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SOILS OF *Clay* COUNTY SOUTH DAKOTA

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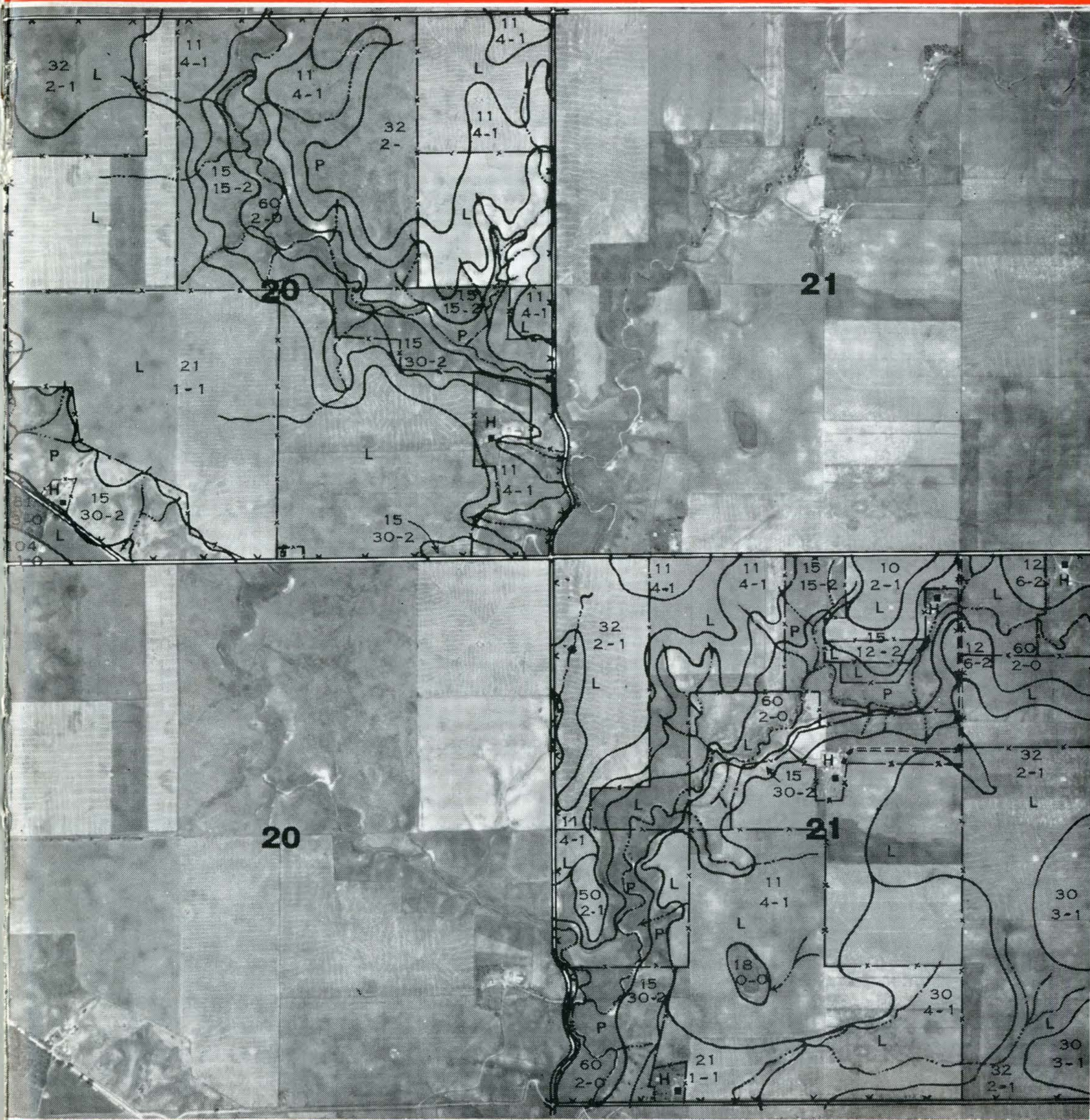

AGRONOMY DEPARTMENT AGRICULTURAL EXPERIMENT STATION
SOUTH DAKOTA STATE COLLEGE, BROOKINGS
IN COOPERATION WITH THE SOIL CONSERVATION SERVICE, U.S.D.A.

Cover Picture

Sections 20 (left) and 21 (right) of Bethel township in Clay County as seen from the air. The sections are shown twice in adjacent positions, before and after mapping. Soil type boundary lines, slope and erosion boundary lines, identifying numbers, drainage pattern, fences, houses, roads and land use appear on the mapped sections. The soil types occurring in the sections can be identified by checking the numbers with the legend for the soil map in the middle of the report. Picture courtesy of Production and Marketing Administration, USDA.

SOILS OF CLAY COUNTY

AGRONOMY DEPARTMENT
AGRICULTURAL EXPERIMENT STATION
SOUTH DAKOTA STATE COLLEGE • BROOKINGS

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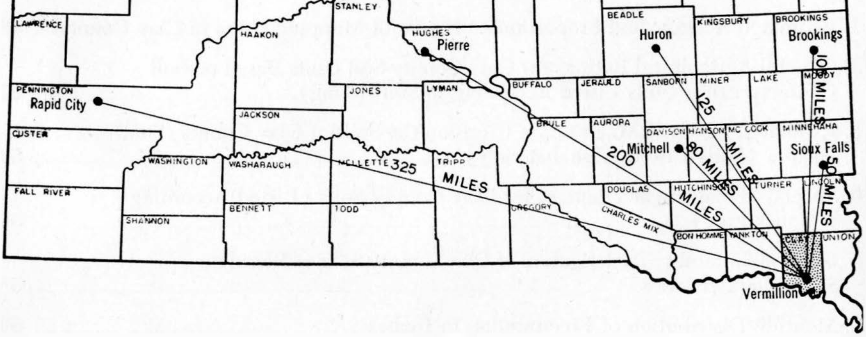
Location. Clay County is located in southeastern South Dakota. It is bordered on the east by Union County, on the west by Yankton County, on the north by Turner and Lincoln counties, and on the south by the Missouri River which is the state, as well as the county, boundary. Clay is the smallest county in the state, having a total land area of approximately 400 square miles.

The county seat, Vermillion, is located on the bluffs overlooking the Missouri River valley, and is centrally located in the county.

Fig. 1. Location of Clay County



Soils of Clay County South Dakota

G. J. Buntley, W. C. Bourne, and F. C. Westin[1]

Introduction

The Clay County soil survey is an inventory of the soil resources found in that area. It is designed to help answer questions such as: *What soil types do I have on my farm? Do different soil types need different management practices? If so, what are the suggested practices? Are certain crops better adapted to different soil types? Do soil types have different yield potentials?*

Published soil surveys are made up of two parts: a map and a report. The Clay County soil map, bound in the middle of the report, shows the location and extent of the various soils in the county. Descriptions of each of the soils shown on the map and the suggested management practices for each are given in the report. Tables are included which list estimated yields of principal crops for each soil, the general agricultural rating for each soil, specific management recommendations, and suitability for irrigation.

KNOW YOUR SOILS

Soils develop from the decomposition of rock minerals and from plant and animal remains added to them. The changing of rock into soil *parent material* is accomplished through chemical and physical weathering of rock into various sized particles. This weathered rock material may develop into soil in place, or it may be transported and relocated by wind, water, or glacial action. The exposure of this rock material to soil forming factors over long periods of time is the final stage of soil development. It is during this stage that different kinds of soils develop which may be recognized and classified. Soil development is a dynamic process that is still going on today, though at a very slow pace.

The soil forming factors are: climate, organisms (including bacteria, insects, other animals, and plants) topography, parent material and time. Because each of these factors varies greatly and there are many combinations of the variations, a great number of different soils exist.

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The field work for this survey was done by W. C. Bourne, John Dunlavy, Herman Weber and Dwayne Moxon, Soil Conservation Service, USDA, and completed in 1945. The survey was correlated by C. A. Mogen, Division of Soil Survey, Soil Conservation Service, USDA. The following persons also assisted in the preparation of the report: F. E. Shubeck and L. F. Puhr of the South Dakota Agricultural Experiment Station and G. A. Avery of the Soil Conservation Service.

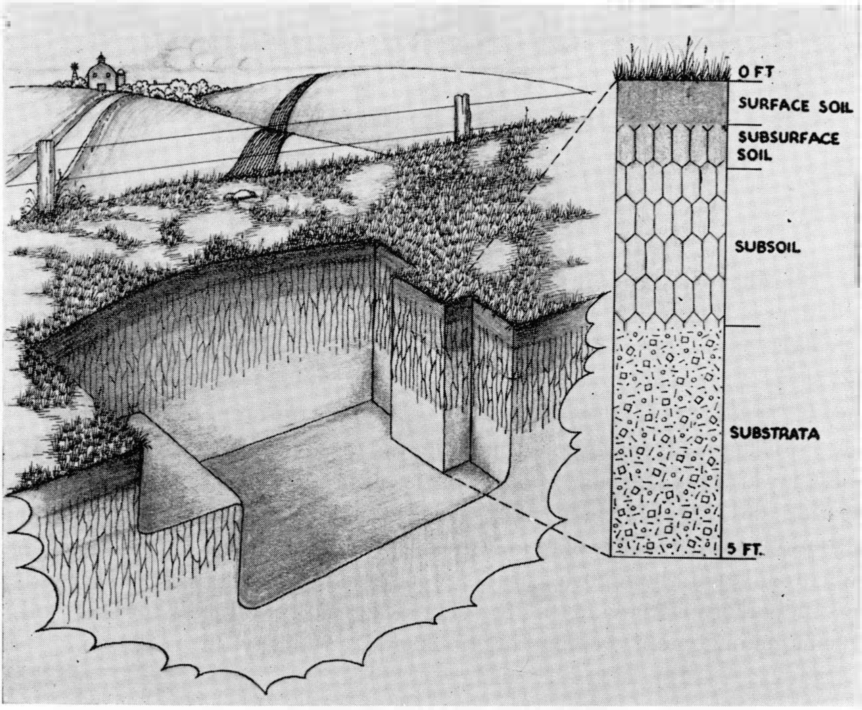


Fig. 2. Sketch of a major soil profile in the county showing the different layers of horizons which are found in the soil. This is Barnes soil

How Soils Are Recognized

Soils, like people, have profiles by which they can be recognized. A soil profile is a vertical cross-section of soil consisting of several horizontal layers called *horizons*. Each soil profile has a set of characteristics by which it can be recognized and separated from other soil profiles (Fig. 2). Some of these characteristics are the number, arrangement, and thickness of the horizons; the color of the soil in each horizon; the class or texture (loam, silt loam, etc.) of the soil; the structure or arrangement of soil particles (granular, prismatic, etc.) and the consistency of the soil mass (friable, hard, etc.) in each horizon.

How Soils Are Classified and Named

Soils are classified in a system comprised of seven basic categories: Order, Sub-order, Great Soil Group, Family, Series, Type and Phase. The last three, namely series, type and phase, are the basic units of classification used in mapping soils in the field.

A soil series describes a group of soils that are alike in every respect except for the texture of the surface soil. This group is given a geographic name taken from the area in which the series was first found and described. An example of this is the Volin series..

A soil type describes a soil series with additional information on the texture of the surface soil, which is called soil class. Therefore, a soil type name is made up of two parts: the series and the class. When the series name is Volin and the class name is silt loam, the soil type name is Volin silt loam. From this it can be seen that there can be more than one soil type in a soil series. For instance, there is Volin silt loam, Volin loam, and Volin silty clay loam.

Many times soil types are subdivided into *soil phases.* The soil phase is used as a means of adding supplementary information to the soil type, such as information on erosion, or slope. This information influences the use and management of the soil type. Slope group phases and erosion phases have been added to the soil type names in this report; for example, Barnes loam, nearly level and Barnes loam, eroded, undulating. A diagrammatic description of the slope group phases used in this report is shown in Fig. 3.

How Soils Are Mapped

The basic classification unit most used in mapping soils is the soil type. The soil type is a definite described unit with a slight range in profile characteristics. Since nature's boundaries are not sharp, a narrow transition zone usually occurs between two soil types. This zone includes soils having some of the characteristics of the nearby soils.

Many different soil types can be present in any given area. They can be separated only by careful examination of the soil profiles in the field. For this reason, thousands of holes are dug in a county during the course of the mapping. With a spade and auger, the soil surveyor's trademark, profiles are exposed so that they can be studied, classified, and their geographic extent shown on maps.

Lines representing soil type boundaries, separate one soil type from another on the map. Within an area of one soil type, lines are used also to separate the different slopes upon which the soil types may occur and the different degrees of erosion that the soil type has undergone.

In some areas, two or more soil types occur so intermingled with each other that their separation into individual types, if possible, would serve no practical purpose. When this situation occurs, the area is mapped as one unit and described as a *complex* of the two or more types involved. In other areas, two or more soil types occur in areas of sufficient size that they can be shown as individual soil types on the large scale field map, but they can not

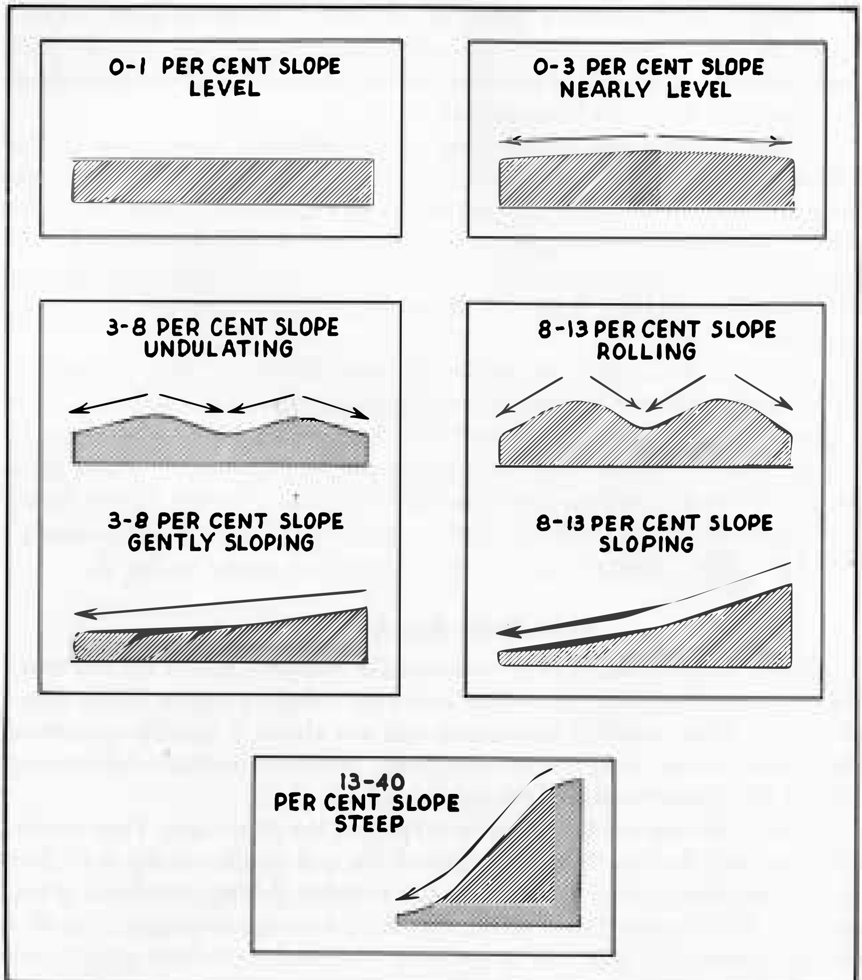


Fig. 3. Diagrammatic description of slope group phases

usually be shown as individual soil types on a published map of a much smaller scale. In this case the two or more types are shown as one unit on the map and described as an *association* of the two or more types involved.

Hundreds of different soils occur in South Dakota. Many of them are found in Clay County and several usually occur on every farm. All of these soils have characteristic differences to which crops are sensitive. It is, therefore, necessary to define all of the different soils and show their location on maps in order that consistent predictions and applicable recommendations can be made in respect to fertility requirements, productivity potentials and management practices. In areas where irrigation is a possibility, the data collected during the course of the survey relating to soil permeability, salt pattern, and harmful alkali content are especially useful in evaluating the soils for irrigation.

HOW TO USE THE SOILS MAP AND REPORT

The soils map is presented in two parts, one describing the north half, the other the south half of the county. To locate your farm on the map, check the diagram on the map sheet, which shows the part of the county that is represented. In order to facilitate the location of a particular farm, the map shows drainage pattern, roads, railroads, towns, houses, churches, schools and cemeteries which can be used as guides.

Once you have located the position of your farm on the soils map, you will find each soil type or association designated by a number. The number is usually placed inside the area that comprises the soil type, but if the area is too small to accommodate the number, it is placed outside with a connecting arrow.

After finding the numbers for the soils that occur on a farm, check these on the legend which is printed on the back of the map sheets. On the legend the name for each soil is listed after the number. The soil names are grouped under headings determined by the way the soils were developed. For instance, under the heading "Upland soils developed in loam to clay loam, glacial till," you will find "Barnes loam, nearly level; Barnes loam, undulating," etc.

Now that the names of the soils are known, turn to the section in the report titled, "Soils of Clay County, Their Use and Management." In this section all the soils are described. The same grouping and the same headings that are used in the legend are given here. For instance, "Upland soils developed in loam to clay loam, glacial till," is the heading for "Barnes loam, nearly level; Barnes loam, undulating;" etc. Under each heading a diagram is presented that shows the parent material in which each soil has developed and the topographic position upon which each soil occurs. A picture and description of the soil profile is also given. General use and management recommendations appear in a short paragraph below the profile description.

More specific recommendations as to rotations, fertilizers, and fertilizer applications are found in the section, "Productivity and Management of Clay County Soils." This section also includes estimated yield tables.

Upland soils developed in loam to clay loam glacial till

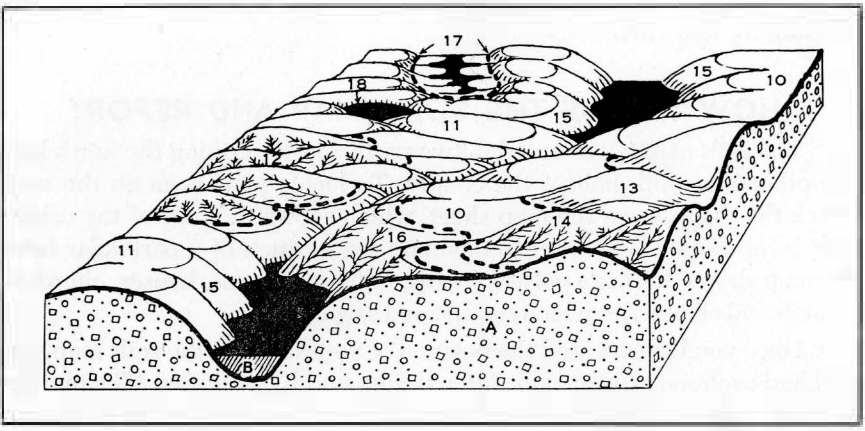


Fig. 4. A—Loam to clay loam glacial till. B—Alluvial sediments

10 Barnes loam, nearly level (0-3% slopes)

11 Barnes loam, undulating (3-8% slopes)

12 Barnes loam, eroded, undulating (3-8% slopes)

13 Barnes loam, rolling (8-13% slopes)

14 Barnes loam, eroded, rolling (8-13% slopes)

15 Buse loam, steep (13-40% slopes)

16 Buse loam, eroded, steep (13-40% slopes)

17 Parnell silty clay loam—Hamerly loam, nearly level (0-3% slopes). The Parnell soils occur in flat-bottomed depressions below the slightly higher, surrounding rims occupied by the Hamerly soils.

18 Parnell silty clay loam, level (0-1% slopes)

(10) Barnes Loam, Nearly Level (0-3% Slopes)

Barnes loam, nearly level, occurs on level to gently undulating, glacial till uplands. The Barnes soils are the well-drained members of this group of soils developed in glacial till. This soil differs from Barnes loam, undulating (11), with which it is associated, in that it occurs on more level topography and has a slightly darker and thicker surface horizon (Fig. 4).

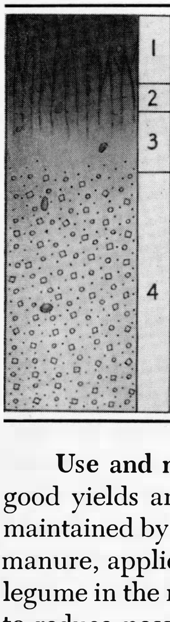
Profile description. See profile description, Barnes loam, Fig. 5.

Use and management. Practically all the areas of this soil are in cultivation, and good yields are obtained. The soil can be kept at high levels of productivity. Additions of organic matter, such as barnyard or green manure, applications of needed fertilizer (see Table 4), and use of a legume in the rotation, are necessary practices for the maintenance of tilth and productivity.

(11) Barnes Loam, Undulating (3-8% Slopes)

Barnes loam, undulating, occurs on undulating, glacial till uplands. The Barnes soils are the well-drained members of this group of soils developed in glacial till. This soil has the typical Barnes profile and topography (Fig. 4).

Fig. 5. Profile description. Barnes loam



1 (0-10") Dark brown to black, friable loam of granular structure, neutral to slightly acid in reaction

2 (10-14") Brown to dark brown, firm loam to clay loam of weak prismatic structure, neutral in reaction

3 (14-24") Light grayish-brown, firm, massive clay loam with spots of calcium carbonate (lime), mildly alkaline in reaction

4 (24"+) Yellowish-brown, clay loam glacial till

Use and management. Most areas of this soil are in cultivation, and good yields are obtained. The productivity and tilth of this soil can be maintained by additions of organic matter in the form of barnyard or green manure, application of needed fertilizer (see Table 4), and the use of a legume in the rotation. Contours and grassed waterways are recommended to reduce possible erosion when the soil occurs in the upper limits of the 3 to 8 percent slope classification.

(12) Barnes Loam, Eroded, Undulating (3-8% Slopes)

Barnes loam, eroded, undulating, occurs on undulating, glacial till uplands that have undergone accelerated erosion. The Barnes soils are the well-drained members of this group of soils developed in glacial till. This soil differs from the associated Barnes loam, undulating (11), which has not been subjected to accelerated erosion, in having a lighter colored and somewhat thinner surface soil (Fig. 4).

Profile description. See profile description, Barnes loam, Fig. 5.

Use and management. The majority of the areas of this soil are in cultivation; however, yields at best are only average. The intensive use of contours and grassed waterways is recommended to stop present, and prevent future erosion. The addition of organic matter, such as crop residues and barnyard or green manure, is also recommended as an erosion control measure and as a method of increasing productivity and improving tilth. These practices, along with applications of needed fertilizer (see Table 4) and the use of legumes in the rotation, will help regain the original high level of productivity of this soil.

(13) Barnes Loam, Rolling, (8-13% Slopes)

Barnes loam, rolling, occurs on rolling, glacial till uplands. The Barnes soils are the well-drained members of this group of soils developed in glacial till. This unit differs from the associated Barnes loam, undulating (11), which occurs on undulating topography and has a slightly darker, thicker, surface horizon, and from the associated Barnes loam, eroded, rolling (14), which has a lighter colored, somewhat thinner, surface soil due to erosion (Fig. 4).

Profile description. See profile description, Barnes loam, Fig. 5.

