	56	--------	--	F	3
BrC	Belfield-Reeder loams, 6 to 9 percent slopes	16	----------	--	IVe-7	61	---	---
	Belfield soil	--	Clayey	56	--------	--	E	4
	Reeder soil	--	Silty	56	--------	--	F	3
CbE	Cabba-Lantry silt loams, 15 to 25 percent slopes	17	----------	--	VIIs-1	63	---	10
	Cabba soil	--	Shallow	56	--------	--	---	---
	Lantry soil	--	Thin Upland	56	--------	--	---	---
CbF	Cabba-Lantry silt loams, 25 to 40 percent slopes	17	----------	--	VIIs-1	63	---	10
	Cabba soil	--	Shallow	56	--------	--	---	---
	Lantry soil	--	Thin Upland	56	--------	--	---	---
CdA	Canning loam, 0 to 2 percent slopes	19	Silty	56	IIIs-2	61	D	6
ChB	Chantier clay, 2 to 9 percent slopes	19	Dense Clay	57	VIs-5	63	---	10
CsC	Chantier-Shale land complex, 3 to 15 percent slopes	19	----------	--	--------	--	---	---
	Chantier soil	--	Dense Clay	57	VIs-5	63	---	10
	Shale land	--	----------	--	VIIIs-2	64	---	---
DaA	Daglum silt loam, 0 to 2 percent slopes	20	Claypan	56	IVs-2	62	C	9
DoB	Dupree-Opal clays, 2 to 9 percent slopes	21	----------	--	--------	--	---	---
	Dupree soil	--	Dense Clay	57	VIs-3	63	---	10
	Opal soil	--	Clayey	56	IIIe-4	60	I	4
DsE	Dupree-Sansarc clays, 9 to 25 percent slopes	21	----------	--	VIIs-2	63	---	10
	Dupree soil	--	Dense Clay	57	--------	--	---	---
	Sansarc soil	--	Shallow	56	--------	--	---	---
EkA	Ekalaka fine sandy loam, 0 to 6 percent slopes	23	Sandy	56	IVe-13	62	H	5

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Range site		Capability unit		Pasture group	Windbreak group
			Name	Page	Symbol	Page	Symbol	Number
EkC	Ekalaka fine sandy loam, 6 to 9 percent slopes	23	Sandy	56	VIe-6	62	---	10
FaA	Farland silt loam, 0 to 2 percent slopes	24	Silty	56	IIc-2	60	F	3
FaB	Farland silt loam, 2 to 6 percent slopes	24	Silty	56	IIe-1	59	F	3
FbF	Flasher loamy fine sand, 25 to 40 percent slopes	24	Shallow	56	VIIe-4	63	---	10
FvD	Flasher-Vebar complex, 6 to 15 percent slopes	24	----------	--	VIe-10	62	---	---
	Flasher soil	--	Shallow	56	-------	--	---	10
	Vebar soil	--	Sandy	56	-------	--	H	5
FvE	Flasher-Vebar complex, 15 to 25 percent slopes	25	----------	--	VIIe-4	63	---	10
	Flasher soil	--	Shallow	56	-------	--	---	---
	Vebar soil	--	Sandy	56	-------	--	---	---
Gb	Glenross fine sandy loam	26	Saline Lowland	55	VIw-4	63	---	10
Gr	Glenross-Regan fine sandy loams	26	----------	--	VIw-4	63	---	10
	Glenross soil	--	Saline Lowland	55	-------	--	---	---
	Regan soil	--	Subirrigated	55	-------	--	J	---
Hc	Heil soils	27	Closed Depression	55	VIs-1	63	B	10
HsB	Hurley-Slickspots complex, 2 to 9 percent slopes	28	----------	--	-------	--	---	---
	Hurley soil	--	Thin Claypan	57	VIs-1	63	---	10
	Slickspots	--	----------	--	VIIIs-3	64	---	---
In	Intermittent lakes	28	----------	--	VIIIw-1	64	---	---
LmD	Lantry-Morton silt loams, 6 to 15 percent slopes	29	----------	--	-------	--	---	---
	Lantry soil	--	Thin Upland	56	VIe-3	62	---	10
	Morton soil	--	Silty	56	IIIe-1	60	F	3
Lo	Lohler silty clay	30	Overflow	55	IIc-1	59	F	1
Lp	Lohler and Havrelon soils	30	Overflow	55	IIc-1	59	---	1
	Lohler soil	--	----------	--	-------	--	F	---
	Havrelon soil	--	----------	--	-------	--	G	---
LwA	Lowry silt loam, 0 to 2 percent slopes	32	Silty	56	IIe-1	59	F	3
LwB	Lowry silt loam, 2 to 6 percent slopes	32	Silty	56	IIe-1	59	F	3
Ma	Mine pits and dumps	32	----------	--	VIIIs-2	64	---	---
MbD	Moreau-Wayden silty clays, 9 to 25 percent slopes	33	----------	--	VIe-4	62	---	10
	Moreau soil	--	Clayey	56	-------	--	---	---
	Wayden soil	--	Shallow	56	-------	--	---	---
McB	Morton silt loam, 2 to 6 percent slopes	35	Silty	56	IIe-1	59	F	3
MdA	Morton-Belfield complex, 0 to 2 percent slopes	35	----------	--	IIc-2	60	---	---
	Morton soil	--	Silty	56	-------	--	F	3
	Belfield soil	--	Clayey	56	-------	--	E	4
MdB	Morton-Belfield complex, 2 to 6 percent slopes	35	----------	--	IIe-1	59	---	---
	Morton soil	--	Silty	56	-------	--	F	3
	Belfield soil	--	Clayey	56	-------	--	E	4
MfA	Morton-Farland silt loams, 0 to 2 percent slopes	35	Silty	56	IIc-2	60	F	3
MgB	Morton-Lantry silt loams, 2 to 9 percent slopes	35	----------	--	IIIe-1	60	---	---
	Morton soil	--	Silty	56	-------	--	F	3
	Lantry soil	--	Thin Upland	56	-------	--	G	8
Na	Natriborolls, channeled	36	Overflow	55	VIw-1	62	---	10