Use and management. Nearly all of this soil is in cultivation, and good yields are obtained in years of average or above average rainfall. In years of below average rainfall, moisture is limiting to crop growth on this soil. Field contouring, terracing, and grassing waterways are recommended practices to conserve moisture and to prevent possible erosion. The addition of crop residues and barnyard or green manure, the application of needed fertilizer (see Table 4), and the use of legumes in the rotation are necessary practices for the maintenance of tilth and productivity.

(14) Barnes Loam, Eroded, Rolling (8-13% Slopes)

Barnes loam, eroded, rolling, occurs on rolling, glacial till uplands that have undergone accelerated erosion. The Barnes soils are the well-drained members of this group of soils developed in glacial till. This soil differs from Barnes loam, rolling (13), with which it is associated, in having a thinner, lighter colored, surface horizon. In many places the original surface soil is almost gone due to erosion (Fig. 4).

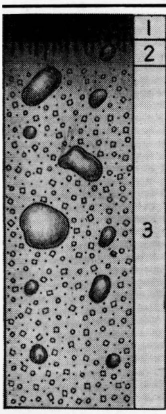
Profile description. See profile description, Barnes loam, Fig. 5.

Use and management. If economically possible, this soil should be taken out of cultivation, at least temporarily, and regrassed. If this is not practical, the same practices are recommended as for Barnes loam, eroded, undulating (12).

(15) Buse Loam, Steep (13-40% Slopes)

Buse loam, steep, occurs on steep, morainic, glacial till uplands and on the steep, upland breaks along the major drainages. The Buse soils are the excessively drained members of this group of soils developed in glacial till. Buse loam, steep, differs from the associated Barnes soils in that it is much more shallow, and from the associated Buse loam, eroded, steep (16), in that it has been only slightly eroded. Stones and glacial boulders are usually scattered over the surface and throughout the profile (Fig. 4).

Fig. 6. Profile description. Buse loam



1 (0-4″) Brownish-black of weak prismatic structure, neutral to slightly alkaline in reaction

2 (4-8″) Yellowish-brown, massive, calcareous loam, alkaline in reaction

3 (8″+) Light yellowish-brown, highly calcareous, clay loam glacial till, very alkaline in reaction

Use and management. Buse loam, steep, is best used as permanent pasture for limited grazing operations. It has a low productivity rating under cultivation due to the thin surface soil, the steep slopes upon which it occurs, the general droughtiness of the profile, and the extreme susceptibility of the unit to accelerated erosion.

(16) Buse Loam, Eroded, Steep (13-40% Slopes)

Buse loam, eroded, steep, is basically the same profile as Buse loam, steep (15). It differs from unit (15) in that it shows the effects of accelerated erosion. These effects are recognized by light-colored patches on the hilltops and steep slopes, wherever this soil is in cultivation. These areas are called locally "bald spots" (Fig. 4).

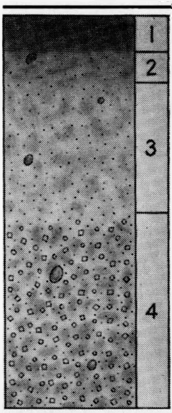
Profile description. See profile description, Buse loam, Fig. 6.

Use and management. This soil, if now under cultivation, should be planted to permanent grass. Grazing regrassed areas should be restricted until the stand is well established. It is recommended that areas of this unit that are not now cultivated, remain out of cultivation because of the erosion hazard.

(17) Parnell Silty Clay Loam - Hamerly Loam, Nearly Level (0-3% Slopes)

This soil unit is an association of Parnell silty clay loam, nearly level (18), and Hamerly loam, nearly level. It occurs on the glacial till upland and loess mantled upland, throughout the areas of Barnes, Kranzburg, and associated soils. The Parnell soils occur in flat-bottomed depressions and are poorly drained to very poorly drained. Hamerly loam occurs on narrow, slightly higher rims around the Parnell depressions and is moderately well drained to somewhat poorly drained. The Hamerly soils are extremely calcareous near the surface (Fig. 4).

Fig. 7. Profile description. Hamerly loam



1 (0-5″) Dark gray, slightly calcareous loam of crumb structure, mildly alkaline in reaction

2 (5-10″) Gray, mottled (spotted) with lighter and darker colors, strongly calcareous loam of granular structure, mildly alkaline in reaction

3 (10-30″) Light brownish-gray, mottled with lighter and darker colors, very strongly calcareous loam of granular structure, strongly alkaline in reaction

4 (30-60″) Highly mottled, calcareous, clay loam glacial till

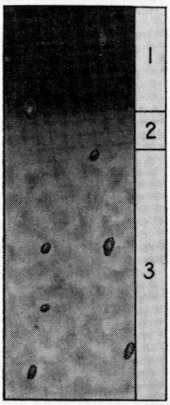
* See Parnell silty clay loam, level, (18) for the profile description of Parnell.

Use and management. The same recommendations are made for this unit as for Parnell silty clay loam, level (18).

(18) Parnell Silty Clay Loam, Level (0-1% Slopes)

Parnell silty clay loam, level, occurs in flat-bottomed depressions in the glacial till uplands and loess mantled uplands throughout the areas of Barnes, Kranzburg, and associated soils. It is poorly drained to very poorly drained (Fig. 4).

Fig. 8. Profile description. Parnell silty clay loam



1 (0-16") Black, massive silty clay loam, neutral to slightly alkaline in reaction

2 (16-22") Dark gray, massive silty clay loam, slightly alkaline in reaction

3 (22"+) Gray, massive, calcareous clay loam or clay, usually mottled (spotted) with rust brown iron stains, alkaline in reaction

Use and management. Cultivation of this unit is seldom possible. The soil is often ponded in spring and early summer. It is recommended that this soil be used for pasture and hayland.

A typical county landscape Photo USDA, SCS

Upland soils developed in deep loess

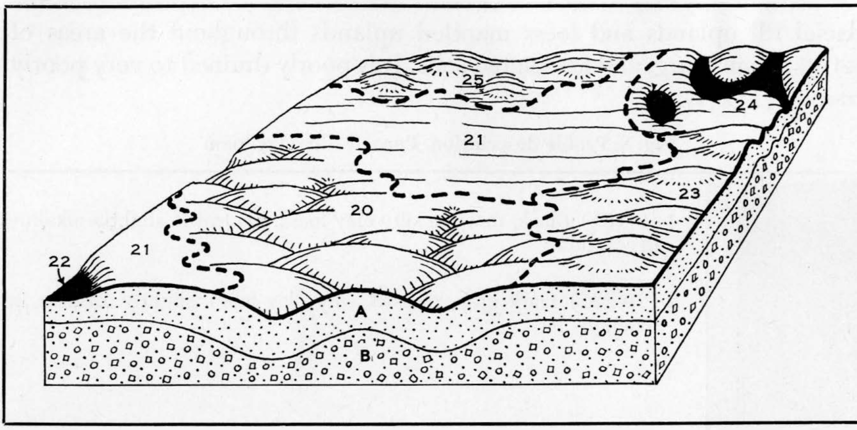


Fig. 9. A—Deep, silt loam to silty clay loam loess (wind-blown silts and clays). B—Loam to clay loam glacial till

20 Moody silt loam, undulating (3-8% slopes)

21 Trent silty clay loam, nearly level (0-3% slopes)

22 Alsen silty clay loam, level (0-1% slopes)

23 Trent silty clay loam—Moody silt loam, nearly level (0-3% slopes). The Trent soils occur on the level areas in the association, below the slight rises occupied by the Moody soils.

24 Trent-Alsen silty clay loams, nearly level (0-3% slopes). The Trent soils occur on the level areas in this association above the slight depressional areas in which the Alsen soils are found.

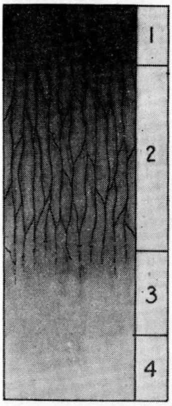
25 Wakonda-Trent silty clay loams, nearly level (0-3% slopes). The Wakonda soils occur on the slight rises above the level of the associated Trent soils.

(20) Moody Silt Loam, Undulating (3-8% Slopes)

Moody silt loam, undulating, occurs on undulating, glacial till upland that has been covered with a thick blanket of loess (wind-blown silts and clays). It is the well-drained member of this group of soils developed in deep loess (Fig. 9).

Use and management. Practically all the areas of this soil are in cultivation, and excellent yields are obtained. The soil is considered one of the best in the county and is equaled by few others. A high level of productivity is maintained through the addition of organic matter, such as barnyard or green manure, the use of needed fertilizer (see Table 4), and the use of legumes in the rotation. Contour farming with grassed waterways is recommended to reduce possible erosion.

Fig. 10. Profile description. Moody silt loam



1 (0-8″) Very dark grayish-brown, very friable silt loam of crumb structure, neutral to slightly acid in reaction

2 (8-37″) Dark brown to brown, friable silty clay loam of prismatic structure, neutral to slightly acid in reaction

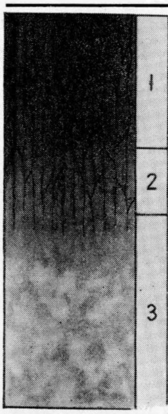
3 (37-50″) Brown, friable, massive, calcareous silty clay loam, mildly alkaline in reaction

4 (50-60″) Yellowish-brown, friable, massive, very calcareous, silty clay loam loess, mildly alkaline in reaction

(21) Trent Silty Clay Loam, Nearly Level (0-3% Slopes)

Trent silty clay loam, nearly level, occurs on level to gently undulating, glacial till upland that has been covered with a thick blanket of loess (wind-blown silts and clays). It is the moderately well-drained member of this group of soils developed in deep loess (Fig. 9).

Fig. 11. Profile description. Trent silty clay loam



1 (0-20″) Black, very friable silty clay loam of weak granular to weak prismatic structure, neutral in reaction

2 (20-30″) Light brownish-gray, very friable silty clay loam of weak prismatic structure, mildly alkaline in reaction

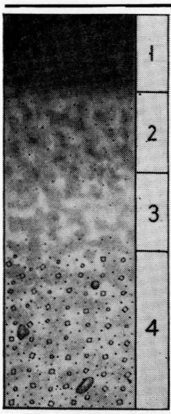
3 (30-60″) Light yellowish-brown, mottled (spotted) with white, friable, massive, very calcareous silty clay loam loess, mildly alkaline in reaction

Use and management. Nearly all of this soil is in cultivation and excellent yields are obtained. Under average management it has a productivity rating comparable to that of the Moody soils; however, with special management its productivity rating can exceed that of the Moody soils. In years of average rainfall it is wet and cool, and slow to warm up in the spring. The result is a reduction in the available nitrogen during this period. As the soil warms up, the nitrogen in the soil becomes available to carry the crop through to maturity. The addition of a nitrogenous fertilizer in the spring bridges this gap in the available nitrogen cycle and gives the crop a boost that increases yield, and in many cases speeds maturity, especially in corn. With the exception of this special practice, and considering there is no erosion hazard, the use and management of this soil is the same as that for the Moody soils.

(22) Alsen Silty Clay Loam, Level (0-1% Slopes)

Alsen silty clay loam, level, occurs in shallow, flat-bottomed depressions and swales on glacial till upland that has been covered with a thick blanket of loess (wind-blown silts and clays). It is the somewhat poorly drained member of this group of soils developed in deep loess. It differs from Trent silty clay loam, nearly level (21), with which it is associated, in occurring in depressions and being less well drained (Fig. 9).

Fig. 12. Profile description. Alsen silty clay loam



1 (0-12″) Black, very friable silty clay loam of granular structure, neutral in reaction

2 (12-24″) Dark gray, faintly mottled (spotted) with light and dark colors, friable silty clay loam of granular structure, neutral in reaction

3 (24-36″) Light brownish-gray, distinctly mottled with light and dark colors, friable, massive silty clay loam, neutral in reaction

4 (36-60″) Light gray, distinctly mottled with light and dark colors, firm, massive, clay loam glacial till, moderately alkaline in reaction

Use and management. Cultivation of this unit in years of average or above average rainfall is sometimes restricted because of excess moisture in the spring. Tile or ditch drainage is recommended for large areas of this soil, but for small areas this measure is not considered economically practical. Other than for the drainage recommendation, this soil can be handled successfully by following the recommended use and management for Trent silty clay loam, nearly level (21).

(23) Trent Silty Clay Loam - Moody Silt Loam, Nearly Level (0-3% Slopes)

This soil unit is an association of Trent silty clay loam, nearly level (21), and Moody silt loam, nearly level. The association occurs on nearly level, glacial till upland that has been covered with a thick blanket of loess (wind-blown silts and clays). Trent is the moderately well-drained member and Moody is the well-drained member of this group of soils developed in deep loess (Fig. 9).

Profile description. See profile description, Trent silty clay loam, Fig. 11, and Moody silt loam, Fig. 10.

Use and management. Areas of the individual members within this association are usually not large enough to allow carrying on separate management practices for each. Trent is the predominant member of this association. With the exception of the special practice of early applications of extra nitrogen on the Trent, the use and management of the Trent and Moody soils are the same. It is recommended that the same management be followed for this unit as was recommended for Trent silty clay loam, nearly level (21).

(24) Trent-Alsen Silty Clay Loams, Nearly Level (0-3% Slopes)

This unit is an association of Trent silty clay loam, nearly level (21), and Alsen silty clay loam, nearly level (22). It occurs on nearly level, glacial till upland that has been covered with a thick blanket of loess (wind-blown silts and clays). Trent is the moderately well-drained member and Alsen is the somewhat poorly drained member of this group of soils developed in deep loess (Fig. 9).

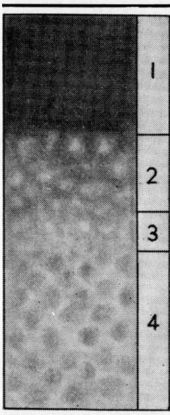
Profile description. See profile description, Trent silty clay loam, Fig. 11, and Alsen silty clay loam, Fig. 12.

Use and management. Areas of the individual members within this association are usually not large enough to allow carrying on separate management practices for each. Trent is the predominant member of this association. The recommended management of this unit is the same as for Trent silty clay loam, nearly level (21).

(25) Wakonda-Trent Silty Clay Loams, Nearly Level (0-3% Slopes)

This soil unit is an association of Wakonda silty clay loam, nearly level, and Trent silty clay loam, nearly level (21). It occurs on nearly level, glacial till upland that has been covered with a thick blanket of loess (wind-blown silts and clays). The Wakonda soils occur on slight rises above the level of the associated Trent soils. They are moderately well-drained to somewhat poorly drained and are extremely calcareous at rather shallow depths in the profile. The Trent soils occur on the nearly level areas and are moderately well-drained (Fig. 9).

Fig. 13. Profile description. Wakonda silty clay loam



1 (0-18″) Very dark brown, friable silty clay loam

2 (18-30″) Very dark brown, mottled (spotted) with light colors, friable, strongly calcareous silty clay loam

3 (30-36″) Dark olive brown, mottled with light colors, friable, strongly calcareous silt loam

4 (36-60″) Yellowish-brown, mottled with light and dark colors, friable, strongly calcareous silt loam

Use and management. Areas of the individual members within this association are usually not large enough to allow carrying on separate management practices for each. Wakonda silty clay loam is the most predominant member of this association. Tile or ditch drainage is recommended for large areas of this unit, but for small areas this measure is probably not economically practical. Other than for the drainage factor, and possible phosphate deficiencies, this soil unit can be handled successfully by following the recommended use and management for Trent silty clay loam, nearly level (21).

Upland soils developed in shallow and moderately deep loess over glacial till

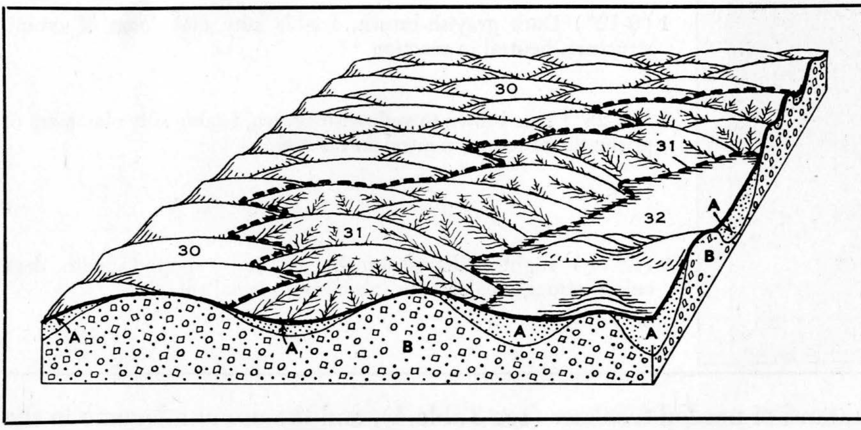


Fig. 14. A—Patchy, very shallow to moderately deep, silt loam to silty clay loam loess (wind-blown silts and clays). B—Loam to clay loam glacial till.

30 Kranzburg silty clay loam-Barnes loam, undulating (3-8% slopes). The Kranzburg soils have developed in thin deposits of loess (wind-blown silts and clays) over glacial till, and usually occur on the slopes below the knobs on which the Barnes soils developed in glacial till are found.

31 Kranzburg silty clay loam-Barnes loam, eroded, undulating (3-8% slopes). This unit has the same sequence of soil occurrence as unit (30). It differs from it only in having undergone accelerated erosion.

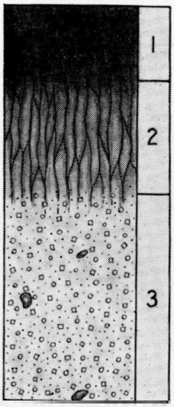
32 Trent silty clay loam-Barnes loam, nearly level (0-3% slopes). The Trent soils in the association have developed in thin to moderately deep deposits of loess (wind-blown silts and clays) over glacial till, and usually occur on the nearly level slopes below the low rises on which the Barnes soils, developed in glacial till, are found.

(30) Kranzburg Silty Clay Loam - Barnes Loam, Undulating (3-8% Slopes)

This soil unit is an association of Kranzburg silty clay loam, undulating and Barnes loam, undulating (11). It occurs on undulating, glacial till upland that has been partially covered with a thin to moderately deep, discontinuous blanket of loess (wind-blown silts and clays). The Kranzburg soils have developed in thin deposits of loess over glacial till, and usually occur on slopes below the knobs on which the Barnes soils, developed in glacial till, are found. Kranzburg soils and Barnes soils are well drained (Fig. 14).

Use and management. Most of the areas of this unit are in cultivation, and good yields are obtained. The productivity of this unit can be maintained by additions of organic matter as barnyard or green manure, appli-

Fig. 15. Profile description. Kranzburg silty clay loam



1 (0-12″) Dark grayish-brown, friable silty clay loam of crumb structure, neutral in reaction

2 (12-28″) Pale brown to yellowish-brown, friable silty clay loam of prismatic structure, neutral in reaction

3 (28″+) Light yellowish-brown, mottled (spotted) with dark colors, strongly calcareous, clay loam glacial till

cations of needed fertilizer (see Table 4), and the use of a legume in the rotation. Contours and grassed waterways are recommended to reduce possible erosion when the unit occurs in the upper limits of the 3 to 8 percent slope group.

(31) Kranzburg Silty Clay Loam - Barnes Loam, Eroded, Undulating (3-8% Slopes)

This unit is an association of Kranzburg silty clay loam, eroded, undulating, and Barnes loam, eroded, undulating (12). It occurs on undulating, glacial till upland that has been partially covered with a thin to moderately deep, discontinuous blanket of loess (wind-blown silts and clays). Both the Kranzburg soils and the Barnes soils are well-drained. This unit is basically the same as the associated Kranzburg silty clay loam-Barnes loam, undulating (30). It differs from it, however, in having somewhat thinner and lighter colored surface soils due to accelerated erosion (Fig. 14).

Profile description. See profile description, Kranzburg silty clay loam, Fig. 15, and Barnes loam, Fig. 5.

Use and management. Most of the areas of this unit are in cultivation; however, yields are below those obtained on Kranzburg silty clay loam-Barnes loam, undulating (30), with which it is associated. The intensive use of contours, terraces, and grassed waterways is recommended to reduce erosion. Addition of organic matter, such as crop residues and barnyard or green manure, is also recommended as an erosion control measure as well as an aid in restoring and maintaining productivity and tilth. These practices, plus regular applications of needed fertilizer (see Table 4) and use of legumes in the rotation, will help regain original high levels of productivity.

(32) Trent Silty Clay Loam - Barnes Loam, Nearly Level, (0-3% Slopes)

This soil unit is an association of Trent silty clay loam, nearly level (21), and Barnes loam, nearly level (10). It occurs on nearly level, glacial till upland that has been partially covered with a thin to moderately deep, discontinuous blanket of loess (wind-blown silts and clays). The Trent soils in this association occur on the nearly level slopes below the low knobs on which the associated Barnes soils are found. The Trent soils are the moderately well-drained members and the Barnes soils are the well-drained members of this association (Fig. 14).

Profile description. See profile description, Trent silty clay loam, Fig. 11, and Barnes loam, Fig. 5.

Use and management. Practically all of the areas of this association are in cultivation, and good yields are obtained. Areas of the individual units within the association are usually not large enough to allow carrying on separate management practices for each. Trent is the predominant member of the association. It is recommended that the same management be followed for this association as was recommended for Trent silty clay loam, nearly level (21).

Upland soils developed in eolian sands

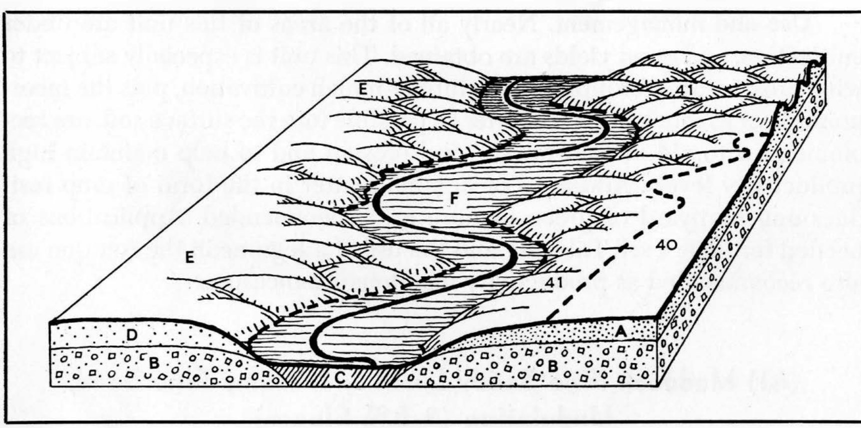


Fig. 16. A—Moderately deep to deep eolian sands (wind-blown sands). B—Loam to clay loam glacial till. C—Alluvial sediments. D—Silt loam to silty clay loam loess (wind-blown silts and clays). E—Upland loess soils described in Figs. 9 and 14. F—Bottomland soils.

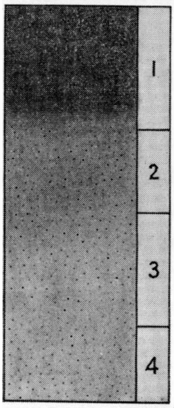
40 Maddock fine sandy loam and loamy fine sand, nearly level (0-3% slopes)

41 Maddock fine sandy loam and loamy fine sand, undulating (3-8% slopes)

(40) Maddock Fine Sandy Loam and Loamy Fine Sand, Nearly Level (0-3% Slopes)

Maddock fine sandy loam and loamy fine sand, nearly level, occurs on nearly level, glacial till upland that has been covered with a blanket of moderately deep to deep eolian sand (wind-blown sands). This soil is well-drained to somewhat excessively drained (Fig. 16).

Fig. 17. Profile description. Maddock fine sandy loam and loamy fine sand



1 (0-18") Very dark gray, very friable fine sandy loam or loamy fine sand of single grain structure, neutral in reaction

2 (18-32") Dark grayish-brown, loose fine sand, neutral in reaction

3 (32-48") Light yellowish-brown, loose, calcareous fine sand, mildly alkaline in reaction

4 (48-60") Light yellowish-brown, loose, moderately calcareous fine sand, mildly alkaline in reaction

Use and management. Nearly all of the areas of this unit are under cultivation, and good yields are obtained. This unit is especially subject to wind erosion. Strip cropping, and stubble-mulch cultivation, plus the incorporation of as much organic matter as possible into the surface soil, are recommended to aid in controlling wind erosion and to help maintain high productivity levels. Additions of organic matter in the form of crop residues and barnyard or green manure are recommended. Applications of needed fertilizer (see Table 4) and the use of a legume in the rotation are also recommended as productivity maintenance measures.

(41) Maddock Fine Sandy Loam and Loamy Fine Sand, Undulating (3-8% Slopes)

Maddock fine sandy loam and loamy fine sand, undulating, occurs on undulating, glacial till upland that has been covered with a blanket of moderately deep to deep eolian sands (wind-blown sands). This unit is well-drained to somewhat excessively drained. It differs from Maddock fine sandy loam and loamy fine sand, nearly level (40), in that it occurs on stronger slopes and usually has a slightly thinner surface soil horizon (Fig. 16).

Profile description. See profile description, Maddock fine sandy loam and loamy fine sand, Fig. 17.

Use and management. Nearly all of the areas of this soil unit are under cultivation, and good yields are obtained. This soil unit is especially subject to wind erosion. Strip cropping and stubble-mulch cultivation are recommended, along with additions of organic matter in the form of crop residues and barnyard or green manure, to aid in controlling wind erosion. These practices, in addition to the use of needed fertilizer (see Table 4) and use of a legume in the rotation, help to maintain high levels of productivity. Where this soil unit occurs on slopes in the upper limits of the 3 to 8 percent slope group, the practices of contouring and grassing waterways should be followed to avoid possible soil erosion.

Terrace soils developed in loamy material over gravel

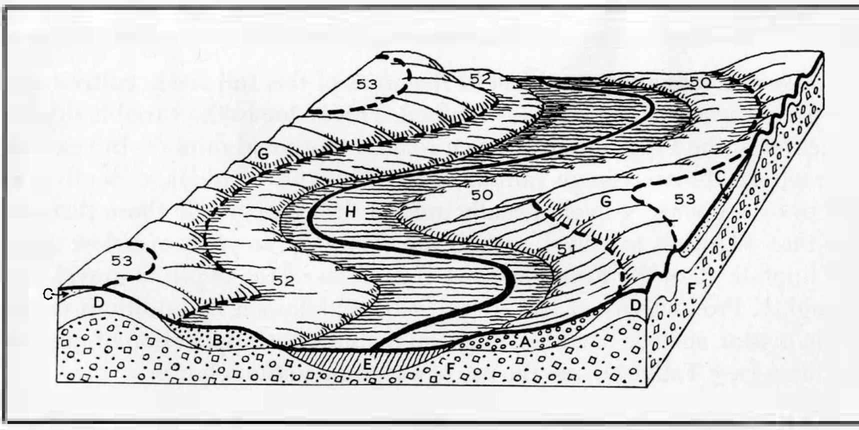


Fig. 18. A—Gravelly terrace materials. B—Sandy terrace materials. C—Shallow to moderately deep, silt loam loess (wind-blown silts and clays). D—Moderately deep to deep, eolian sands (wind-blown sands). E—Alluvial sediments. F—Loam to clay loam glacial till. G—Soils described in Fig. 16. H—Bottomland soils

50 Fordville loam, nearly level (0-3% slopes)

51 Fordville loam, gently sloping (3-8% slopes)

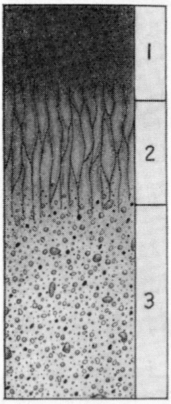
52 Fordville loam, coarse sand substratum, nearly level (0-3% slopes)

53 Flandreau silt loam, terrace phase, nearly level (0-3% slopes)

(50) Fordville Loam, Nearly Level (0-3% Slopes)

Fordville loam, nearly level, occurs along major streams on nearly level, gravelly terraces that are overlain by various depths of sediments. The Fordville soils are well-drained to somewhat excessively drained (Fig. 18).

Fig. 19. Profile description. Fordville loam



1 (0-14″) Black, friable loam of granular structure

2 (14-30″) Dark brown, friable loam of prismatic structure

3 (30″+) Dark brown, calcareous gravel and sand

Use and management. Most of the areas of this soil are in cultivation, but great variations in yield are obtained. This is due to the variable depths to gravel in the Fordville soils when related to annual rainfall. In years of average or above average rainfall, Fordville soils of average depth (30 inches or deeper to gravel) usually are not droughty, while those that are less than 30 inches to gravel, usually are droughty. In years of below average rainfall, all of the Fordville soils, regardless of the depth to gravel, are droughty. Productivity of this unit can be maintained by additions of organic matter, such as barnyard or green manure, the application of needed fertilizer (see Table 4), and the use of a legume in the rotation.

(51) Fordville Loam, Gently Sloping (3-8% Slopes)

Fordville loam, gently sloping, occurs along major streams on gently sloping, gravelly terraces that are overlain by various depths of sediments. The Fordville soils are well-drained to somewhat excessively drained. This unit differs from Fordville loam, nearly level (50), in occurring on more sloping topography and in being generally somewhat more shallow to gravel (Fig. 18).

Profile description. See profile description, Fordville loam, Fig. 19.

Use and management. Many of the areas of this soil are in cultivation, but below average yields generally are obtained. This soil is usually droughty except in years of above average rainfall. It can probably best be utilized as early pasture or hayland. If it must be cultivated, the same productivity maintenance practices should be followed as are recommended for Fordville loam, nearly level (50). Contouring is also recommended when the soil occurs in the upper limits of the 3 to 8 percent slope group.

(52) Fordville Loam, Coarse Sand Substratum, Nearly Level (0-3% Slopes)

Fordville loam, coarse sand substratum, nearly level, occurs on nearly level, sandy and gravelly terraces along major drainages, that are overlain by various depths of sediments. The Fordville soils are well-drained to somewhat excessively drained. This unit differs from Fordville loam, nearly level (50), in that it is underlain with coarse sand rather than gravel (Fig. 18).

Profile description. See profile description, Fordville loam, Fig. 19.

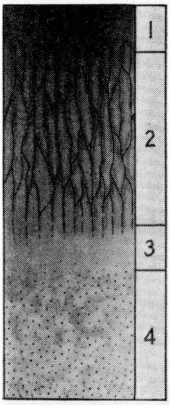
Use and management. Most of the areas of this unit are in cultivation, and somewhat better yields are obtained from it than are obtained from Fordville loam, nearly level (50). This is due to the slightly better water-holding capacity of the sand substratum under this unit, when compared with the gravel substratum under unit (50). The use and management recommendations for this unit are the same as those suggested for Fordville loam, nearly level (50).

(53) Flandreau Silt Loam, Terrace Phase, Nearly Level (0-3% Slopes)

Flandreau silt loam, terrace phase, nearly level, occurs on nearly level eolian sand (wind-blown sand) covered terraces of varied elevations that have been subsequently covered with a shallow to moderately deep blanket of silt loam loess (wind-blown silts and clays). The Flandreau soils are well-drained. This unit differs from Moody silt loam (20), primarily in having a sand substratum. It differs from Maddock fine sandy loam and loamy fine sand (40), in having silt loam to loam upper horizons (Fig. 18).

Use and management. Practically all of the areas of this unit are in cultivation, and good yields are obtained. A high level of productivity is easily maintained by the addition of organic matter, such as barnyard or green manure, the use of needed fertilizer (see Table 4), and the use of legumes in the rotation.

Fig. 20. Profile description. Flandreau silt loam



1 (0-7") Black, friable silt loam of granular structure, neutral in reaction

2 (7-33") Brown, friable loam grading into sandy loam of prismatic structure, neutral in reaction

3 (33-40") Light yellowish-brown, massive loamy sand, neutral in reaction

4 (40-60") Pale yellow, mottled (spotted) with light and dark colors, massive, calcareous loamy sand or sand, moderately alkaline in reaction

Soils developed in colluvial-alluvial and alluvial materials

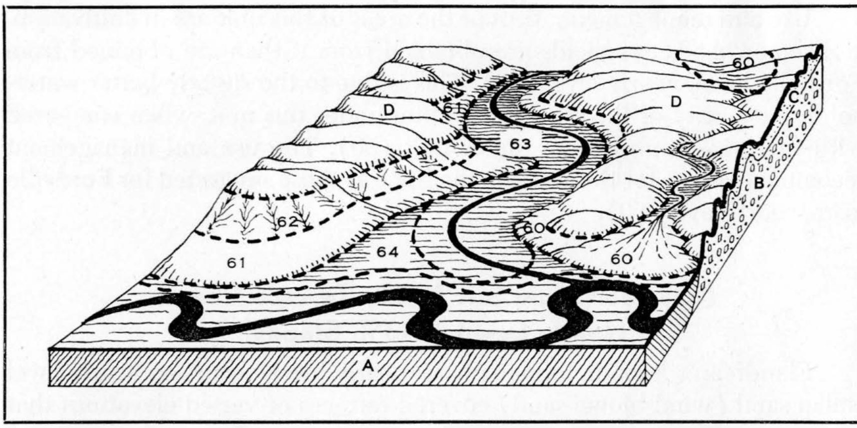


Fig. 21. A—Alluvial sediments. B—Loam to clay loam glacial till. C—Silt loam to silty clay loam loess (wind-blown silts and clays). D—Upland loess soils see Figs. 9 and 14

60 Alcester-Judson silt loams, nearly level (0-3% slopes). The Alcester-Judson soils are developed in colluvial-alluvial materials. Alcester soils differ from the Judson soils only in having calcium carbonate (lime) within 3 feet of the surface, whereas the Judson soils are noncalcareous to depths of at least 5 feet. This difference between the two soils in the association cannot be seen on the diagram above.

61 Alcester-Judson silt loams, gently sloping (3-8% slopes). The same soil differences occur in this unit as occurred in unit (60).

62 Alcester-Judson silt loams, eroded, sloping (8-13% slopes). The same soil differences occur in this unit as occured in unit (60).

63 Alcester-Lamoure silt loams, nearly level (0-3% slopes). The Alcester soils differ from the Lamoure soils in being well-drained to moderately well-drained. The Lamoure soils are somewhat poorly drained. This soil difference cannot be shown on the diagram above.

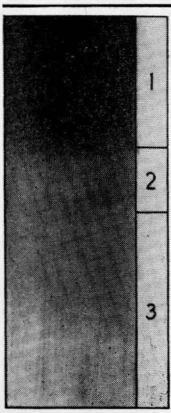
64 McPaul silt loam, nearly level (0-3% slopes)

(60) Alcester-Judson Silt Loams, Nearly Level (0-3% Slopes)

This soil unit is an association of Alcester silt loam, nearly level, and Judson silt loam, nearly level. The soils of this unit have developed in colluvial-alluvial materials. They occur in close association in nearly level positions at the heads of drains, in and along the upper reaches of upland drains, and on the fans and footslopes along major stream bottoms. Both of the soils in this unit have well-drained to moderately well-drained profiles. The Alcester soils differ from the Judson soils in having calcium carbonate (lime) within 3 feet of the surface, whereas the Judson soils are noncalcareous to depths of at least 5 feet and are neutral to slightly acid in the upper horizons. This unit differs from Alcester-Judson silt loams, gently sloping (61), which occurs on more sloping topography, and from Alcester-Judson silt loams, eroded, sloping (62), which occurs on much steeper topography and which has undergone accelerated erosion (Fig. 21).

Use and management. All of the larger areas of this soil unit are in cultivation, and good yields are obtained. When this soil unit occurs as narrow stringers in and along the upper reaches of upland drains, it is usually left in pasture because of the poor field pattern. High productivity levels can be maintained for the larger cultivated areas through additions of organic matter, such as barnyard or green manure, the use of needed fertilizer (see Table 4), and the use of legumes in the rotation.

Fig. 22. Profile description. Alcester silt loam

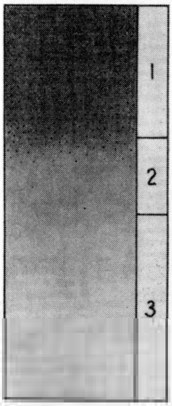


1 (0-20") Very dark grayish-brown, friable silt loam of granular structure, noncalcareous to slightly calcareous

2 (20-30") Dark grayish-brown, very friable, massive, slightly calcareous silt loam

3 (30"+) Brown, friable, massive, calcareous silt loam

Fig. 23. Profile description. Judson silt loam



1 (0-20″) Very dark grayish-brown, friable, noncalcareous silt loam of granular structure

2 (20-32″) Dark grayish-brown, friable, massive, noncalcareous silt loam

3 (32+″) Brownish-gray, friable, massive, noncalcareous silt loam

(16) Alcester-Judson Silt Loams, Gently Sloping (3-8% Slopes)

This unit is an association of Alcester silt loam, gently sloping, and Judson silt loam, gently sloping. The soils of this unit have developed in colluvial-alluvial materials, and occur in close association in gently sloping positions at the heads of drains, in and along the upper reaches of upland drains, and on the fans and footslopes along major stream bottoms. Both of the soils in this unit are well-drained to moderately well-drained. The Alcester soils differ from the Judson soils in having calcium carbonate (lime) within 3 feet of the surface, whereas the Judson soils are noncalcareous to depths of at least 5 feet and neutral to slightly acid in the upper horizons. This unit differs from Alcester-Judson silt loams, nearly level (60), which occurs on more level topography, and from Alcester-Judson silt loams, eroded, sloping (62), which occurs on more sloping topography and has undergone accelerated erosion (Fig. 21).

Profile description. See profile descriptions of Alcester-Judson silt loams, Figs. 22 and 23.

Use and management. All of the larger areas of this unit are in cultivation, and good yields are obtained. When the unit occurs as narrow stringers in and along upland drains, it is usually left in pasture because of poor field pattern and the susceptibility of the unit, in this position, to erosion. High levels of productivity can be maintained for this unit through the addition of organic matter, such as barnyard or green manure, the use of needed fertilizer (see Table 4), and the use of a legume in the rotation. Contours and grassed waterways are recommended to reduce possible erosion when unit occurs in upper limits of the 3 to 8 percent slope group.

(62) Alcester-Judson Silt Loams, Eroded, Sloping (8-13% Slopes)

This soil unit is an association of Alcester silt loam, eroded, sloping, and Judson silt loam, eroded, sloping. The soils of this unit have developed in colluvial-alluvial materials and occur in close association in sloping positions at the heads of drains, in and along the upper reaches of upland drains, and on the fans and footslopes along major stream bottoms. Both of the soils in this unit are in the well-drained to moderately well-drained range. The Alcester soils differ from the Judson soils in having calcium carbonate (lime) within 3 feet of the surface, whereas the Judson soils are noncalcareous to depths of at least 5 feet and are neutral to slightly acid in the upper horizons. This unit differs from Alcester-Judson slit loams, nearly level (60), and Alcester-Judson silt loams, gently sloping (61), in that it occurs on more sloping topography and has undergone accelerated erosion (Fig. 21).

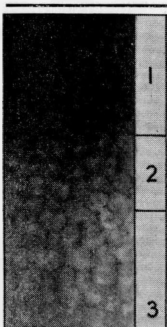
Profile description. See profile descriptions of Alcester-Judson silt loams, Figs. 22 and 23.

Use and management. If economically possible, this soil unit should be taken out of cultivation and regrassed, at least temporarily. When this soil unit occurs as narrow stringers in and along upland drains, it is recommended that it not be cultivated, because it is extremely susceptible to erosion and has a generally poor field pattern.

(63) Alcester-Lamoure Silt Loams, Nearly Level (0-3% Slopes)

This unit is an association of Alcester silt loam, nearly level, and Lamoure silt loam, nearly level. The soils of this unit have developed in

Fig. 24. Profile description. Lamoure silt loam



1 (0-18″) Black, friable, calcareous (limy) silt loam of granular structure

2 (18-30″) Very dark grayish-brown mottled (spotted) with light and dark colors, friable, calcareous silty clay loam of granular structure

3 (30″+) Very dark grayish-brown mottled with light and dark colors, friable, calcareous, massive silty clay loam

* See Alcester-Judson silt loams, nearly level, (60) for profile description of Alcester silt loam.

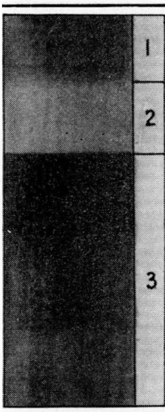
colluvial-alluvial and alluvial materials. They occur in close association on the nearly level areas in and along the lower main stems of upland drains. The Lamoure soils differ from the Alcester soils, which are well-drained to moderately well-drained, in being somewhat poorly drained to poorly drained (Fig. 21).

Use and management. Practically all of this soil unit is in pasture or permanent grass. This soil unit generally has a poor field pattern and a definite flood hazard. It is very well suited for all season pasture or hayland.

(64) McPaul Silt Loam, Nearly Level (0-3% Slopes)

McPaul silt loam, nearly level, has developed in variable depths of light-colored, calcareous (limy), colluvial or recent alluvial sediments, eroded principally from loess derived soils of the uplands. These erosional sediments have been deposited over older, dark-colored, silty, alluvial materials. This unit occurs on nearly level footslope-bottom transition areas. The McPaul soils are moderately well-drained to well-drained (Fig. 21).

Fig. 25. Profile description. McPaul silt loam



1 (0-10") Light yellowish-brown, friable, slightly calcareous silt loam

2 (10-22") Very light yellowish-brown, friable, slightly calcareous silt loam

3 (22"+) Dark brownish-gray, calcareous, heavy silt loam to silty clay loam

Use and management. This soil can be handled successfully by following the recommendations that were made for Alcester-Judson silt loams, nearly level (60).

Bottomland soils developed in fine-textured alluvium

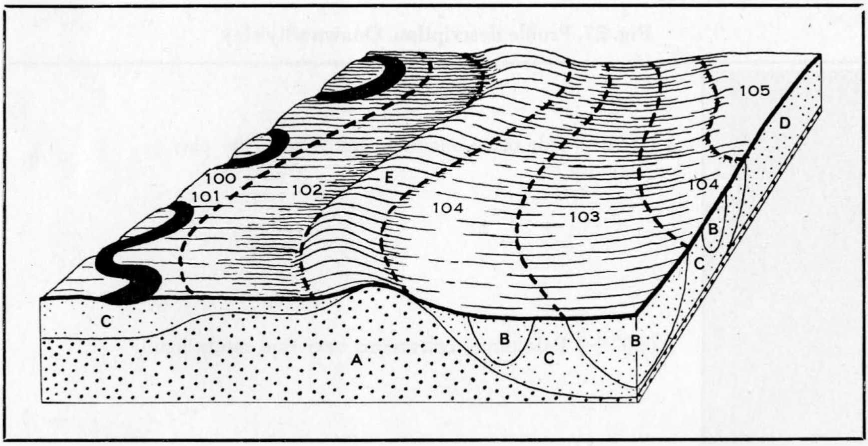


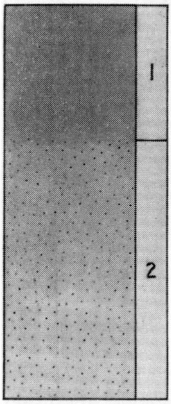
Fig. 26. A—Coarse-textured (sandy), alluvial (water deposited) sediments. B—Fine-textured (clay and silty clay) alluvial sediments. C—Fine-textured, calcareous (limy), alluvial sediments. D—Fine-textured, alluvial sediments highly saline (high in sulfates and chlorides of calcium, magnesium and sodium), and alkali (only sodium salts). E—Natural stream levee

100 Onawa silty clay, level (0-1% slopes)
101 Onawa clay, level (0-1% slopes)
102 Onawa silty clay, very shallow to sand, level (0-1% slopes)
103 Luton clay, level (0-1% slopes)
104 Luton-Solomon silty clays, level (0-1% slopes). The Luton soils in this association occur where the fine-textured sediments are not calcareous. The Solomon soils in the association occur where the fine-textured sediments are calcareous.
105 Napa complex, level (0-1% slopes)

(100) Onawa Silty Clay, Level (0-1% Slopes)

Onawa silty clay, level, has developed in light-colored, calcareous (limy), fine-textured (clay and silty clay), recent slack water sediments that have been deposited over deep, older, moderately coarse-textured (sandy loam) sediments. The Onawa soils occur on level first bottoms (the lowest land level along streams or rivers) of the Missouri River. The natural surface drainage of this unit is usually poor; however, the internal drainage is moderate. This unit differs from Onawa clay, level (101), in having a silty clay surface texture and from Onawa silty clay, very shallow over sand, level (102), which is much more shallow over the older, coarse-textured substratum. This unit differs from Luton clay, level (103), which has developed in generally noncalcareous, fine-textured sediments, and from Solomon silty clay, level, which has developed in calcareous, fine-textured sediments (Fig. 26).

Fig. 27. Profile description. Onawa silty clay



1 (0-20") Pale olive, massive, calcareous silty clay

2 (20"+) Pale olive, calcareous very fine sandy loam

Use and management. The amount of this soil under cultivation and the yields obtained change annually depending somewhat on the extent of spring flooding and the height of the fluctuating water table. Areas with slow surface drainage are best used for pasture, while areas with adequate surface drainage are best used for cropland. Tile drainage may be needed on some areas for maximum production. Favorable soil tilth is easily destroyed if this soil is cultivated when wet. The productivity level of this soil is not high; however, it can be increased greatly through the addition of organic matter, such as crop residues and barnyard manure, the application of a high-nitrogen fertilizer, and the consistent use of a legume in the rotation.

(101) Onawa Clay, Level (0-1% Slopes)

Onawa clay, level, has developed in light-colored, calcareous (limy), fine-textured (clays and silty clays), recent slack water sediments that have been deposited over deep, older, moderately coarse to coarse-textured (sandy loams) sediments. The Onawa soils occur on level first bottoms (the lowest land level along streams and rivers) of the Missouri River. The natural surface drainage of this unit is usually poor; however, the internal drainage is moderate. The unit differs from Onawa silty clay, level (100), in having a clay surface texture, and from Onawa silty clay, very shallow over sand, level (102), which is much more shallow over the older, coarse-textured substratum. This soil also differs from Luton clay, level (103), which has developed in generally noncalcareous, fine-textured sediments, and from Solomon silty clay, level, which has developed in calcareous, fine-textured sediments (Fig. 26).

Profile description. See profile description, Onawa silty clay, Fig. 27.

Use and management. This soil can be handled successfully by following the same use and management recommended for Onawa silty clay, level (100).

(102) Onawa Silty Clay, Very Shallow to Sand, Level (0-1% Slopes)

Onawa silty clay, very shallow over sand, level, has developed in very thin deposits of light-colored, calcareous (limy), fine-textured (clays and silty clays), recent slack water sediments, over deep, older, moderately coarse-textured (sandy loam) sediments. The Onawa soils occur on level first bottoms (the lowest land level along streams and rivers) of the Missouri River. The natural surface drainage of this unit is usually poor; however, the internal drainage is moderate to good. This unit differs from Onawa silty clay, level (100), and Onawa clay, level (101), in being very shallow to the coarse-textured substratum. It also differs from Luton clay, level (103), which has developed in generally noncalcareous, fine-textured sediments, and from Solomon silty clay, level, which has developed in calcareous, fine-textured sediments (Fig. 26).