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Range site		Capability unit		Pasture group	Windbreak group
			Name	Page	Symbol	Page	Symbol	Number
OaB	Opal clay, 2 to 9 percent slopes	36	Clayey	56	IIIe-4	60	I	4
OhB	Opal-Hurley complex, 0 to 9 percent slopes	37	---	--	---	--	---	---
	Opal soil	--	Clayey	56	IIIe-4	60	I	4
	Hurley soil	--	Thin Claypan	57	VIs-1	63	---	10
OpA	Opal-Promise clays, 1 to 4 percent slopes	37	Clayey	56	IIIs-3	61	I	4
OsC	Opal-Sansarc clays, 6 to 15 percent slopes	37	---	--	VIe-4	62	---	10
	Opal soil	--	Clayey	56	---	--	---	---
	Sarsarc soil	--	Shallow	56	---	--	---	---
OtB	Opal-Slickspots complex, 2 to 6 percent slopes	37	---	--	---	--	---	---
	Opal soil	--	Clayey	56	IIIe-4	60	I	4
	Slickspots	--	---	--	VIIIs-3	64	---	---
Pa	Parshall fine sandy loam	38	Sandy	56	IIIe-7	60	H	1
Pe	Parshall-Ekalaka fine sandy loams	38	Sandy	56	IIIe-7	60	H	---
	Parshall soil	--	---	--	---	--	---	1
	Ekalaka soil	--	---	--	---	--	---	5
PrA	Promise clay, 0 to 2 percent slopes	39	Clayey	56	IIIs-3	61	I	4
PrB	Promise clay, 2 to 6 percent slopes	39	Clayey	56	IIIe-4	60	I	4
PsA	Promise-Slickspots complex, 0 to 2 percent slopes	39	---	--	---	--	---	---
	Promise soil	--	Clayey	56	IIIs-3	61	I	4
	Slickspots	--	---	--	VIIIs-3	64	---	---
Pw	Promise-Swanboy clays, channeled	39	Overflow	55	VIw-1	62	---	10
RaA	Reeder loam, 0 to 2 percent slopes	41	Silty	56	IIc-2	60	F	3
RaB	Reeder loam, 2 to 6 percent slopes	41	Silty	56	IIe-1	59	F	3
RaC	Reeder loam, 6 to 9 percent slopes	41	Silty	56	IIIe-1	60	F	3
RbC	Regent silty clay loam, 6 to 9 percent slopes	42	Clayey	56	IIIe-1	60	F	3
RmB	Regent-Moreau complex, 2 to 9 percent slopes	43	Clayey	56	IIIe-1	60	---	---
	Regent soil	--	---	--	---	--	F	3
	Moreau soil	--	---	--	---	--	I	4
RpA	Regent-Ridgeview silty clay loams, 0 to 2 percent slopes	43	Clayey	56	IIc-2	60	---	---
	Regent soil	--	---	--	---	--	F	3
	Ridgeview soil	--	---	--	---	--	E	4
RpB	Regent-Ridgeview silty clay loams, 2 to 6 percent slopes	43	Clayey	56	IIe-1	59	---	---
	Regent soil	--	---	--	---	--	F	3
	Ridgeview soil	--	---	--	---	--	E	4
RsA	Reliance silty clay loam, 0 to 2 percent slopes	44	Silty	56	IIc-2	60	F	3
RsB	Reliance silty clay loam, 2 to 6 percent slopes	44	Silty	56	IIe-1	59	F	3
RtB	Rhoades-Daglum complex, 2 to 6 percent slopes	45	---	--	VIs-1	63	---	---
	Rhoades soil	--	Thin Claypan	57	---	--	---	10
	Daglum soil	--	Claypan	56	---	--	C	9