Profile description. See Onawa silty clay, level (100).

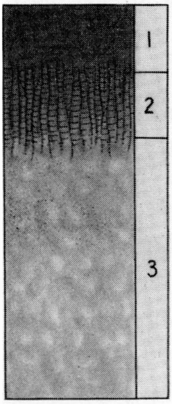
Use and management. This soil can be handled successfully by following the same use and management recommended for Onawa silty clay, level (100).

(103) Luton Clay, Level, (0-1% Slopes)

Luton clay, level, has developed in generally noncalcareous (not limy), fine-textured (clays and silty clays), alluvial (water deposited) sediments. The Luton soils occur on the Missouri River floodplains and usually occur in large, low, somewhat swampy areas back from the natural stream levees where natural surface drainage is poor to very poor. This unit differs from Onawa silty clay, level (100); Onawa clay, level (101); and Onawa silty clay, very shallow to sand, level (102), in being an essentially noncalcareous, dark-colored profile developed entirely in fine-textured sediments. It also differs from Solomon silty clay, level, in being essentially noncalcareous (Fig. 26).

Use and management. The proportion of cultivated land to uncultivated land and the yields obtained on this soil vary widely from year to year

Fig. 28. Profile description. Luton clay



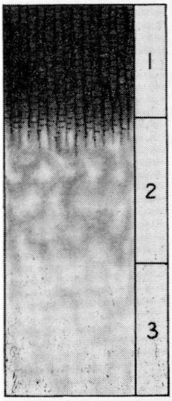
1 (0-10") Black, massive clay, neutral to very slightly alkaline in reaction

2 (10-20") Very dark gray clay of blocky structure, neutral to very slightly alkaline in reaction

3 (20-60") Very dark gray mottled (spotted) with light colors, massive clay or silty clay, neutral to alkaline in reaction

because of poor drainage. It is recommended that it be used for meadow or limited crop land unless adequate surface drainage can be obtained. Usually, surface drainage must be improved before this soil is suitable for cropland. The use of surface ditches is recommended as the most practical drainage improvement because drainage tile do not function properly in the fine-textured subsoil and substrata. The tilth of this soil is fair to poor at best and can be easily destroyed altogether by tillage when too wet. All crop residues should be returned to the soil to aid in reducing the puddling effect of cultivation. Application of needed fertilizers (see Table 4) that are high in nitrogen is recommended to increase the productivity.

Fig. 29. Profile description. Solomon silty clay



1 (0-17") Black, firm, calcareous clay of blocky structure

2 (17-39") Very dark gray mottled (spotted) with light colors, firm, massive, calcareous clay

3 (39"+) Mottled dark gray and gray, firm, massive, calcareous clay

* See Luton clay, level (103) for profile description of the Luton soils.

(104) Luton-Solomon Silty Clays, Level (0-1% Slopes)

This soil unit is an association of Luton silty clay, level, and Solomon silty clay, level. The soils of this unit have developed in fine-textured (clays and silty clays), alluvial (water deposited) sediments. The Luton soils occur in generally noncalcareous (not limy) sediments, and the Solomon soils occur in calcareous (limy) sediments. The soils of this unit occur in close association in rather large, low, concave, somewhat swampy areas back from the natural stream levees, where surface drainage is poor to very poor. The soils of this association differ from the Onawa soils, chiefly in being much darker and in not having coarse-textured substrata (Fig. 26).

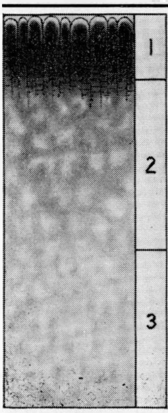
Use and management. This soil unit can be handled successfully by following the same use and management recommended for Luton clay, level (103).

(105) Napa Complex, Level (0-1% Slopes)

Napa complex, level, is a complex of young and very young Solonetz ("alkali gumbo") soils, which have developed in fine-textured (clays and silty clays), alluvial (water deposited) sediments that are highly saline (high in sulfates and chlorides of calcium, magnesium and sodium) and alkali (only sodium salts). The Napa soils occur on flats back from the streams, where drainage is poor and a high seasonal watertable is present (Fig. 26).

Use and management. Practically all of this unit is out of cultivation, and poor to very poor yields are obtained when cropped. It is strongly recommended that this unit be used only for hayland and pasture.

Fig. 30. Profile description. Napa silty clay



1 (0-10″) Black, firm silty clay of columnar structure grading downward to blocky structure, alkaline in reaction

2 (10-36″) Very dark gray mottled (spotted) with light colors, very firm, massive silty clay, strongly alkaline in reaction

3 (36″+) Olive gray mottled with light and dark colors, massive, slightly calcareous silty clay, alkaline in reaction

Bottomland soils developed in moderately fine-textured alluvium

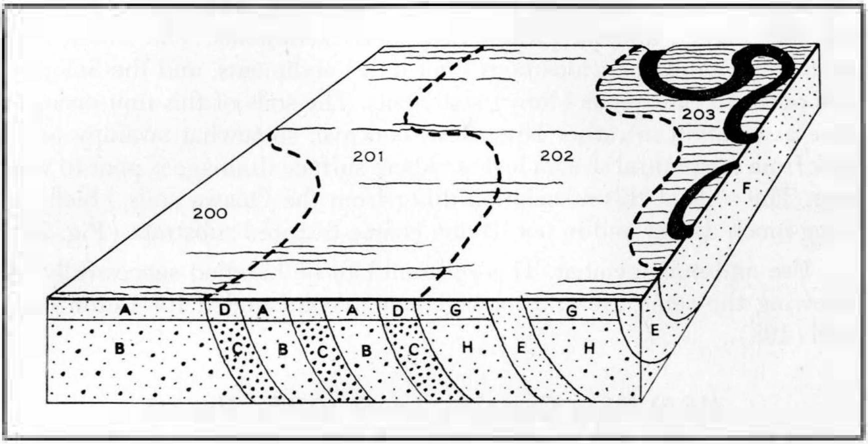


Fig. 31. A—Moderately fine-textured (silty clay loam), alluvial (water deposited) sediments. B—Medium-textured (loams and silt loams), calcareous (limy) alluvial sediments. C—Moderately coarse and coarse-textured (sandy loams and sands), calcareous, alluvial sediments. D—Moderately fine-textured, alluvial sediments highly saline (high in sulfates and chlorides of calcium, magnesium and sodium) and alkali (only sodium salts). E—Moderately fine-textured, calcareous and slightly saline, alluvial sediments. F—Moderately fine-textured, calcareous, alluvial sediments. G—Moderately fine-textured, slightly saline, alluvial sediments. H—Medium-textured, calcareous and slightly saline, alluvial sediments.

200 Blencoe silty clay loam, level (0-1% slopes)

201 Blencoe-Gayville silty clay loams, level (0-1% slopes). The Gayville soils in this association occur where the moderately fine-textured, alluvial sediments are high in alkali and saline salts (A), and are underlain with moderately coarse to coarse-textured, calcareous, alluvial sediments (C). The Blencoe soils in this association occur where the moderately fine-textured, alluvial sediments are free of salts (D), and are underlain with medium-textured, calcareous, alluvial sediments (B).

202 Blencoe-Lamoure silty clay loams, slightly saline, nearly level (0-3% slopes). The Blencoe soils in this association occur where the moderately fine-textured alluvial sediments are slightly saline (G), and are underlain with medium-textured, calcareous and slightly saline, alluvial sediments (H). The Lamoure soils in this association occur where the moderately fine-textured, alluvial sediments are calcareous and slightly saline (E).

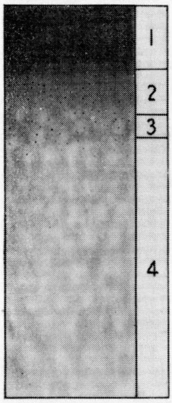
203 Lamoure silty clay loam, level (0-1% slopes)

(200) Blencoe Silty Clay Loam, Level (0-1% Slopes)

Blencoe silty clay loam, level, has developed in moderately fine-textured (silty clay loam), alluvial (water deposited) sediments, over medium-textured (loams and silt loams), calcareous (limy), alluvial sediments.

The Blencoe soils occur on the Missouri River floodplains, and are moderately well-drained to somewhat poorly drained. They differ from the Lamoure soils, which are calcareous and poorly drained, and from the Gayville soils, which are Solonetz ("alkali gumbo") soils with coarse-textured (sandy) substrata (Fig. 31).

Fig. 32. Profile description. Blencoe silty clay loam



1 (0-10") Black silty clay loam of granular structure, slightly acid in reaction

2 (10-16") Very dark brown silty clay loam of granular structure

3 (16-20") Mottled (spotted) very dark grayish-brown and dark yellowish-brown silty clay loam of granular structure

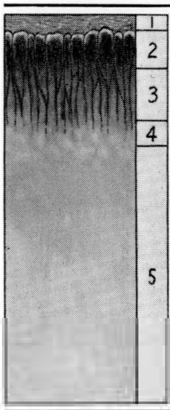
4 (20"+) Mottled dark grayish-brown and olive brown, massive, calcareous silt loam, slightly alkaline in reaction

Use and management. Most of the areas of this unit are under cultivation; however, yields vary greatly from year to year. The best use for this unit is as cropland, with the exception of small areas in which surface drainage is restricted. It is recommended that adequate surface drainage be provided by surface ditches. Tiles may be necessary in some cases to provide subsurface drainage if maximum production levels are to be attained. It is recommended that tillage operations be carried on when the soil is not wet to avoid the destruction of soil tilth. The practice of returning all crop residues to the soil aids in reducing the puddling effect of cultivation. The application of high nitrogen fertilizers, and the use of legumes in the rotation are recommended to increase the productivity of this unit.

(201) Blencoe-Gayville Silty Clay Loams, Level (0-1% Slopes)

This soil unit is an association of Blencoe silty clay loam, level (200), and Gayville silty clay loam, level. The moderately well-drained to somewhat poorly drained Blencoe soils are the predominant members of the association. They have developed in moderately fine-textured (silty clay loam), alluvial (water deposited) sediments, over medium-textured (loams and silt loams), calcareous (limy), alluvial sediments. The somewhat poorly to poorly drained Gayville soils are Solonetz ("alkali-gumbo") soils developed in moderately fine-textured alluvial sediments that are highly saline (high in sulfates and chlorides of calcium, magnesium and sodium) and alkali (only sodium salts), over moderately coarse and coarse-textured (sandy loams and sands), calcareous, alluvial sediments. This association occurs on the low terraces or on the floodplain of the Missouri River (Fig. 31).

Fig. 33. Profile description. Gayville silty clay loam



1 (0-2") Light grayish-brown silty clay loam of platy structure, neutral in reaction
2 (2-8") Black silty clay loam of columnar structure, neutral in reaction
3 (8-16") Dark grayish-brown, calcareous silty clay loam of prismatic to blocky structure, highly alkaline in reaction
4 (16-20") Light grayish-brown mottled (spotted) with dark colors, massive, calcareous silty clay loam, alkaline in reaction

5 (20"+) Very pale brown, massive, calcareous very fine sandy loam, alkaline in reaction
* See Blencoe silty clay loam, level (200) for profile description of the Blencoe soils.

Use and management. Most of the areas of this soil unit are under cultivation; however, yields vary from year to year. The Blencoe soils constitute the major area of this association. It is recommended that the same use and management be followed for this association as that recommended for Blencoe silty clay loam, level (200). In areas where the Gayville soils occur in large enough areas to make separate use and management practical, the same recommendations can be followed that are given for Napa complex, level (105).

(202) Blencoe-Lamoure Silty Clay Loams, Slightly Saline, Nearly Level (0-3% Slopes)

This soil unit is an association of Blencoe silty clay loam, slightly saline, nearly level and Lamoure silty clay loam, slightly saline, nearly level. The moderately well-drained to somewhat poorly drained Blencoe soils in this association have developed in moderately fine-textured (silty clay loam), slightly saline, alluvial (water deposited) sediments over medium-textured (loams and silt loams), calcareous (limy), alluvial sediments. The poorly drained Lamoure soils in this association have developed entirely in moderately fine-textured, calcareous and slightly saline alluvial sediments. This association occurs on the Missouri River floodplain (Fig. 31).

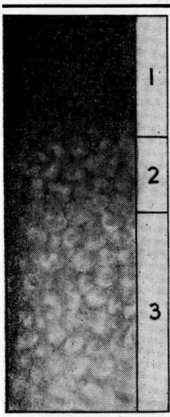
Profile description. See Blencoe silty clay loam, Fig. 32, for profile description of the Blencoe soils. See Lamoure silty clay loam, Fig. 34, for profile description of the Lamoure soils.

Use and management. Most of the areas of this soil association are under cultivation; however, yields vary greatly from year to year. The Blencoe soils constitute the major area of this association. It is recommended that the same use and management be followed for this association as that recommended for Blencoe silty clay loam, level (200). In areas where the Lamoure soils occur in large enough areas to make separate use and management practical, the same recommendations can be followed that are given for Lamoure silty clay loam, level (203).

(203) Lamoure Silty Clay Loam, Level (0-1% Slopes)

Lamoure silty clay loam, level, has developed in moderately fine-textured (silty clay loam), calcareous (limy), alluvial (water deposited) sediments. The Lamoure soils occur on the Missouri River floodplains, and are poorly drained. They differ from the Blencoe soils, which are moderately well-drained to somewhat poorly drained and are not calcareous in the surface layers, and from the Gayville soils, which are Solonetz ("alkali gumbo") soils with coarse-textured (sandy) substrata (Fig. 31).

Fig. 34. Profile description. Lamoure silty clay loam



1 (0-18″) Black, friable, calcareous (limy) silty clay loam of granular structure

2 (18-30″) Very dark grayish-brown mottled (spotted) with light and dark colors, friable, calcareous silty clay loam of granular structure

3 (30″+) Very dark grayish-brown mottled with light and dark colors, friable, calcareous, massive silty clay loam

Use and management. The proportion of cultivated land to uncultivated land and the yields obtained on this soil vary widely from year to year, depending on the extent of spring flooding, the height of the fluctuating watertable, and the amount of precipitation prior to planting time. It is recommended that this soil be used for pasture or limited cropland unless adequate surface drainage can be obtained. The use of surface ditches appears to be the most practical drainage improvement measure, because tile do not function properly in the moderately fine to fine-textured subsoil and substrata. With drainage, productivity for this soil can be increased through the addition of organic matter, such as barnyard or green manure, the application of a complete fertilizer that is high in nitrogen, and the use of legumes in the rotation.

Bottomland soils developed in medium-textured alluvium

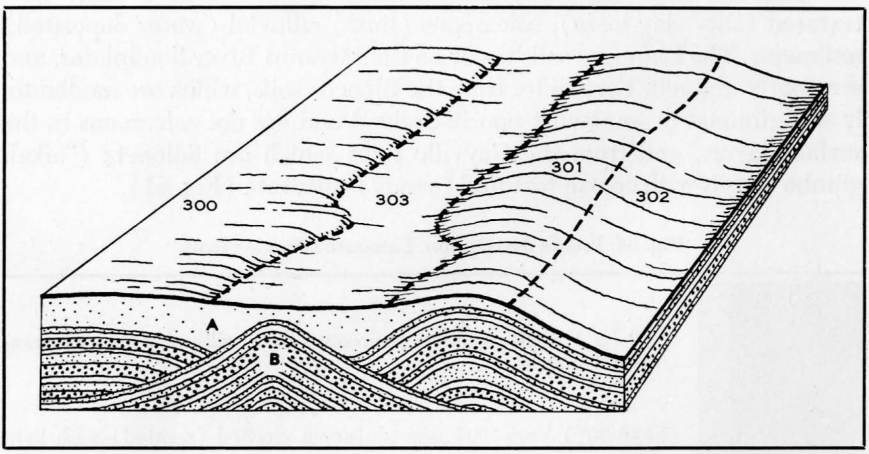


Fig. 35. A—Medium-textured (loams and silt loams), calcareous (limy), alluvial (water deposited) sediments. B—Stratified (layered); medium, moderately coarse (sandy loams), and coarse-textured (sands), calcareous, alluvial sediments

300 Volin silt loam, level (0-1% slopes)

301 Haynie silt loam, nearly level (0-3% slopes)

302 Haynie silt loam, sloping (8-13% slopes)

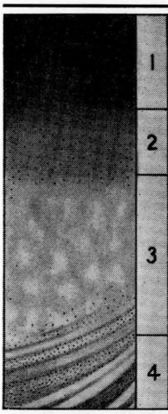
303 Wann-Leshara loams, level (0-1% slopes). The Wann soils occur where the medium-textured sediments are shallow over the stratified alluvial sediments. The Leshara soils occur where the medium-textured sediments are deep over the stratified alluvial sediments.

(300) Volin Silt Loam, Level (0-1% Slopes)

Volin silt loam, level, has developed in medium-textured (loams and silt loams), calcareous (limy), alluvial sediments. These sediments occur over stratified (layered), calcareous, alluvial sediments. These stratified materials are medium, moderately coarse (sandy loams), and coarse-textured (sands). The Volin soils occur on comparatively high, level Missouri River bottomland and are moderately well-drained. They differ from the Haynie soils, which are shallow to very shallow over the stratified substrata, and from the Wann and Leshara soils, which are poorly drained (Fig. 35).

Use and management. Practically all of the areas of this soil are in cultivation, and good yields are obtained. High productivity levels are easily maintained by additions of organic matter, such as barnyard or green manure, regular applications of needed fertilizer (see Table 4), and the use of legumes in the rotation.

Fig. 36. Profile description. Volin silt loam



1 (0-14") Very dark grayish-brown, friable silt loam of granular structure

2 (14-24") Dark grayish-brown, friable, massive silt loam

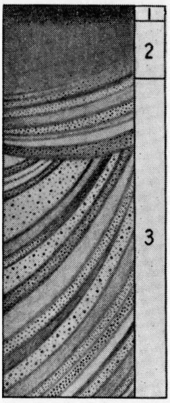
3 (24-48") Yellowish-gray mottled with light and dark colors, friable, massive, highly calcareous silt loam grading into fine sandy loam

4 (48-60") Grayish-brown to yellowish-gray, calcareous, stratified silts, sandy loams, and sands

(301) Haynie Silt Loam, Nearly Level (0-3% Slopes)

Haynie silt loam, nearly level, has developed in shallow to very shallow, medium-textured (loams and silt loams), calcareous (limy), alluvial sediments. These sediments occur over stratified (layered), calcareous, alluvial sediments. These stratified materials are medium, moderately coarse (sandy loams), and coarse-textured (sands). This unit occurs on nearly level Missouri River bottomland and is moderately well-drained. It differs from the Haynie silt loam, sloping (302), with which it is associated, in occurring on more level slopes. The Haynie soils in general differ from the Volin soils, which are deep over the stratified substrata and from the Wann and Leshara soils, which are poorly drained (Fig. 35).

Fig. 37. Profile description. Haynie silt loam



1 (0-2") Light brownish-gray, friable silt loam of granular structure

2 (2-11") Very light yellowish-brown, massive silt loam

3 (11-60") Yellowish-gray to grayish-brown, calcareous, stratified silts, sandy loams, and sands

Use and management. Much of the area of this soil is under cultivation; however, yields are only fair. The best use of this soil is as limited cropland. Protection from wind erosion should be provided for areas of this unit under intensive cultivation. Strip cropping and stubble-mulch tillage are recommended practices. Productivity levels can be increased by regular additions of organic matter, such as barnyard or green manure, applications of a complete fertilizer that is high in nitrogen, and the continuous use of legumes in the rotation.

(302) Haynie Silt Loam, Sloping (8-13% Slopes)

Haynie silt loam, sloping, has developed in shallow to very shallow, medium-textured (loams and silt loams), calcareous (limy), alluvial sediments. These sediments occur over stratified (layered), calcareous, alluvial sediments. These stratified materials are medium, moderately coarse (sandy loams), and coarse-textured (sands). This unit occurs on areas of sloping, channeled alluvium on the Missouri River bottomland and is moderately well-drained. It differs from Haynie silt loam, nearly level (301), with which it is associated, in occurring on stronger slopes. The Haynie soils in general differ from the Volin soils, which are deep over the stratified substrata, and from the Wann and Leshara soils, which are poorly drained (Fig. 35).

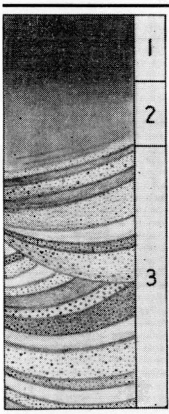
Profile description. See Haynie silt loam, Fig. 37.

Use and management. If economically possible, this soil unit should be taken out of cultivation and regrassed. It is best used for limited grazing operations. If the unit remains in cultivation, the same recommendations should be followed as were suggested for Haynie silt loam, nearly level (301), only on a more intensive scale.

(303) Wann-Leshara Loams, Level (0-1% Slopes)

This soil unit is an association of Wann loam, level, and Leshara loam, level. The association occurs on the Missouri River bottomland, and both members of the association are poorly drained. The Wann and Leshara soils have developed in various depths of calcareous (limy), medium-textured (loams and silt loams), alluvial sediments. These sediments occur over stratified (layered), calcareous, alluvial sediments. These stratified materials are medium, moderately coarse (sandy loams), and coarse-textured (sands). The Wann soils differ from the Leshara soils in having less than 30 inches of medium-textured sediments over the stratified substrata. The Leshara soils have more than 30 inches of medium-textured sediments over the stratified substrata. The soils of this unit differ from the Volin and Haynie soils primarily in being poorly drained (Fig. 35).

Fig. 38. Profile description. Wann loam



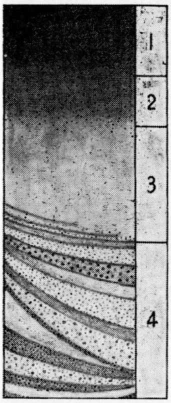
1 (0-10″) Dark grayish-brown loam, neutral to slightly alkaline in reaction

2 (10-20″) Dark brown, calcareous loam

3 (20″+) Brown to light grayish-brown, calcareous, stratified silts, sandy loams and sands

Use and management. Some areas of this soil unit are under cultivation; however, yields obtained from it are below the county average in most cases. This association is probably best used for pasture and hayland unless watertable drainage can be established through intensive tiling operations. If adequate subsurface drainage can be attained this unit is

Fig. 39. Profile description. Leshara loam



1 (0-11″) Black, friable silt loam, neutral in reaction

2 (11-18″) Very dark gray, friable silt loam of granular structure, neutral to alkaline in reaction

3 (18-36″) Dark gray, friable, strongly calcareous silt loam of granular structure

4 (36″+) Dark gray to light yellowish-gray, calcareous, stratified silts, sandy loams, and sands

best used as cropland. Under improved drainage conditions, productivity levels can be increased by regular additions of organic matter, such as barnyard or green manure, applications of needed fertilizer that is high in nitrogen, and the use of legumes in the rotation.

Bottomland soils developed in moderately coarse and coarse-textured alluvium

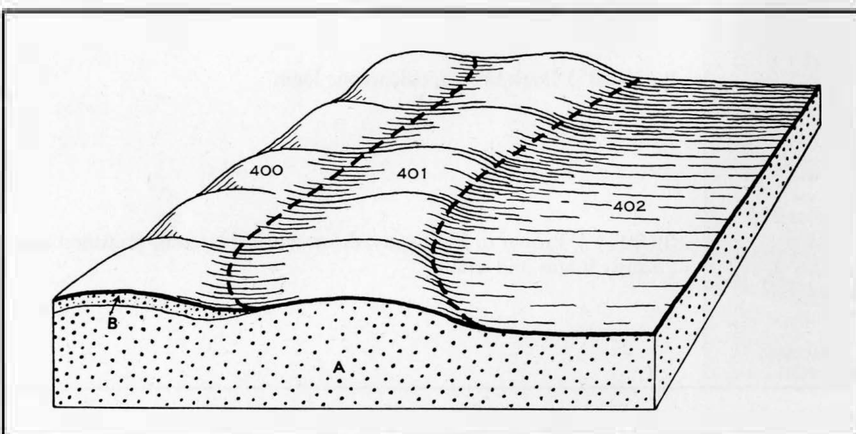


Fig. 40. A—Coarse-textured (sands), calcareous (limy), alluvial sediments. B—Moderately coarse-textured (sandy loams), alluvial sediments

400 Sarpy fine sandy loam, nearly level (0-3% slopes)

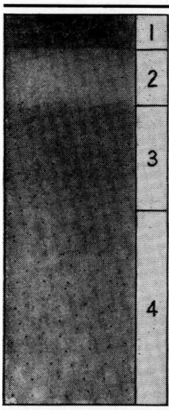
401 Sarpy loamy fine sand, nearly level (0-3% slopes)

402 Riverwash

(400) Sarpy Fine Sandy Loam, Nearly Level (0-3% Slopes)

Sarpy fine sandy loam, nearly level, has developed in moderately coarse (sandy loam) to coarse-textured (sands), calcareous (limy), alluvial sediments. The Sarpy soils occur on nearly level Missouri River floodplains and are moderately well-drained. This unit differs from Sarpy loamy fine sand, nearly level (401), which has a coarser textured surface horizon (Fig. 40).

Fig. 41. Profile description. Sarpy fine sandy loam



1 (0-5″) Dark brown fine sandy loam, slightly acid in reaction

2 (5-14″) Pale brown fine sandy loam or loamy fine sand, neutral in reaction

3 (14-30″) Brown, slightly calcareous loamy fine sand or fine sand, neutral to slightly alkaline in reaction

4 (30″+) Brown mottled (spotted) with dark colors, calcareous fine sand

Use and management. This soil unit generally occurs in relatively small areas. When this is the case, the use and management of this soil is usually the same as that of the soils with which it occurs. When this unit occurs in areas that constitute the major part of any one field, its best use is probably as permanent pasture.

(401) Sarpy Loamy Fine Sand, Nearly Level (0-3% Slopes)

Sarpy loamy fine sand, nearly level, has developed in coarse (sands) and moderately coarse-textured (sandy loams), calcareous (limy), alluvial sediments. The Sarpy soils occur on nearly level Missouri River floodplains, and are moderately well-drained. This unit differs from Sarpy fine sandy loam, nearly level (400), in having a coarser textured surface horizon (Fig. 40).

Profile description. See profile description Sarpy fine sandy loam, Fig. 41.

Use and management. The same use and management is recommended for this unit as that for Sarpy fine sandy loam, nearly level (400).

(402) Riverwash

Riverwash consists of raw, unstabilized, recently deposited, mainly coarse-textured, alluvial sediments. It occurs in or along the higher portions of the Missouri River bed proper.

Table 1. Estimated Acreage and Proportionate Extent of Mapping Units in Clay County, South Dakota

Number of Mapping Unit	Name of Mapping Unit	Acres in County	Percent of County
60.	Alcester-Judson silt loams, nearly level (0-3% slopes)	1,198	0.464
61.	Alcester-Judson silt loams, gently sloping (3-8% slopes)	2,421	0.939
62.	Alcester-Judson silt loams, eroded, sloping (8-13% slopes)	190	0.074
63.	Alcester-Lamoure silt loams, nearly level (0-3% slopes)	2,848	1.104
22.	Alsen silty clay loam, level (0-1% slopes)	2,062	0.799
10.	Barnes loam, nearly level (0-3% slopes)	409	0.159
11.	Barnes loam, undulating (3-8% slopes)	2,608	1.011
12.	Barnes loam, eroded, undulating (3-8% slopes)	2,969	1.151
13.	Barnes loam, rolling (8-13% slopes)	342	0.133
14.	Barnes loam, eroded, rolling (8-13% slopes)	2,726	1.057
200.	Blencoe silty clay loam, level (0-1% slopes)	12,112	4.696
201.	Blencoe-Gayville silty clay loams, level (0-1% slopes)	97	0.038
202.	Blencoe-Lamoure silty clay loams, slightly saline, level (0-1% slopes)	518	0.201
15.	Buse loam, steep (13-40% slopes)	7,028	2.725
16.	Buse loam, eroded, steep (13-40% slopes)	1,606	0.623
53.	Flandreau silt loam, terrace phase, nearly level (0-3% slopes)	1,543	0.598
50.	Fordville loam, nearly level (0-3% slopes)	86	0.033
51.	Fordville loam, gently sloping (3-8% slopes)	365	0.142
52.	Fordville loam, coarse sand substratum, nearly level (0-3% slopes)	1,629	0.632
301.	Haynie silt loam, nearly level (0-3% slopes)	8,403	3.258
302.	Haynie silt loam, sloping (8-13% slopes)	59	0.023
30.	Kranzburg silty clay loam-Barnes loam, undulating (3-8% slopes)	9,691	3.757
31.	Kranzburg silty clay loam-Barnes loam, eroded, undulating (3-8% slopes)	899	0.349
203.	Lamoure silty clay loam, level (0-1% slopes)	8,482	3.289
103.	Luton clay, level (0-1% slopes)	14,774	5.728
104.	Luton-Solomon silty clays, level (0-1% slopes)	20,016	7.761
64.	McPaul silt loam, nearly level (0-3% slopes)	295	0.114
40.	Maddock fine sandy loam and loamy fine sand, nearly level (0-3% slopes)	572	0.222
41.	Maddock fine sandy loam and loamy fine sand, undulating (3-8% slopes)	315	0.122
20.	Moody silt loam, undulating (3-8% slopes)	202	0.078
105.	Napa complex, level (0-1% slopes)	3,493	1.354
100.	Onawa silty clay, level (0-1% slopes)	6,078	2.357
101.	Onawa clay, level (0-1% slopes)	157	0.061

Table 1. Estimated Acreage and Proportionate Extent of Mapping Units in Clay County, South Dakota (Continued)

Number of Mapping Unit	Name of Mapping Unit	Acres in County	Percent of County
102.	Onawa silty clay, very shallow to sand, nearly level (0-1% slopes)	846	0.328
18.	Parnell silty clay loam, level (0-1% slopes)	1,535	0.595
17.	Parnell silty clay loam-Hamerly loam, nearly level (0-3% slopes)	1,221	0.473
402.	Riverwash	3,212	1.245
400.	Sarpy fine sandy loam, nearly level (0-3% slopes)	1,296	0.502
401.	Sarpy loamy fine sand, nearly level (0-3% slopes)	2,541	0.985
21.	Trent silty clay loam, nearly level (0-3% slopes)	60,183	23.333
24.	Trent-Alsen silty clay loams, nearly level (0-3% slopes)	6,652	2.579
32.	Trent silty clay loam-Barnes loam, nearly level (0-3% slopes)	40,678	15.772
23.	Trent silty clay loam-Moody silt loam, nearly level (0-3% slopes)	15,300	5.932
300.	Volin silt loam, level (0-1% slopes)	4,575	1.774
25.	Wakonda-Trent silty clay loams, nearly level (0-3% slopes)	2,753	1.067
303.	Wann-Leshara loams, level (0-1% slopes)	655	0.254
—	Gravel Pits	64	0.025
—	Rivers and Lakes	216	0.084
	TOTAL	257,920	100.00

PHYSIOGRAPHY AND SOIL GROUPS OF CLAY COUNTY

Clay county is divided into four broad physiographic areas or divisions (Fig. 42). These divisions are the loess upland, the loess-glacial till upland, the Vermillion River lowland, and the Missouri River lowland. All of the major soil groups described in the preceding section of this report occur in one of these four physiographic divisions, and occur in a certain position in the landscape pattern.

Loess Upland. This division includes nearly level to undulating, loess-blanketed, glacial till upland. Several soil groups occur in this division (Fig. 42).

1. Upland soils developed in deep silt loam to silty clay loam loess (Fig. 9).
2. Upland soils developed in moderately deep to deep loamy loess (Fig. 16).
3. Soils developed in silt loam to silty clay loam colluvial-alluvial and alluvial materials occurring in and along upland drains and on the footslopes along the major stream bottoms (Fig. 21).

Loess-Glacial Till Upland. This division includes nearly level to undulating glacial till upland with a thin, discontinuous mantle of loess and nearly level to steep, loess-free glacial till upland. Three soil groups occur in this division (Fig. 42).

1. Upland soils developed in patchy, very shallow to moderately deep, silt loam to silty clay loam loess over loam to clay loam glacial till (Fig. 14).
2. Upland soils developed in loam to clay loam glacial till (Fig. 4).
3. Soils developed in silt loam to silty clay loam colluvial-alluvial and alluvial materials occurring in and along upland drains and on the footslopes along the major stream bottoms (Fig. 21).

Vermillion River Lowlands. This division includes level to nearly level alluvial lowland and gravelly stream terraces. Four soil groups occur in part in this division.

1. Bottomland soils developed in fine-textured alluvium. (Fig. 26) (The Luton and Solomon soils are the predominant occurring members.)
2. Bottomland soils developed in moderately fine-textured alluvium. (Fig. 31) (The Lamoure soils are the predominant occurring members.)
3. Bottomland soils developed in medium-textured alluvium. (Fig. 35) (The Wann and Leshara soils are the predominant occurring members.)
4. Terrace soils developed in loam and silt loam materials over gravel and sand (Fig. 18).

Missouri River Lowlands. This division includes level to nearly level alluvial lowlands.

1. Bottomland soils developed in fine-textured alluvium (Fig. 26).
2. Bottomland soils developed in moderately fine-textured alluvium (Fig. 31).

3. Bottomland soils developed in medium-textured alluvium (Fig. 35).
4. Bottomland soils developed in moderately coarse to coarse-textured alluvium (Fig. 40).

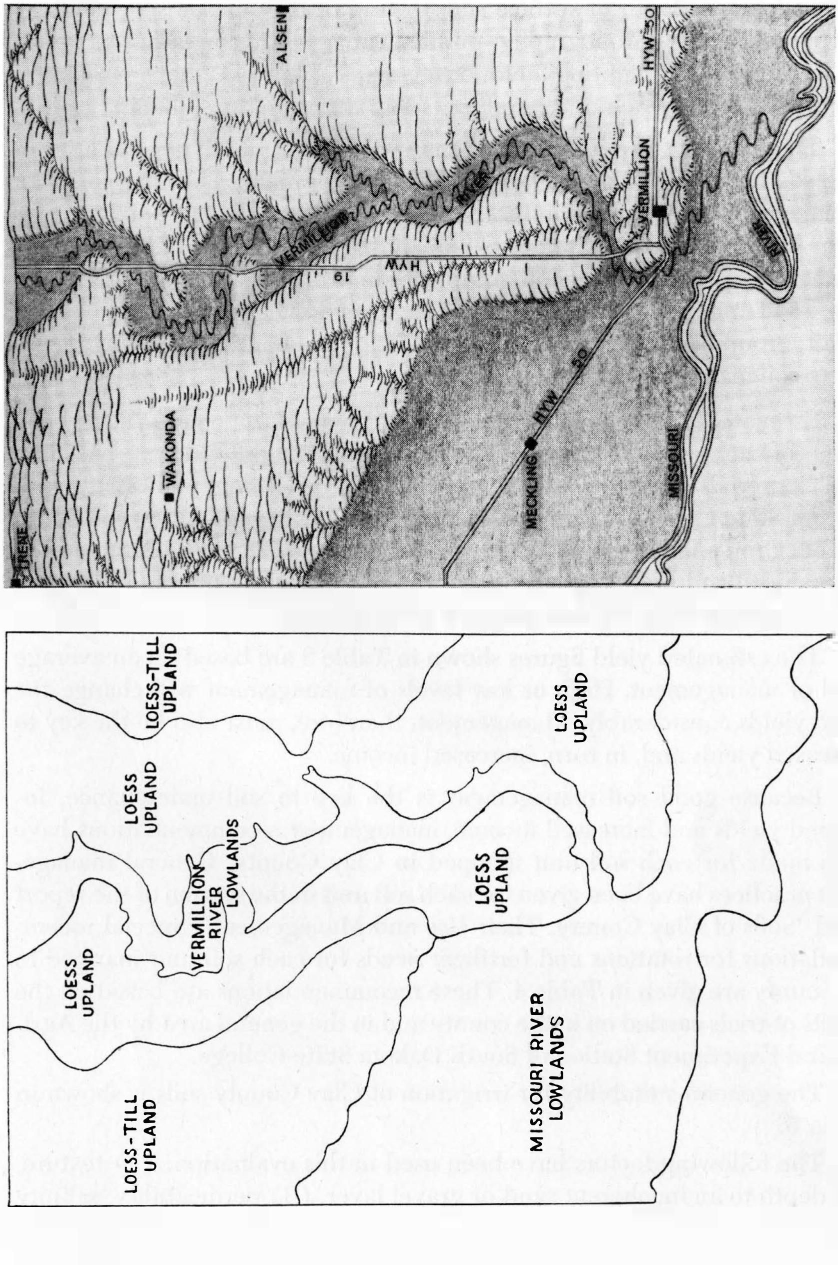


Fig. 42. Physiographic diagram and physiographic divisions of Clay County

PRODUCTIVITY AND MANAGEMENT OF SOILS

All of the soil units mapped in Clay County have been assigned a general agricultural rating. These ratings were obtained by evaluating the following factors: depth of surface soil, texture of the surface soil, depth to the parent material, topography, profile drainage, erosion, inherent fertility, and any special limiting factor or factors. Table 2 lists the general agricultural rating for each of the soil units that occur on the soil map.

These ratings are an index of the inherent productivity potential of each soil unit. No management level has been assumed. Different levels of management will change the listed ratings considerably. If a soil unit falls in the fair to poor group, it does not mean that it can not be elevated to the good to fair or even to the good group with improved management. In addition, a soil unit in the excellent group may drop down into the good, or good to fair, group because of poor management. Management, therefore, is the key to soil maintenance.

Estimated yields of the major crops grown in the county have been listed for each soil unit in the county. Estimated yield figures are based on data from trials carried on by the Agricultural Experiment Station of South Dakota State College, county-wide yield averages computed by the South Dakota Crop and Livestock Reporting Service, and the field observation of experienced soil and crop scientists. Table 3 lists the estimated yields of major crops for each soil unit mapped in the county.

The estimated yield figures shown in Table 3 are based on an average level of management. High or low levels of management will change the listed yields considerably. Management, therefore, must also be the key to increased yields and, in turn, increased income.

Because good soil management is the key to soil maintenance, increased yields and increased income, management recommendations have been made for each soil unit mapped in Clay County. General management practices have been given for each soil unit in the section of the report titled "Soils of Clay County, Their Use and Management." Special recommendations for rotations and fertilizer needs for each soil unit mapped in the county are given in Table 4. These recommendations are based on the results of trials carried on in the county and in the general area by the Agricultural Experiment Station of South Dakota State College.

The general suitability for irrigation of Clay County soils is shown in Table 5.

The following factors have been used in this evaluation: (1) texture, (2) depth to an incoherent sand or gravel layer, (3) permeability, salinity

Table 2. General Agricultural Ratings for Clay County Soil Units Based on Soil Characteristics (Soils Listed According to Soil Rating)

Number of Mapping Unit	Name of Mapping Unit	General Agricultural Rating
EXCELLENT		
21.	Trent silty clay loam, nearly level (0-3% slopes)	98.5
300.	Volin silt loam, level (0-1% slopes)	98.5
23.	Trent silty clay loam-Moody silt loam, nearly level (0-3% slopes)	97.1
23.	Trent silty clay loam-Moody silt loam, nearly level (0-3% slopes)	97.5
10.	Barnes loam, nearly level (0-3% slopes)	97.1
20.	Moody silt loam, undulating (3-8% slopes)	95.7
53.	Flandreau silt loam, terrace phase, nearly level (0-3% slopes)	93.5
60.	Alcester-Judson silt loams, nearly level (0-3% slopes)	92.4
30.	Kranzburg silty clay loam-Barnes loam, undulating (3-8% slopes)	91.7
11.	Barnes loam, undulating (3-8% slopes)	91.4
GOOD		
24.	Trent-Alsen silty clay loams, nearly level (0-3% slopes)	87.8
61.	Alcester-Judson silt loams, gently sloping (3-8% slopes)	84.1
200.	Blencoe silty clay loam, level (0-1% slopes)	82.8
50.	Fordville loam, nearly level (0-3% slopes)	80.0
52.	Fordville loam, coarse sand substratum, nearly level (0-3% slopes)	80.0
GOOD TO FAIR		
22.	Alsen silty clay loam, level (0-1% slopes)	77.1
25.	Wakonda-Trent silty clay loams, nearly level (0-3% slopes)	76.3
51.	Fordville loam, gently sloping (3-8% slopes)	73.5
63.	Alcester-Lamoure silt loams, nearly level (0-3% slopes)	73.1
64.	McPaul silt loam, nearly level (0-3% slopes)	72.8
31.	Kranzburg silty clay loam-Barnes loam, eroded, undulating (3-8% slopes)	71.5
12.	Barnes loam, eroded, undulating (3-8% slopes)	70.0
202.	Blencoe-Lamoure silty clay loams, slightly saline, level (0-1% slopes)	69.9
13.	Barnes loam, rolling (8-13% slopes)	65.7
40.	Maddock fine sandy loam and loamy fine sand, nearly level (0-3% slopes)	61.4
FAIR TO POOR		
62.	Alcester-Judson silt loams, eroded, sloping (8-13% slopes)	59.2
203.	Lamoure silty clay loam, level (0-1% slopes)	57.1
41.	Maddock fine sandy loam and loamy fine sand, undulating (3-8% slopes)	56.2
201.	Blencoe-Gayville silty clay loams, level (0-1% slopes)	55.6
303.	Wann-Leshara loams, level (0-1% slopes)	53.5
18.	Parnell silty clay loam, level (0-1% slopes)	50.0
100.	Onawa silty clay, level (0-1% slopes)	50.0
17.	Parnell silty clay loam-Hamerly loam, nearly level (0-3% slopes)	46.8
101.	Onawa clay, level (0-1% slopes)	45.5
400.	Sarpy fine sandy loam, nearly level (0-3% slopes)	45.0
301.	Haynie silt loam, nearly level (0-3% slopes)	40.7
102.	Onawa silty clay, very shallow to sand, level (0-1% slopes)	40.7
104.	Luton-Solomon silty clays, level (0-1% slopes)	40.0
401.	Sarpy loamy fine sand, nearly level (0-3% slopes)	39.2
14.	Barnes loam, eroded, rolling (8-13% slopes)	37.1
103.	Luton clay, level (0-1% slopes)	35.5
15.	Buse loam, steep (13-40% slopes)	32.8
302.	Haynie silt loam, sloping (8-13% slopes)	17.8
16.	Buse loam, eroded, steep (13-40% slopes)	12.8
105.	Napa complex, level (0-1% slopes)	10.7
402.	Riverwash	0.0

and alkali nature of the soil and substrata, (4) presence of a dispersed (gumbo) horizon, (5) depth to lime, (6) inherent fertility, (7) stoniness, (8) topographic position, and (9) steepness and regularity of the slope.

The type descriptions of the Clay County soils furnish most of the data needed to indicate their general suitability for irrigation. The factors of permeability, salinity and alkali are ordinarily analyzed using laboratory samples and by special field experiments. Data from laboratory and field experiments are not available for Clay County soils so the factors of permeability, salinity and alkali are evaluated from what can be inferred from the soil descriptions. Because of this, the ratings shown in Table 5 should be regarded as approximations.

The ratings used in this report may change as advances are made in irrigation equipment, irrigation techniques, and soil amendments. For example, the development of gated pipe has provided a means of transporting water over sands without having excessive water loss. A properly designed sprinkler system may allow for the successful irrigation of hummocky or undulating land which may have only a fair or poor rating in this report. Several soil amendments are now on the market which may aid in reclaiming salted and puddled soils.

Table 3. Estimated Yields of Major Grain Crops on the Soils of Clay County, South Dakota* (Soils Listed Alphabetically)

Number of Mapping Unit	Name of Mapping Unit	Crops and Estimated Yields per Acre		
		Corn Average Management	Oats Average Management	Barley Average Management
		Bushels	Bushels	Bushels
60.	Alcester-Judson silt loams, nearly level (0-3% slopes)	36	35	26
61.	Alcester-Judson silt loams, gently sloping (3-8% slopes)	33	30	21
62.	Alcester-Judson silt loams, eroded, sloping (8-13% slopes)	28	24	18
63.	Alcester-Lamoure silt loams, nearly level (0-3% slopes)	----†	----	----
22.	Alsen silty clay loam, level (0-1% slopes)	32	28	21
10.	Barnes loam, nearly level (0-3% slopes)	39	35	27
11.	Barnes loam, undulating (3-8% slopes)	33	31	24
12.	Barnes loam, eroded, undulating (3-8% slopes)	28	24	17
13.	Barnes loam, rolling (8-13% slopes)	28	24	17
14.	Barnes loam, eroded, rolling (8-13% slopes)	22	20	13
200.	Blencoe silty clay loam, level (0-1% slopes)	35‡	31‡	24‡
201.	Blencoe-Gayville silty clay loams, level (0-1% slopes)	21‡	18‡	11‡
202.	Blencoe-Lamoure silty clay loams, slightly saline, level (0-1% slopes)	----	----	----
15.	Buse loam, steep (13-40% slopes)	----	----	----
16.	Buse loam, eroded, steep (13-40% slopes)	----	----	----
53.	Flandreau silt loam, terrace phase, nearly level (0-3% slopes)	35	32	24
50.	Fordville loam, nearly level (0-3% slopes)	30	27	20

Table 3. Estimated Yields of Major Grain Crops on the Soils of Clay County, South Dakota* (Soils Listed Alphabetically) (Continued)

Number of Mapping Unit	Name of Mapping Unit	Crops and Estimated Yields per Acre: Corn Average Management	Oats Average Management	Barley Average Management
51.	Fordville loam, gently sloping (3-8% slopes)	25	24	17
52.	Fordville loam, coarse sand substratum, nearly level (0-3% slopes)	30	28	20
301.	Haynie silt loam, nearly level (0-3% slopes)	20	18	10
302.	Haynie silt loam, sloping (8-13% slopes)	—	—	—
30.	Kranzburg silty clay loam-Barnes loam, undulating (3-8% slopes)	35	31	25
31.	Kranzburg silty clay loam-Barnes loam, eroded undulating (3-8% slopes)	31	26	18
203.	Lamoure silty clay loam, level (0-1% slopes)	—	—	—
103.	Luton clay, level (0-1% slopes)	—	—	—
104.	Luton-Solomon silty clays, level (0-1% slopes)	—	—	—
64.	McPaul silt loam, nearly level (0-3% slopes)	26	21	15
40.	Maddock fine sandy loam and loamy fine sand, nearly level (0-3% slopes)	28	24	17
41.	Maddock fine sandy loam and loamy fine sand, undulating (3-8% slopes)	25	20	11
20.	Moody silt loam, undulating (3-8% slopes)	40	35	27
105.	Napa complex, level (0-1% slopes)	—	—	—
100.	Onawa silty clay, level (0-1% slopes)	25‡	21‡	14‡
101.	Onawa clay, level (0-1% slopes)	20‡	20‡	12‡
102.	Onawa silty clay, very shallow to sand, nearly level (0-1% slopes)	25‡	21‡	14‡
18.	Parnell silty clay loam, level (0-1% slopes)	----	—	—
17.	Parnell silty clay loam-Hamerly loam, nearly level (0-3% slopes)	----	—	—
402.	Riverwash	----	—	—
400.	Sarpy fine sandy loam, nearly level (0-3% slopes)	—	—	—
401.	Sarpy loamy fine sand, nearly level (0-3% slopes)	—	—	—
21.	Trent silty clay loam, nearly level (0-3% slopes)	44	39	32
24.	Trent-Alsen silty clay loams, nearly level (0-3% slopes)	35	33	26
32.	Trent silty clay loam-Barnes loam, nearly level (0-3% slopes)	40	35	28
23.	Trent silty clay loam-Moody silt loam, nearly level (0-3% slopes)	42	39	30
300.	Volin silt loam, level (0-1% slopes)	45	40	32
25.	Wakonda-Trent silty clay loams, nearly level (0-3% slopes)	33	32	24
303.	Wann-Leshara loams, level (0-1% slopes)	23‡	20‡	13‡

*Estimated yield data in this report refer only to years of average or near average annual precipitation and will not hold true for periods of prolonged drought. Much higher yields are being obtained with improved soil management practices and improved varieties.