GUIDE TO MAPPING UNITS--Continued

Map symbol	Mapping unit	Page	Range site		Capability unit		Pasture group	Windbreak group
			Name	Page	Symbol	Page	Symbol	Number
RvA	Ridgeview silty clay loam, 0 to 2 percent slopes	46	Clayey	56	IIIs-3	61	E	4
SaE	Sarsarc-Dupree clays, 9 to 45 percent slopes	46		--	VIIs-2	63	---	10
	Sansarc soil	--	Shallow	56		--	---	---
	Dupree soil	--	Dense Clay	57		--	---	---
SbC	Sansarc-Opal clays, 6 to 15 percent slopes	47		--	VIs-3	63	---	10
	Sansarc soil	--	Shallow	56		--	---	---
	Opal soil	--	Clayey	56		--	---	---
SbE	Sansarc-Opal clays, 15 to 25 percent slopes	47		--	VIIs-2	63	---	10
	Sansarc soil	--	Shallow	56		--	---	---
	Opal soil	--	Clayey	56		--	---	---
ScF	Sansarc-Shale land complex, 15 to 45 percent slopes	48		--		--	---	---
	Sansarc soil	--	Shallow	56	VIIs-2	63	---	10
	Shale land	--		--	VIIIs-2	64	---	---
SdC	Schamber gravelly sandy loam, 3 to 15 percent slopes	48	Very Shallow	57	VIs-4	63	---	10
SfF	Schamber-Sansarc complex, 15 to 40 percent slopes	48		--	VIIs-4	63	---	10
	Schamber soil	--	Very Shallow	57		--	---	---
	Sansarc soil	--	Shallow	56		--	---	---
Sh	Shale land	49		--	VIIIs-2	64	---	---
Sm	Shambo loam	49	Silty	56	IIc-2	60	F	3
Sw	Swanboy clay	50	Dense Clay	57	VIs-5	63	---	10
Sy	Swanboy-Slickspots complex	50		--		--	---	---
	Swanboy soil	--	Dense Clay	57	VIs-5	63	---	10
	Slickspots	--		--	VIIIs-3	64	---	---
Ta	Tally fine sandy loam	51	Sandy	56	IIIe-7	60	H	5
Th	Trembles-Havrelon complex	51	Overflow	55	IIIe-7	60	---	1
	Trembles soil	--		--		--	H	---
	Havrelon soil	--		--		--	G	---
Tr	Trembles and Banks soils	52		--		--	---	---
	Trembles soil	--	Overflow	55	IIIe-7	60	H	1
	Banks soil	--	Sands	55	VIe-8	62	---	7
VeB	Vebar fine sandy loam, 0 to 6 percent slopes	53	Sandy	56	IIIe-10	61	H	5
VfB	Vebar-Flasher complex, 2 to 9 percent slopes	53		--		--	---	---
	Vebar soil	--	Sandy	56	IVe-8	61	H	5
	Flasher soil	--	Shallow	56	VIe-10	62	---	10
WaF	Wayden-Moreau silty clays, 25 to 40 percent slopes	54		--	VIIs-2	63	---	10
	Wayden soil	--	Shallow	56		--	---	---
	Moreau soil	--	Clayey	56		--	---	---

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