†Indicates that the crop is not adapted.
‡These yields will not be attained in years of flooding or above average precipitation.

Table 4. Special Management Practices for Clay County Soils (Listed According to Soil Rating)

Number of Mapping Unit	Name of Mapping Unit	Management: Rotation	Corn	Small Grain	Alfalfa
EXCELLENT					
21.	Trent silty clay loam, nearly level (0-3% slopes)	A	A_1B_1	A_2	A_3
300.	Volin silt loam, level (0-1% slopes)	A	A_1	A_2	A_3
32	Trent silty clay loam-Barnes loam, nearly level (0-3% slopes)	A	A_1B_1	A_2	A_3
23.	Trent silty clay loam-Moody silt loam, nearly level (0-3% slopes)	A	A_1B_1	A_2	A_3
10.	Barnes loam, nearly level (0-3% slopes)	A	A_1	A_2	A_3
20.	Moody silt loam, undulating (3-8% slopes)	A	A_1	A_2	A_3
53.	Flandreau silt loam, terrace phase, nearly level (0-3% slopes)	A	A_1	A_2	A_3
60.	Alcester-Judson silt loams, nearly level (0-3% slopes)	A	A_1	A_2	A_3
30.	Kranzburg silty clay loam-Barnes loam, undulating (3-8% slopes)	A	A_1	A_2	A_3
11.	Barnes loam, undulating (3-8% slopes)	A	A_1	A_2	A_3
GOOD					
24.	Trent-Alsen silty clay loams, nearly level (0-3% slopes)	A	A_1B_1	A_2	A_3
61.	Alcester-Judson silt loams, gently sloping (3-8% slopes)	A	A_1	A_2	A_3
200.	Blencoe silty clay loam, level (0-1% slopes)	A	A_1	A_2	A_3
50.	Fordville loam, nearly level (0-3% slopes)	A	A_1	A_2	A_3
52.	Fordville loam, coarse sand substratum, nearly level (0-3% slopes)	A	A_1	A_2	A_3
FAIR TO GOOD					
22.	Alsen silty clay loam, level (0-1% slopes)	A	A_1B_1	A_2	A_3B_3
25.	Wakonda-Trent silty clay loams, nearly level (0-3% slopes)	A	C_1B_1	A_2	A_3
51.	Fordville loam, gently sloping (3-8% slopes)	B	A_1	B_2	A_3
63.	Alcester-Lamoure silt loams, nearly level (0-3% slopes)	F or E	A_1	B_2	—
64.	McPaul silt loam, nearly level (0-3% slopes)	B	D_1B_1	B_2	A_3
31.	Kranzburg silty clay loam-Barnes loam, eroded, undulating (3-8% slopes)	C	D_1	B_2	A_3
12.	Barnes loam, eroded, undulating (3-8% slopes)	C	D_1	B_2	A_3
202.	Blencoe-Lamoure silty clay loams, slightly saline, level (0-1% slopes)	G or E	C_1	B_2	—
13.	Barnes loam, rolling (8-13% slopes)	C	D_1	B_2	A_3
40.	Maddock fine sandy loam and loamy fine sand, nearly level (0-3% slopes)	B	D_1	B_2	A_3B_3
FAIR TO POOR					
62.	Alcester-Judson silt loams, eroded, sloping (8-13% slopes)	C	D_1	B_2	A_3
203.	Lamoure silty clay loam, level (0-1% slopes)	F or G	—	—	—
41.	Maddock fine sandy loam, and loamy fine sand, undulating (3-8% slopes)	C	D_1	B_2	A_3B_3
201.	Blencoe-Gayville silty clay loams, level (0-1% slopes)	C	B_1	B_2	A_3
303.	Wann-Leshara loams, level (0-1% slopes)	G or E	A_1B_1	A_2	—
18.	Parnell silty clay loam, level (0-1% slopes)	F or G	—	—	—
100.	Onawa silty clay, level (0-1% slopes)	G or E	D_1B_1	B_2	—
17.	Parnell silty clay loam-Hamerly loam, nearly level (0-3% slopes)	F or G	—	—	—
101.	Onawa clay, level (0-1% slopes)	G or E	D_1B_1	B_2	—
400.	Sarpy fine sandy loam, nearly level (0-3% slopes)	H	—	—	—
301.	Haynie silt loam, nearly level (0-3% slopes)	F or D	D_1	B_2	A_3
102.	Onawa silty clay, very shallow to sand, level (0-1% slopes)	G or E	D_1B_1	B_2	A_3
104.	Luton-Solomon silty clays, level (0-1% slopes)	E or F	—	—	—
401.	Sarpy loamy fine sand, nearly level (0-3% slopes)	H	—	—	—
14.	Barnes loam, eroded, rolling (8-13% slopes)	H or D	D_1	B_2	A_3
103.	Luton clay, level (0-1% slopes)	F or G	—	—	—
15.	Buse loam, steep (13-40% slopes)	H	—	—	—
302.	Haynie silt loam, sloping (8-13% slopes)	H	—	—	—
16.	Buse loam, eroded, steep (13-40% slopes)	H	—	—	—
105.	Napa complex, level (0-1% slopes)	H	—	—	—
402.	Riverwash	—	—	—	—

Table 4. Special Management Practices for Clay County Soils (Listed According to Soil Rating) (Continued)

Rotation	Fertilizer Application: Corn*	Fertilizer Application: Small Grain*	Fertilizer Application: Alfalfa and Clover*
A Alf.-Alf.-Corn-Sm. Grain-Corn-Sm. Grain or Alf. Br.-Alf. Br.-Corn-Sm. Grain -Sm. Grain-Corn- Sm. Grain or Corn-Sm. Grain-Sm. Grain + Sw. Cl.-Sw. Cl. or Corn-Sm. Grain + Sw. Cl. Plow Sw. Cl. under in spring or Sm. Grain-Corn-Sm. Grain + Sw. Cl.-Sw. Cl.-Sm. Grain or Corn	A_1 10 tons of barnyard manure per acre or 100 lbs. of 0-43-0 per acre plowed under when corn follows alfalfa or clovers or 100 to 200 lbs. of 33-0-0 per acre and 100 lbs. of 0-43-0 per acre plowed under when no manure or legumes are included in the rotation.	A_2 100-150 lbs. of 16-20-0 added with the drill at time of planting. When barnyard manure has been applied additional phosphate is recommended.	A_3 100-150 lbs. of 0-43-0 added with the drill at time of planting.
B Alf.-Alf.-Alf.-Corn-Sm. Grain Corn-Sm. Grain or Alf. Br.-Alf. Br.-Alf. Br.-Corn-Sm. Grain-Corn-Sm. Grain or Corn-Sm. Grain-Sm. Grain + Sw. Cl.-Sw. Cl.	B_1 50-75 lbs. of 10-20-0 per acre starter fertilizer on wet, cool, slow-starting soils.	B_2 150-200 lbs. of 20-20-0 per acre added with the drill at time of planting. When barnyard manure has been applied additional phosphate only is recommended.	B_3 Have soil tested for lime.
C Alf. Br.-Alf. Br.-Alf. Br.-Corn-Sm. Grain or Alf.-Alf.-Alf.-Corn-Sm. Grain or Corn-Sm. Grain + Sw. Cl.-Sw. Cl.	C_1 Same as the two alternatives in treatment A_1 plus an additional 100 lbs. of 0-43-0 per acre.		
D Alf.-Alf.-Alf. or Corn or Sm. Grain or Alf. Br.-Alf. Br.-Alf. Br.-Corn or Sm. Grain or Sm. Grain + Sw. Cl.-Sw. Cl. E Meadow†-Meadow-Corn or Sm. Grain	D_1 15 tons of barnyard manure per acre of 150 lbs. of 0-43-0 per acre plowed under when corn follows alfalfa or clovers or 200-250 lbs. of 33-0-0 per acre and 150 lbs. of 0-43-0 per acre plowed under when manure is not applied and legumes are not used in the rotation.		
F Pasture			
G Meadow or Hayland			
H Permanent Grass			

*Applications of needed fertilizers as indicated in general recommendations and by soil tests.
†Reed canary grass, Meadow fescue, Birdsfoot trefoil.

Table 5. General Suitability for Irrigation of Clay County Soils as Based on Soil Characteristics*

Number of Mapping Unit	Name of Mapping Unit	Irrigation Rating Gravity	Sprinkler
EXCELLENT (Agricultural Rating)			
21.	Trent silty clay loam, nearly level (0-3% slopes)	Good	Good
300.	Volin silt loam, level (0-1% slopes)	Excellent	Excellent
32.	Trent silty clay loam-Barnes loam, nearly level (0-3% slopes)	Good to fair	Good to fair
23.	Trent silty clay loam-Moody silt loam, nearly level (0-3% slopes)	Good	Good
10.	Barnes loam, nearly level (0-3% slopes)	Fair	Fair
20.	Moody silt loam, undulating (3-8% slopes)	Fair to poor	Good
53.	Flandreau silt loam, terrace phase, nearly level (0-3% slopes)	Excellent	Excellent
60.	Alcester-Judson silt loams, nearly level (0-3% slopes)	Good to fair	Good
30.	Kranzburg silty clay loam-Barnes loam, undulating (3-8% slopes)	Fair to poor	Fair
11.	Barnes loam, undulating (3-8% slopes)	Fair to poor	Fair
GOOD (Agricultural Rating)			
24.	Trent-Alsen silty clay loams, nearly level (0-3% slopes)	Fair	Fair
61.	Alcester-Judson silt loams, gently sloping (3-8% slopes)	Poor	Good to fair
200.	Blencoe silty clay loam, level (0-1% slopes)	Good to fair	Good to fair
50.	Fordville loam, nearly level (0-3% slopes)	Good	Good
52.	Fordville loam, coarse sand substratum, nearly level (0-3% slopes)	Good	Good
FAIR TO GOOD (Agricultural Rating)			
22.	Alsen silty clay loam, level (0-1% slopes)	Poor	Poor
25.	Wakonda-Trent silty clay loams, nearly level (0-3% slopes)	Unsuitable	Unsuitable
51.	Fordville loam, gently sloping (3-8% slopes)	Fair to poor	Fair
63.	Alcester-Lamoure silt loams, nearly level (0-3% slopes)	Poor	Poor
64.	McPaul silt loam, nearly level (0-3% slopes)	Fair	Fair
31.	Kranzburg silty clay loam-Barnes loam, eroded, undulating (3-8% slopes)	Unsuitable	Poor
12.	Barnes loam, eroded, undulating (3-8% slopes)	Unsuitable	Poor
202.	Blencoe-Lamoure silty clay loams, slightly saline, level (0-1% slopes)	Unsuitable	Unsuitable
13.	Barnes loam, rolling (8-13% slopes)	Unsuitable	Poor
40.	Maddock fine sandy loam and loamy fine sand, nearly level (0-3% slopes)	Good	Good

Table 5. General Suitability for Irrigation of Clay County Soils as Based on Soil Characteristics* (Continued)

Number of Mapping Unit	Name of Mapping Unit	Irrigation Rating Gravity	Irrigation Rating Sprinkler
FAIR TO POOR (Agricultural Rating)			
62.	Alcester-Judson silt loams, eroded, sloping (8-13% slopes)	Unsuitable	Poor
203.	Lamoure silty clay loam, level (0-1% slopes)	Unsuitable	Unsuitable
41.	Maddock fine sandy loam and loamy fine sand undulating (3-8% slopes)	Fair to poor	Fair
201.	Blencoe-Gayville silty clay loams, level (0-1% slopes)	Unsuitable	Unsuitable
303.	Wann-Leshara loams, level (0-1% slopes)	Unsuitable	Poor
18.	Parnell silty clay loam, level (0-1% slopes)	Unsuitable	Unsuitable
100.	Onawa silty clay, level (0-1% slopes)	Poor to unsuitable	Poor
17.	Parnell silty clay loam-Hamerly loam nearly level (0-3% slopes)	Unsuitable	Poor
101.	Onawa clay, level (0-1% slopes)	Unsuitable	Unsuitable
400.	Sarpy fine sandy loam, nearly level (0-3% slopes)	Poor	Fair
301.	Haynie silt loam, nearly level (0-3% slopes)	Fair	Fair
102.	Onawa silty clay, very shallow to sand, level (0-1% slopes)	Poor	Poor
104.	Luton-Solomon silty clays, level (0-1% slopes)	Unsuitable	Unsuitable
401.	Sarpy loamy fine sand, nearly level (0-3% slopes)	Poor	Poor
14.	Barnes loam, eroded, rolling (8-13% slopes)	Unsuitable	Poor
103.	Luton clay, level (0-1% slopes)	Unsuitable	Unsuitable
15.	Buse loam, steep (13-40% slopes)	Unsuitable	Unsuitable
302.	Haynie silt loam, sloping (8-13% slopes)	Unsuitable	Unsuitable
16.	Buse loam, eroded, steep (13-40% slopes)	Unsuitable	Unsuitable
105.	Napa complex, level (0-1% slopes)	Unsuitable	Unsuitable
402.	Riverwash	Unsuitable	Unsuitable

*These ratings do not necessarily apply for specialized crops. For example, certain of the sandy soils rated here as unsuitable may be adapted for a crop such as watermelons.

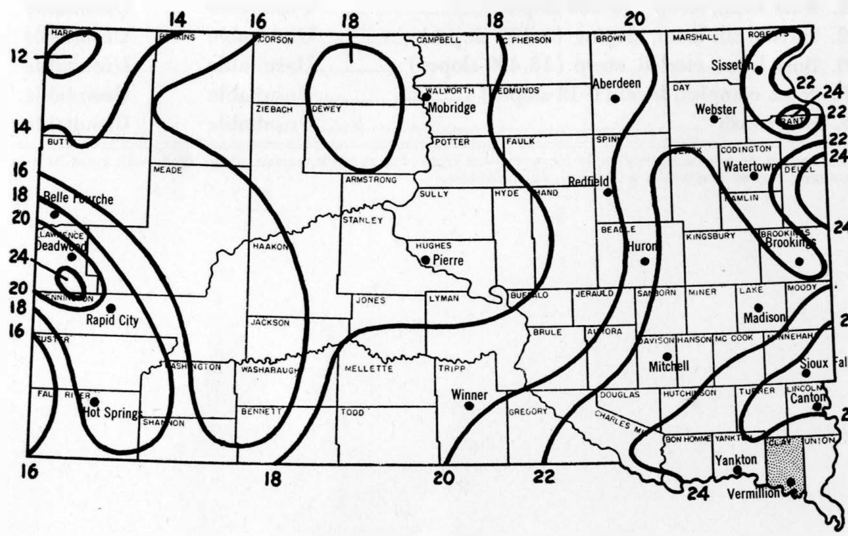
Climate

The climate of Clay County is usually classified as subhumid. Figure 43 shows the placement of Clay County in the state precipitation pattern. Average monthly precipitation for the Vermillion weather station and several nearby stations is given in Table 6. The average length of growing season for Clay County is 150 to 160 days, with April 30 being the average date of the last killing frost in the spring and October 5 being the average date of the first killing frost in the fall.

Table 6. Monthly Distribution of Precipitation in Inches

	Weather Stations			
Month	Vermillion	Centerville	Yankton	3-Station Average
January	0.56	0.65	0.57	0.59
February	0.80	0.84	0.79	0.81
March	1.21	1.22	1.24	1.22
April	2.51	2.08	2.65	2.41
May	3.56	3.61	3.75	3.64
June	4.05	3.94	4.00	4.00
July	3.16	3.26	3.11	3.18
August	2.98	3.01	3.06	2.98
September	3.16	2.83	2.61	2.87
October	1.54	1.51	1.38	1.48
November	1.04	0.97	0.79	0.93
December	0.67	0.76	0.73	0.72
Annual	**25.24**	**24.68**	**24.68**	**24.87**

Fig. 43. Annual precipitation of Clay County



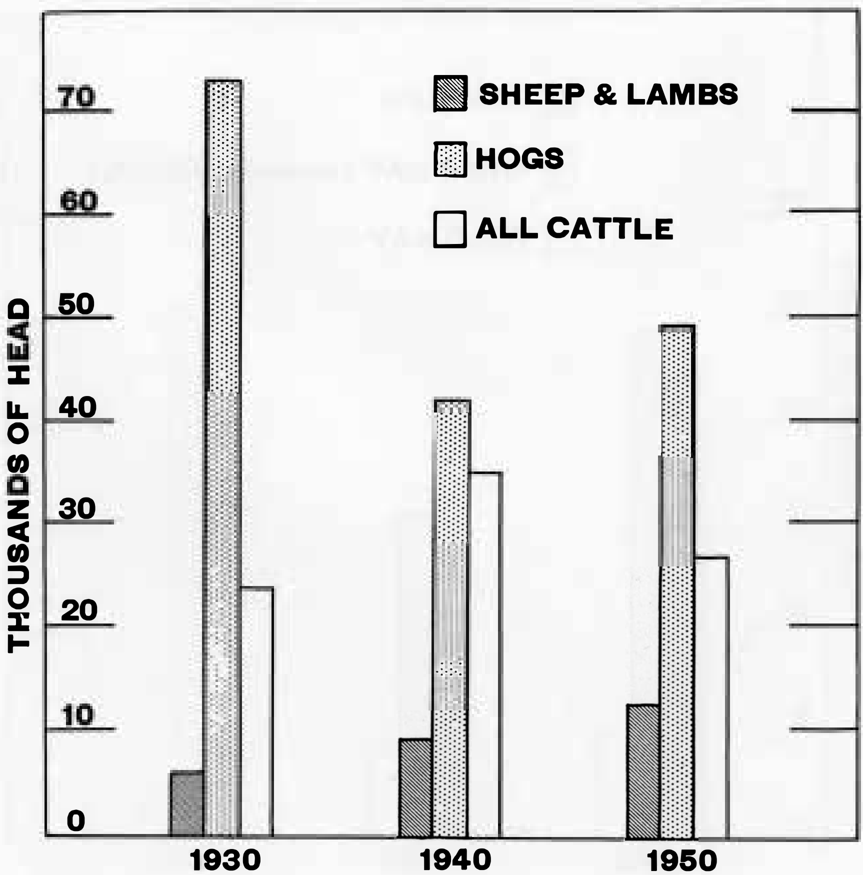
Early History

The first settlement in Clay County of a permanent nature has been credited to the Frost and Todd Company, post settlers. An Indian Treaty of 1858 moved the Indians from this area to a reservation in Charles Mix County. Following this treaty, settlement in the Missouri River Valley increased.

The Dakota Territory was established in 1861 and Clay County was organized a year later. The county was named after Henry Clay, a prominent statesman of the era. The Legislature named Vermillion the county seat in 1863.

Settlement during this period was slow for a number of reasons. The

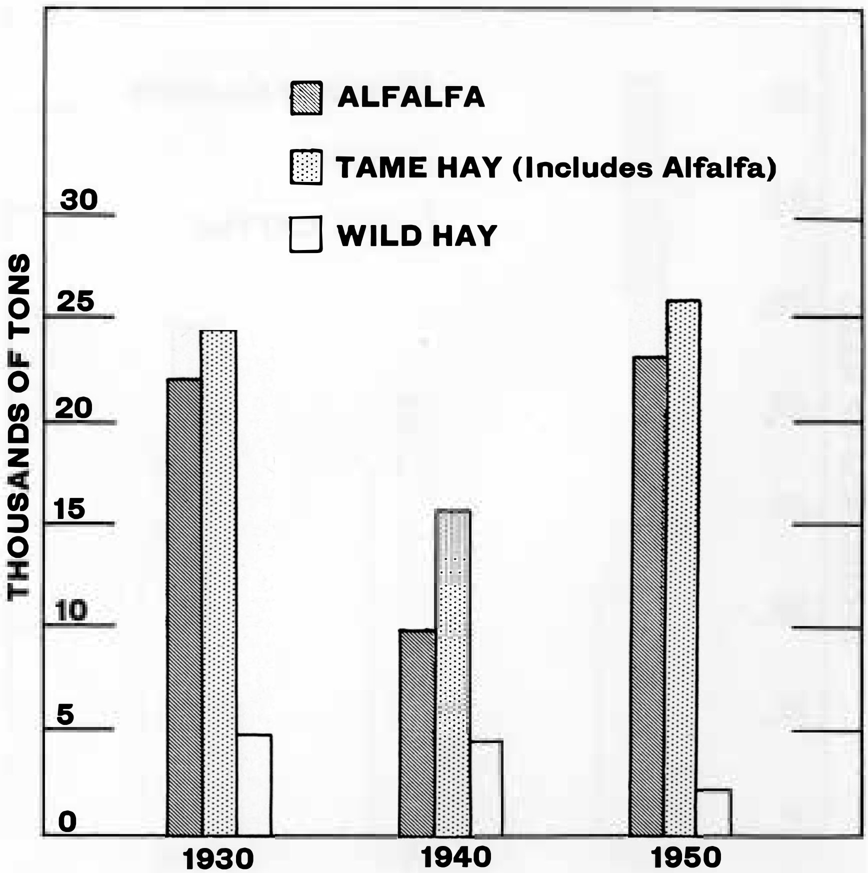
Fig. 44. Livestock production in Clay County



States were involved in the Civil War. Indian wars and uprisings were raging throughout the Dakota Territory. Transportation for crops and farm supplies did not exist. However, settlement in the county boomed with the coming of the railroad to Sioux City, Iowa, in the late 1860's and the construction of the Dakota Southern Railroad into the Territory from Sioux City in 1873.

In the spring of 1881 a rampaging flood demolished Vermillion, the county seat, which was located on the Missouri River bottom at that time. Because of this catastrophe, the present town site was laid out high on the bluffs overlooking the unpredictable "Old Muddy."

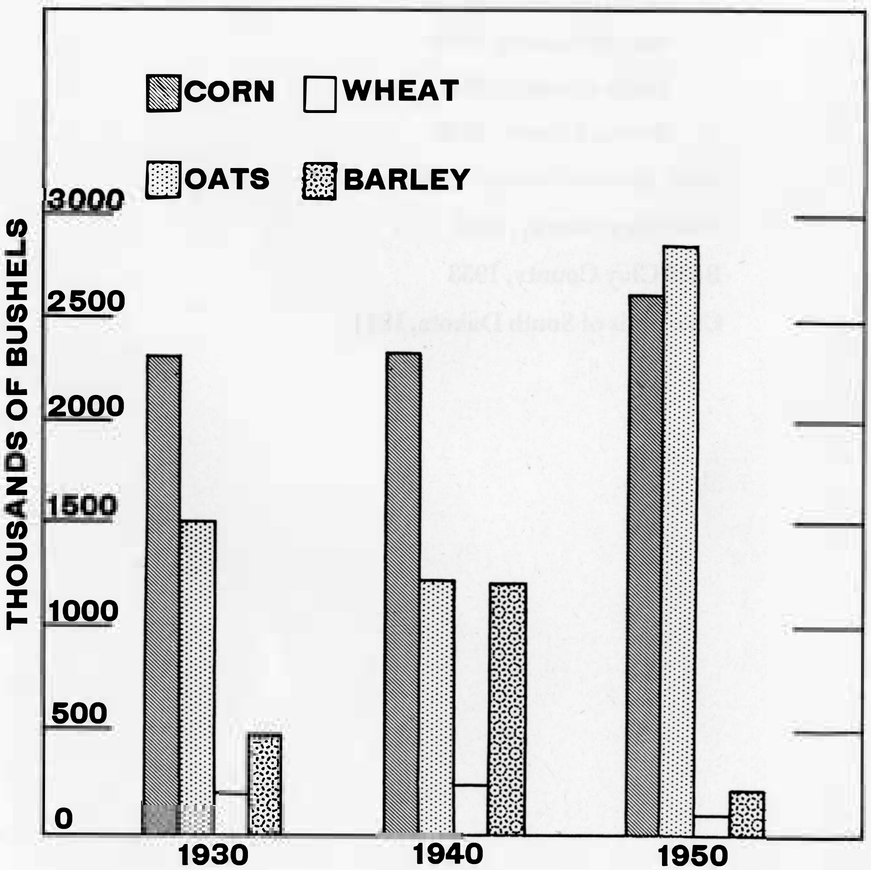
Fig. 45. Hay production in Clay County



Agricultural Production

Agriculture is the primary source of wealth in Clay County. The agriculture is basically of the "corn-oats-legume-livestock" type which is characterized by livestock feeding operations rather than by direct grain marketing (Figs. 44 and 45). This is possible because of the fact that Clay County ranks eighth in corn production in the state and tenth in oats production (Fig. 46).

Fig. 46. Grain production in Clay County



Published Soil Survey Reports

------ Bell Fourche Area, 1908 (not available)

------ Reconnaissance Western South Dakota, 1911 (not available)

------ McCook County, 1924

------ Beadle County, 1924

------ Union County, 1924

------ Grant County, 1927

------ Walworth County, 1928

------ Douglas County, 1928

------ Moody County, 1929

------ Hyde County, 1930

------ Brown County, 1930

B411 Jerauld County, 1951

B421 Day County, 1952

B430 Clay County, 1953

C88 Soils of South Dakota, 1951

Soil Association Map of

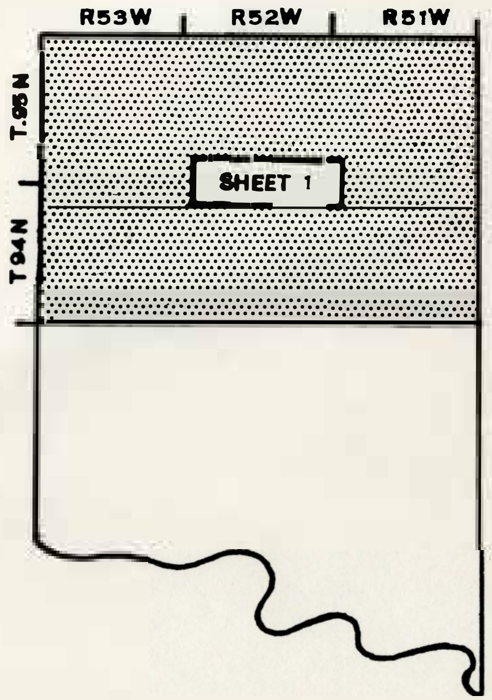
CLAY COUNTY

SOUTH DAKOTA

Agronomy Department, South Dakota Agricultural Experiment Station,
South Dakota State College, Brookings; In Cooperation with
the Soil Conservation Service, U.S.D.A.

Scale in miles

1 0 1 2



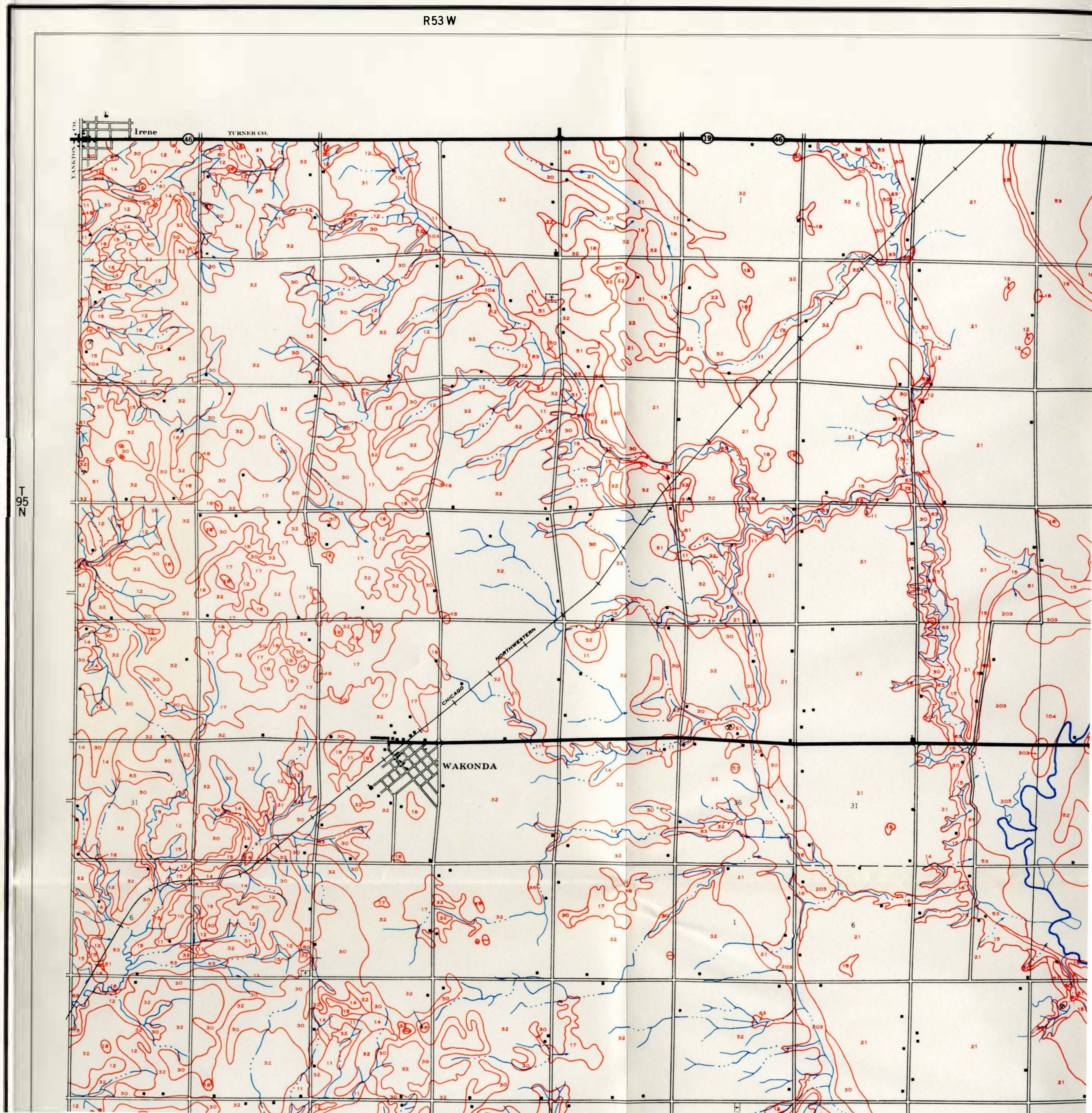
CONVENTIONAL SIGNS

County Boundary

Road

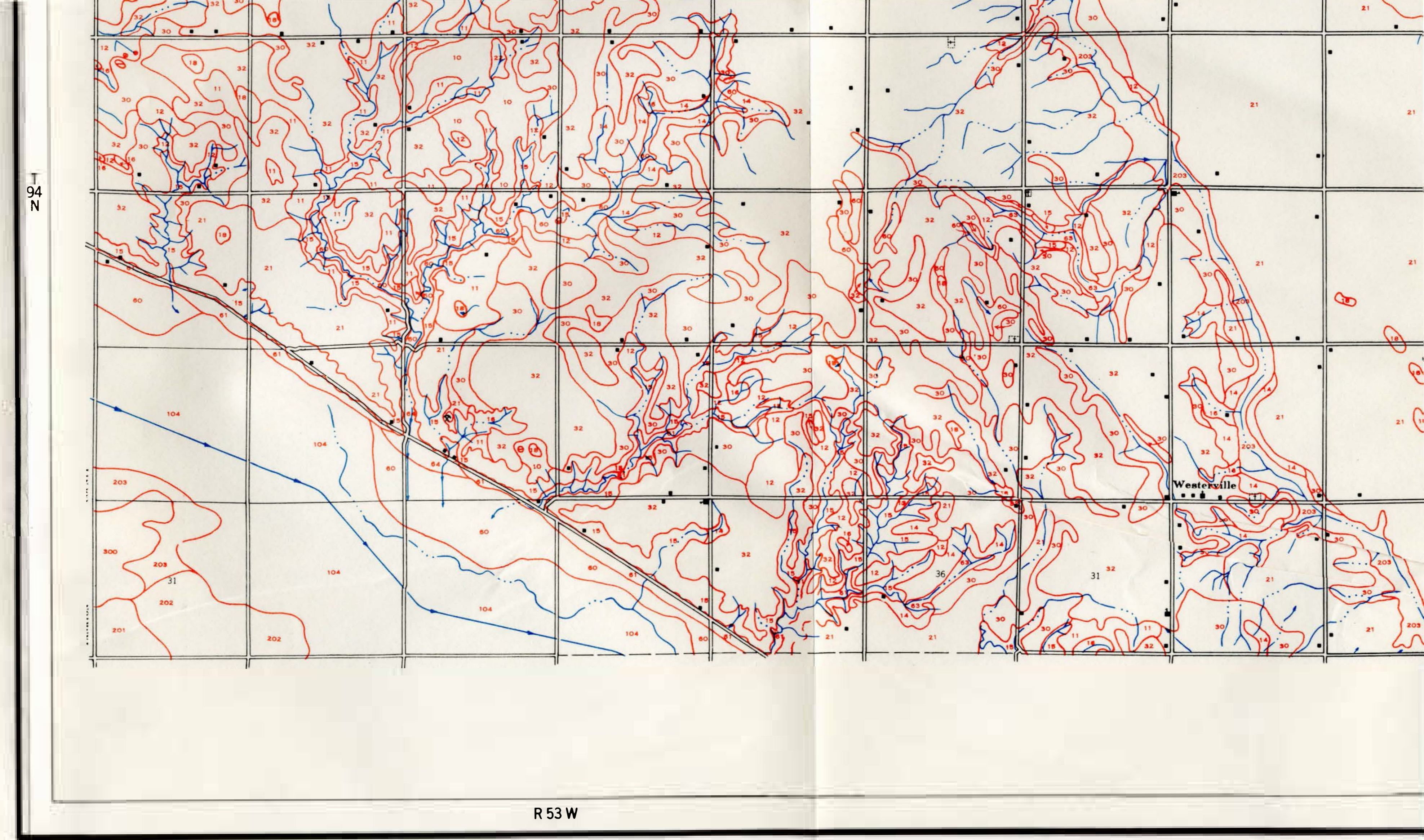
Section Line

Railroad



Railroad	
House	
School House	
Church	
Cemetery	
Gravel Pit	
Permanent Lake	(Blue)
Intermittent Lake	(Blue)
Intermittent Stream	(Blue)
River	(Blue)
Drainage Ditch	(Blue)
Small Wet Depression	
Soil Boundary	(Red)

Lambert Conformal Conic Projection with two standard parallels. Computed by Soil Conservation Service on the State Rectangular Coordinate System. South Dakota South Zone.



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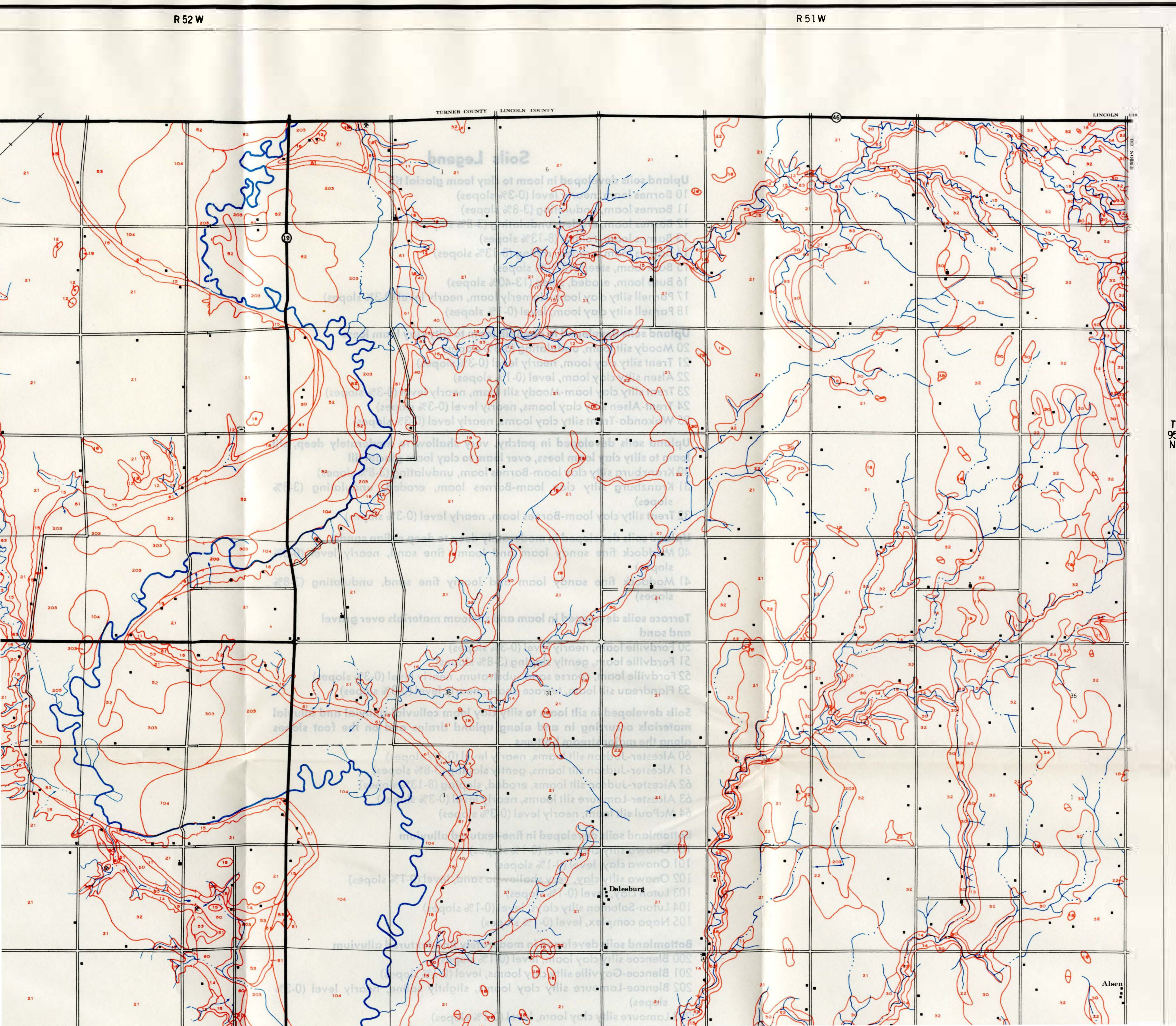
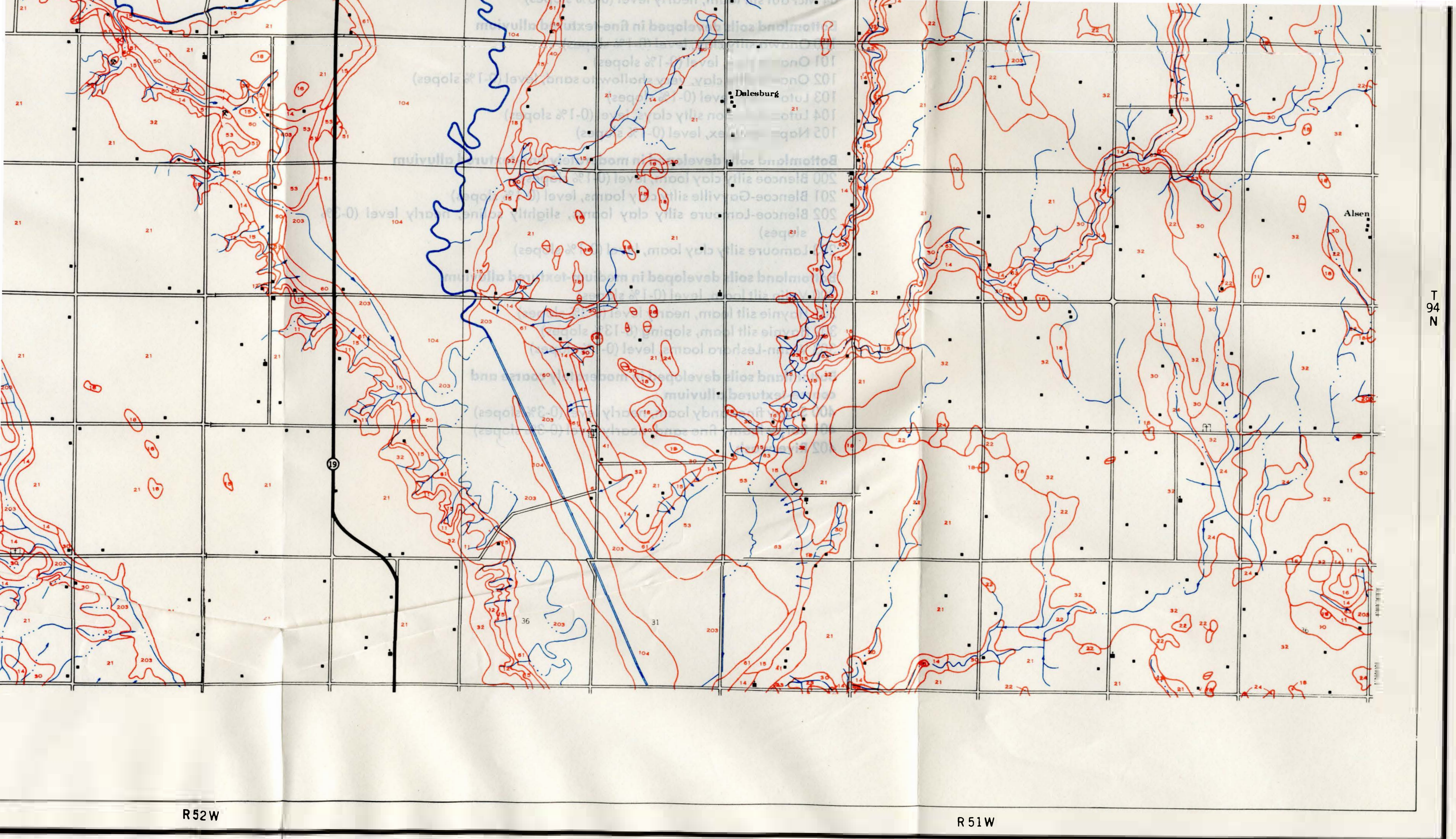

R 52 W
R 51 W
TURNER COUNTY
LINCOLN COUNTY
LINCOLN
T 95 N
Dalesburg
Alsen


Dalesburg
Alsen
19
T
94
N
R52W
R51W

Soils Legend

Upland soils developed in loam to clay loam glacial till

10 Barnes loam, nearly level (0-3% slopes)
11 Barnes loam, undulating (3-8% slopes)
12 Barnes loam, eroded, undulating (3-8% slopes)
13 Barnes loam, rolling (8-13% slopes)
14 Barnes loam, eroded, rolling (8-13% slopes)
15 Buse loam, steep (13-40% slopes)
16 Buse loam, eroded, steep (13-40% slopes)
17 Parnell silty clay loam-Hamerly loam, nearly level (0-3% slopes)
18 Parnell silty clay loam, level (0-1% slopes)

Upland soils developed in deep silt loam to silty clay loam loess

20 Moody silt loam, undulating (3-8% slopes)
21 Trent silty clay loam, nearly level (0-3% slopes)
22 Alsen silty clay loam, level (0-1% slopes)
23 Trent silty clay loam-Moody silt loam, nearly level (0-3% slopes)
24 Trent-Alsen silty clay loams, nearly level (0-3% slopes)
25 Wakonda-Trent silty clay loams, nearly level (0-3% slopes)

Upland soils developed in patchy, very shallow to moderately deep, silt loam to silty clay loam loess, over loam to clay loam glacial till

30 Kranzburg silty clay loam-Barnes loam, undulating (3-8% slopes)
31 Kranzburg silty clay loam-Barnes loam, eroded, undulating (3-8% slopes)
32 Trent silty clay loam-Barnes loam, nearly level (0-3% slopes)

Upland soils developed in moderately deep to deep eolian sands

40 Maddock fine sandy loam and loamy fine sand, nearly level (0-3% slopes)
41 Maddock fine sandy loam and loamy fine sand, undulating (3-8% slopes)

Terrace soils developed in loam and silt loam materials over gravel and sand

50 Fordville loam, nearly level (0-3% slopes)
51 Fordville loam, gently sloping (3-8% slopes)
52 Fordville loam, coarse sand substratum, nearly level (0-3% slopes)
53 Flandreau silt loam, terrace phase, nearly level (0-3% slopes)

Soils developed in silt loam to silty clay loam colluvial-alluvial and alluvial materials occurring in and along upland drains and on the foot slopes along the major stream bottoms

60 Alcester-Judson silt loams, nearly level (0-3% slopes)
61 Alcester-Judson silt loams, gently sloping (3-8% slopes)
62 Alcester-Judson silt loams, eroded, sloping (8-13% slopes)
63 Alcester-Lamoure silt loams, nearly level (0-3% slopes)
64 McPaul silt loam, nearly level (0-3% slopes)

Bottomland soils developed in fine-textured alluvium

100 Onawa silty clay, level (0-1% slopes)
101 Onawa clay, level (0-1% slopes)
102 Onawa silty clay, very shallow to sand, level (0-1% slopes)
103 Luton clay, level (0-1% slopes)
104 Luton-Solomon silty clays, level (0-1% slopes)
105 Napa complex, level (0-1% slopes)

Bottomland soils developed in moderately fine-textured alluvium

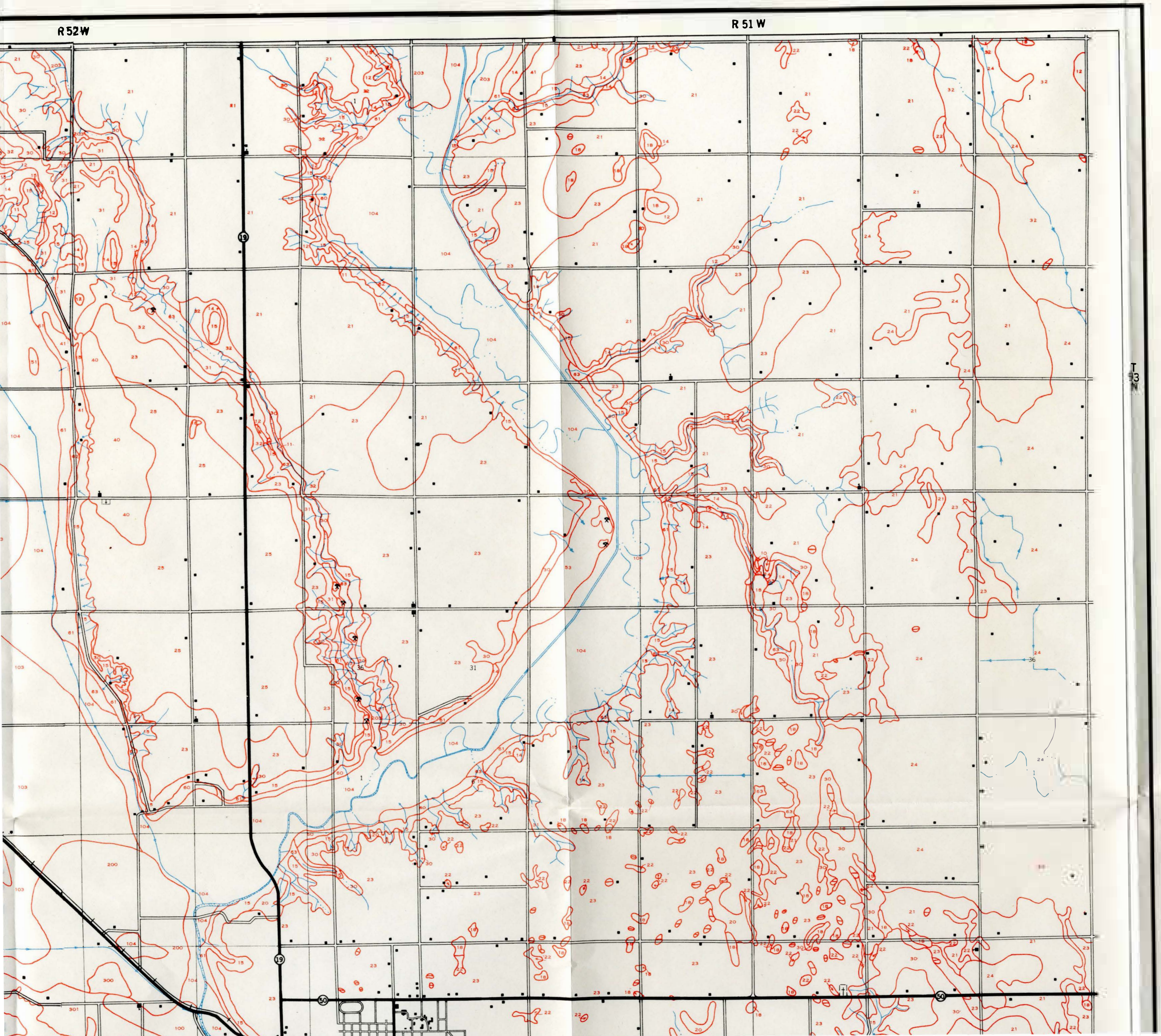
200 Blencoe silty clay loam, level (0-1% slopes)
201 Blencoe-Gayville silty clay loams, level (0-1% slopes)
202 Blencoe-Lamoure silty clay loams, slightly saline, nearly level (0-3% slopes)
203 Lamoure silty clay loam, level (0-1% slopes)

Bottomland soils developed in medium-textured alluvium

300 Volin silt loam, level (0-1% slopes)
301 Haynie silt loam, nearly level (0-3% slopes)
302 Haynie silt loam, sloping (8-13% slopes)
303 Wann-Leshara loams, level (0-1% slopes)

Bottomland soils developed in moderately coarse and coarse-textured alluvium

400 Sarpy fine sandy loam, nearly level (0-3% slopes)
401 Sarpy loamy fine sand, nearly level (0-3% slopes)
402 Riverwash



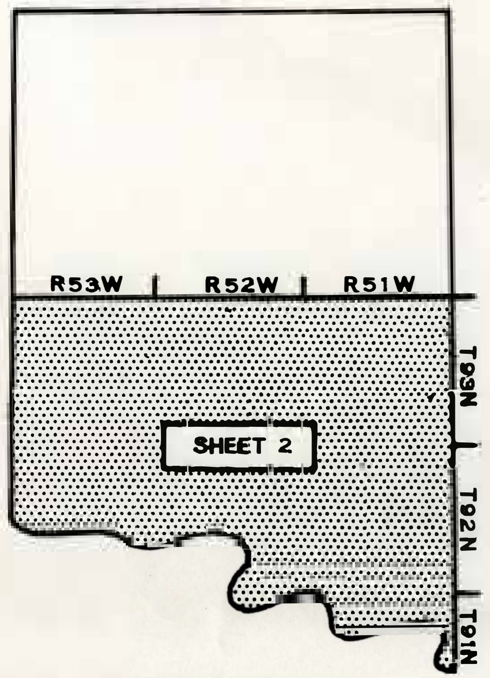
Soil Association Map of CLAY COUNTY

SOUTH DAKOTA

Agronomy Department, South Dakota Agricultural Experiment Station, South Dakota State College, Brookings; In Cooperation with the Soil Conservation Service, U. S. D. A.

Scale in miles

1 0 1 2



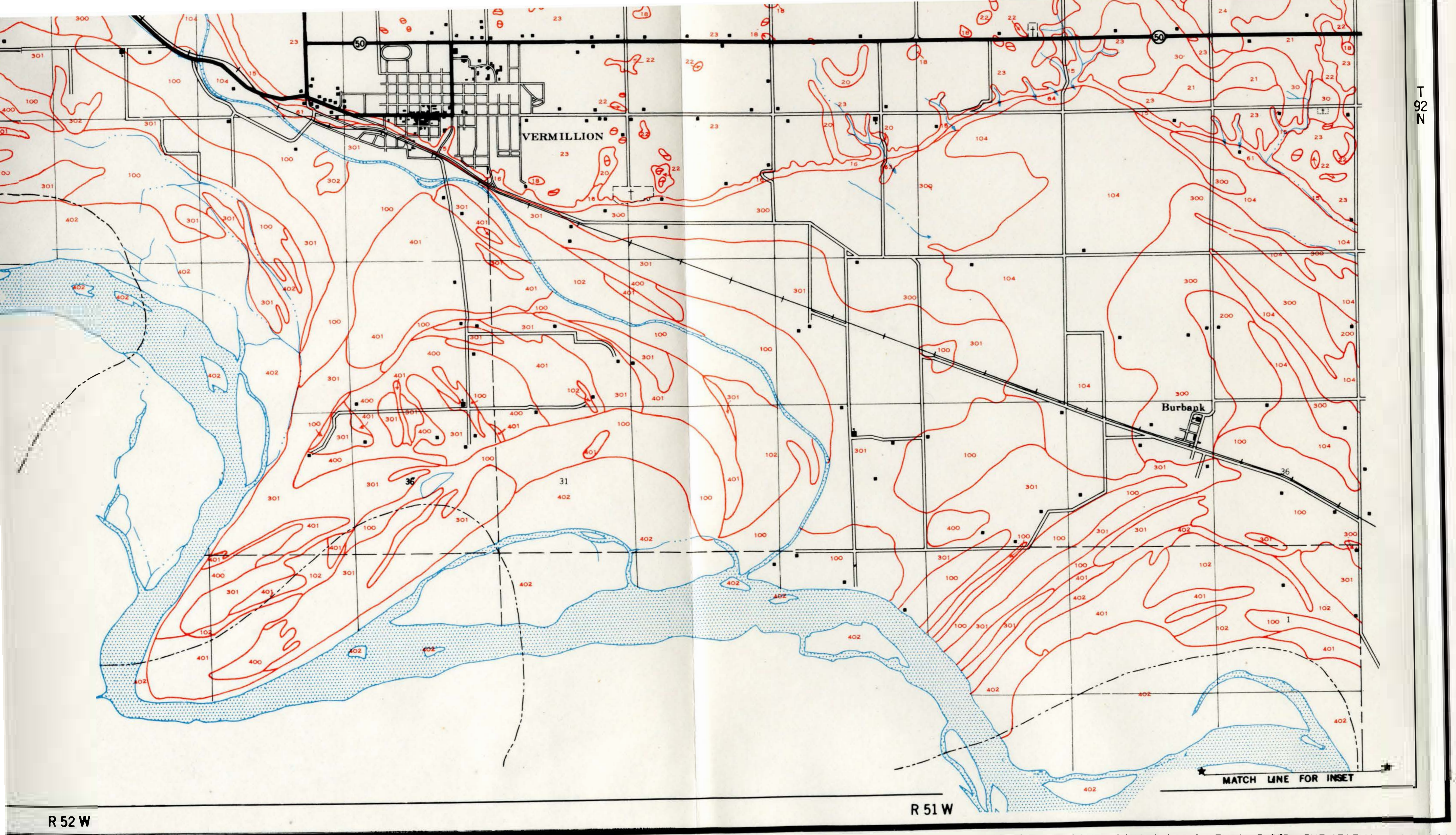
CONVENTIONAL SIGNS

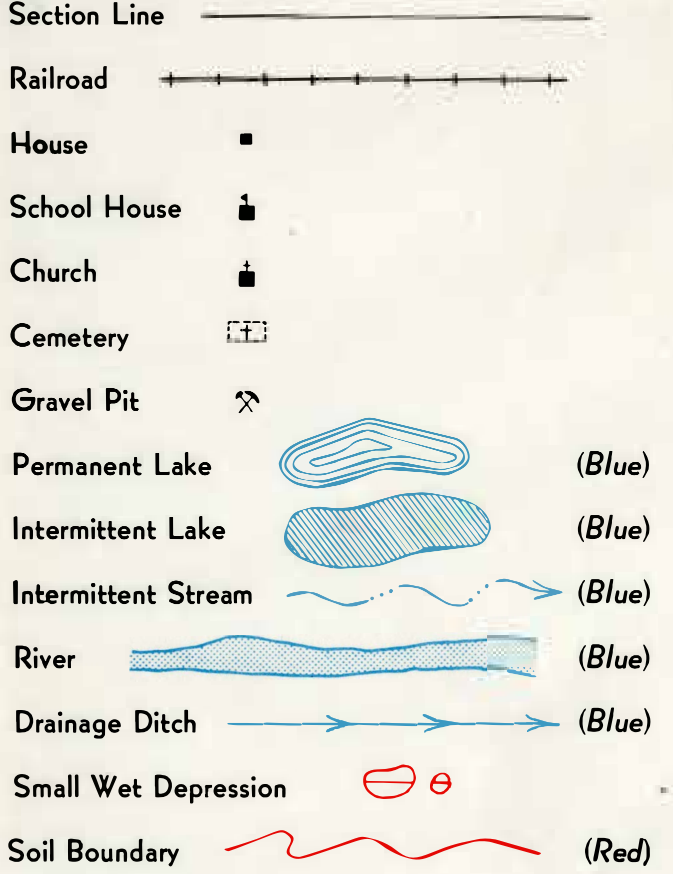
County Boundary

Road

Section Line

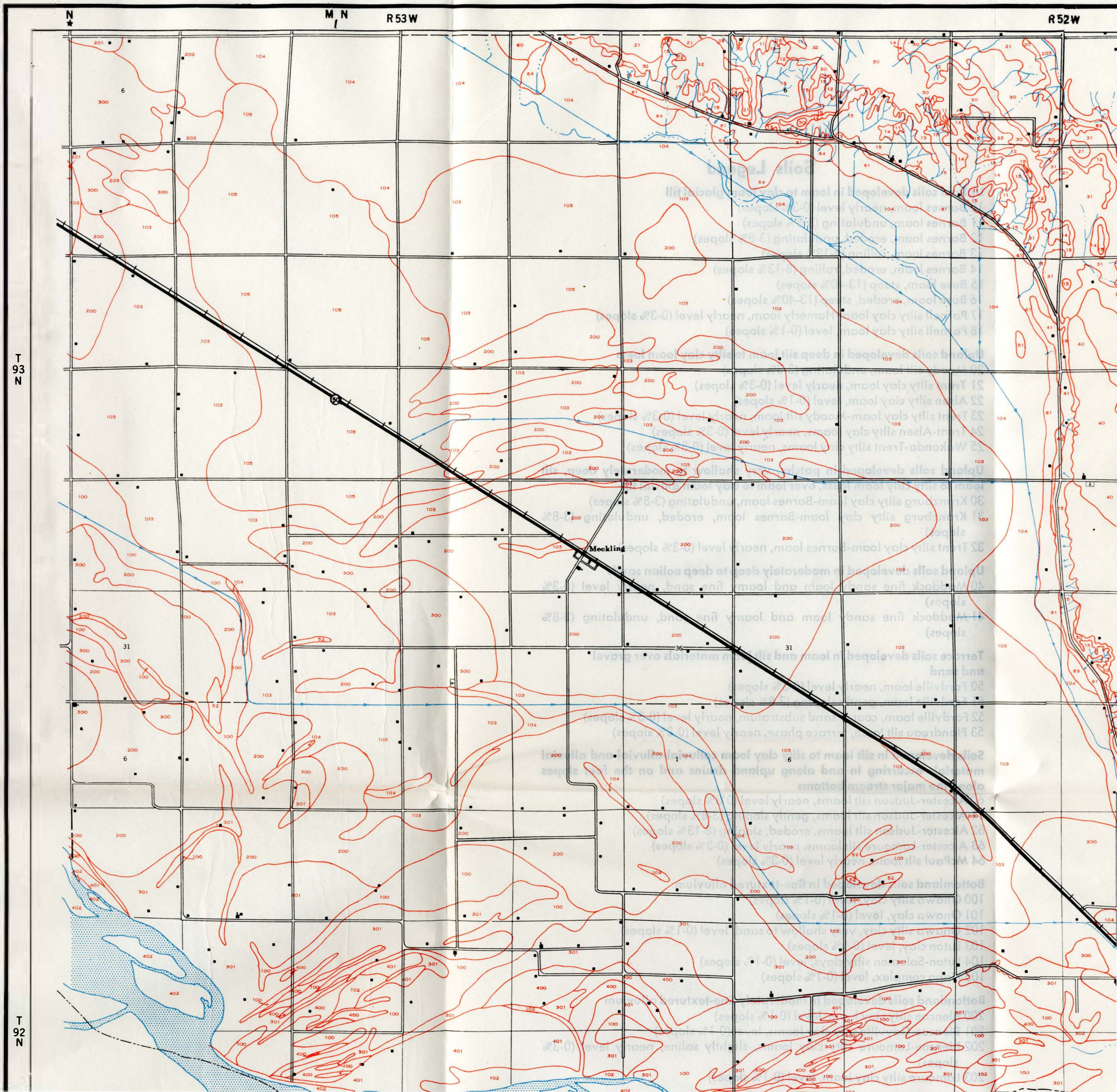
Railroad



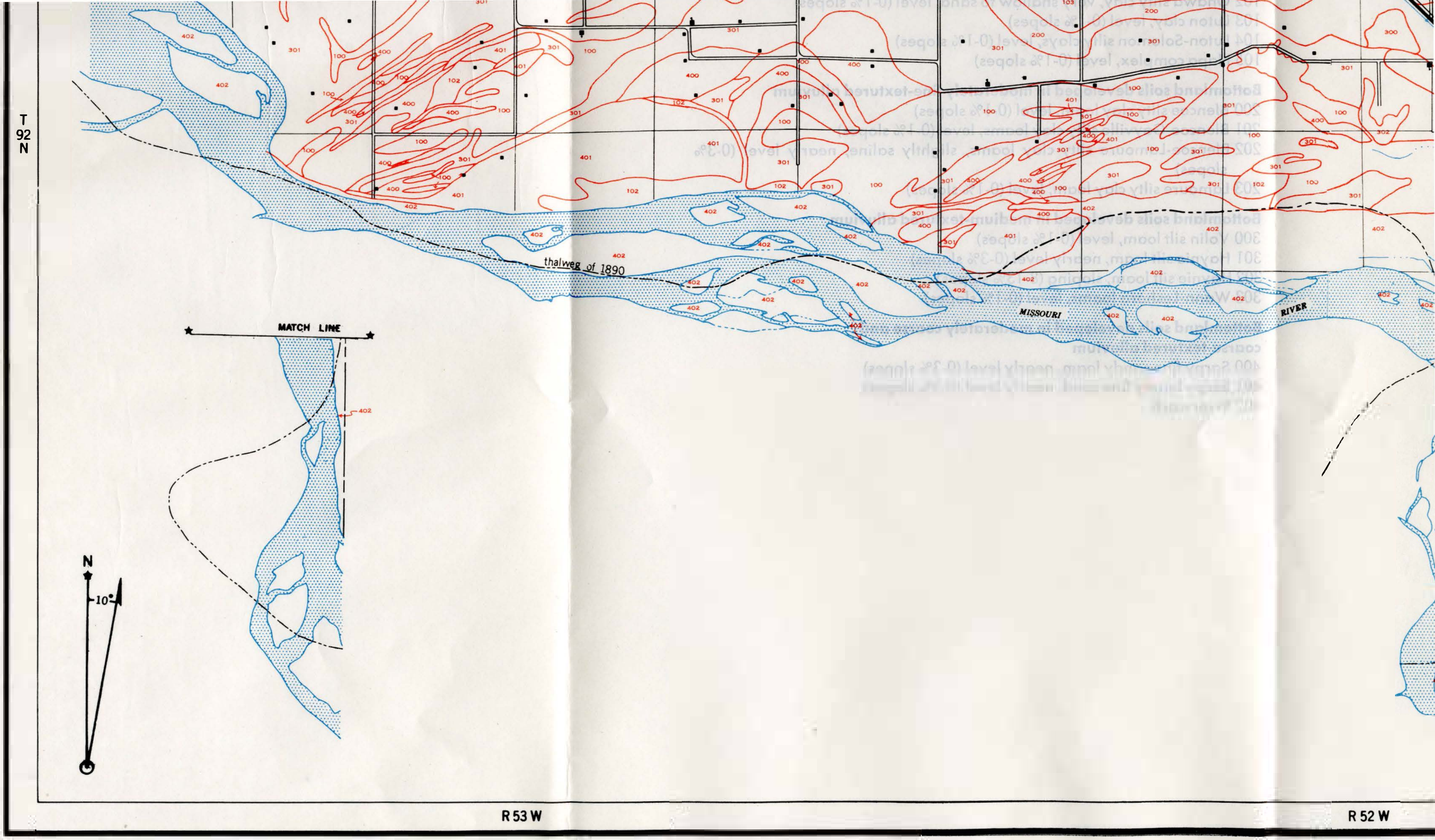


Lambert Conformal Conic Projection with two standard parallels. Computed by Soil Conservation Service on the State Rectangular Coordinate System. South Dakota South Zone.

PUBLISHED BY SOUTH DAKOTA AGRICULTURAL EXPERIMENT STATION, BROOKINGS



N
MN
R 53 W
R 52 W
T
93
N
T
92
N
Meckling



T
92
N
MATCH LINE
thalweg of 1890
MISSOURI
RIVER
N
10°
R 53 W
R 52 W

Soils Legend

Upland soils developed in loam to clay loam glacial till

10 Barnes loam, nearly level (0-3% slopes)
11 Barnes loam, undulating (3-8% slopes)
12 Barnes loam, eroded, undulating (3-8% slopes)
13 Barnes loam, rolling (8-13% slopes)
14 Barnes loam, eroded, rolling (8-13% slopes)
15 Buse loam, steep (13-40% slopes)
16 Buse loam, eroded, steep (13-40% slopes)
17 Parnell silty clay loam-Hamerly loam, nearly level (0-3% slopes)
18 Parnell silty clay loam, level (0-1% slopes)

Upland soils developed in deep silt loam to silty clay loam loess

20 Moody silt loam, undulating (3-8% slopes)
21 Trent silty clay loam, nearly level (0-3% slopes)
22 Alsen silty clay loam, level (0-1% slopes)
23 Trent silty clay loam-Moody silt loam, nearly level (0-3% slopes)
24 Trent-Alsen silty clay loams, nearly level (0-3% slopes)
25 Wakonda-Trent silty clay loams, nearly level (0-3% slopes)

Upland soils developed in patchy, very shallow to moderately deep, silt loam to silty clay loam loess, over loam to clay loam glacial till

30 Kranzburg silty clay loam-Barnes loam, undulating (3-8% slopes)
31 Kranzburg silty clay loam-Barnes loam, eroded, undulating (3-8% slopes)
32 Trent silty clay loam-Barnes loam, nearly level (0-3% slopes)

Upland soils developed in moderately deep to deep eolian sands

40 Maddock fine sandy loam and loamy fine sand, nearly level (0-3% slopes)
41 Maddock fine sandy loam and loamy fine sand, undulating (3-8% slopes)

Terrace soils developed in loam and silt loam materials over gravel and sand

50 Fordville loam, nearly level (0-3% slopes)
51 Fordville loam, gently sloping (3-8% slopes)
52 Fordville loam, coarse sand substratum, nearly level (0-3% slopes)
53 Flandreau silt loam, terrace phase, nearly level (0-3% slopes)

Soils developed in silt loam to silty clay loam colluvial-alluvial and alluvial materials occurring in and along upland drains and on the foot slopes along the major stream bottoms

60 Alcester-Judson silt loams, nearly level (0-3% slopes)
61 Alcester-Judson silt loams, gently sloping (3-8% slopes)
62 Alcester-Judson silt loams, eroded, sloping (8-13% slopes)
63 Alcester-Lamoure silt loams, nearly level (0-3% slopes)
64 McPaul silt loam, nearly level (0-3% slopes)

Bottomland soils developed in fine-textured alluvium

100 Onawa silty clay, level (0-1% slopes)
101 Onawa clay, level (0-1% slopes)
102 Onawa silty clay, very shallow to sand, level (0-1% slopes)
103 Luton clay, level (0-1% slopes)
104 Luton-Solomon silty clays, level (0-1% slopes)
105 Napa complex, level (0-1% slopes)

Bottomland soils developed in moderately fine-textured alluvium

200 Blencoe silty clay loam, level (0-1% slopes)
201 Blencoe-Gayville silty clay loams, level (0-1% slopes)
202 Blencoe-Lamoure silty clay loams, slightly saline, nearly level (0-3% slopes)
203 Lamoure silty clay loam, level (0-1% slopes)

Bottomland soils developed in medium-textured alluvium

300 Volin silt loam, level (0-1% slopes)
301 Haynie silt loam, nearly level (0-3% slopes)
302 Haynie silt loam, sloping (8-13% slopes)
303 Wann-Leshara loams, level (0-1% slopes)

Bottomland soils developed in moderately coarse and coarse-textured alluvium

400 Sarpy fine sandy loam, nearly level (0-3% slopes)
401 Sarpy loamy fine sand, nearly level (0-3% slopes)
402 Riverwash