United States
Department of
Agriculture

Natural Resources
Conservation
Service

In cooperation with North Dakota Agricultural Experiment Station, North Dakota Cooperative Extension Service, and North Dakota State Soil Conservation Committee

Soil Survey of Morton County, North Dakota

The soil properties and interpretations included in this survey were current as of 2002. The most current information is available through the Natural Resources Conservation Service Soil Data Mart Website at http://soildatamart.nrcs.usda.gov/ and/or the Natural Resources Conservation Service Web Soil Survey at http://websoilsurvey.nrcs.usda.gov/app.

How To Use This Soil Survey

General Soil Map

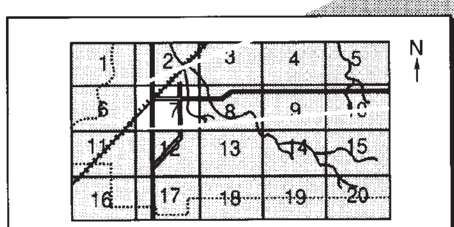
The general soil map, which is a color map, shows the survey area divided into groups of associated soils called general soil map units. This map is useful in planning the use and management of large areas.

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

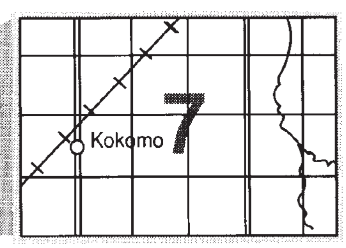
Detailed Soil Maps

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

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

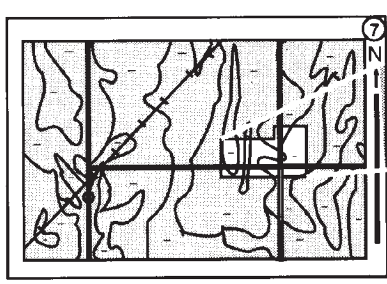


INDEX TO MAP SHEETS

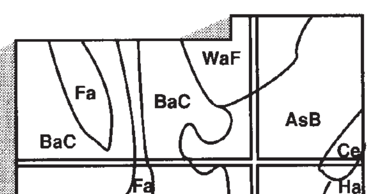


MAP SHEET

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



MAP SHEET



AREA OF INTEREST

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

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

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

Major fieldwork for this soil survey was completed in 1994. Soil names and descriptions were approved in 1991. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1987 to 1994. This survey was made cooperatively by the Natural Resources Conservation Service, the North Dakota Agricultural Experiment Station, North Dakota Cooperative Extension Service, and North Dakota State Soil Conservation Committee. It is part of the technical assistance furnished to the Morton County Soil Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. Maps may not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: A typical landscape of western Morton County along Hailstone Creek. Notice the diversity in land use. Porcelanite (scoria) capped buttes in the background are comon in this part of the county.

Additional information about the Nation's natural resources is available online from the Natural Resources Conservation Service at http://www.nrcs.usda.gov.

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Issued 2002

Foreword

This soil survey contains information that can be used in land-planning programs in Morton County. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment. For additional information concerning the use of soil surveys refer to North Dakota State University Extension Service Bulletin 60, “Soil Survey: The Foundation for Productive Natural Resource Management,” (Seelig, 1993) and to the USDA-NRCS publication “From the Surface Down: An Introduction to Soil Surveys for Agronomic Use,” (Broderson, 1991).

This soil survey is designed for many different users. Farmers, ranchers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to ensure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the STATSGO general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Thomas E. Jewett
State Conservationist
Natural Resources Conservation Service

Where to Get Updated Information

The soil properties and interpretations included in this survey were current as of 2002. The most current information is available through the Natural Resources Conservation Service Soil Data Mart Website at http://soildatamart.nrcs.usda.gov/ and/or the Natural Resources Conservation Service Web Soil Survey at http://websoilsurvey.nrcs.usda.gov/app.

Additional information is available from the Natural Resources Conservation Service Field Office Technical Guide in Mandan, North Dakota, or online at www.nrcs.usda.gov/technical/efotg. The data in the Field Office Technical Guide are updated periodically.

Additional information about soils and about NRCS is available through the North Dakota NRCS Web page at www.nd.nrcs.usda.gov.

For further information please contact:

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Soil Survey of
Morton County, North Dakota

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United States Department of Agriculture, Natural Resources Conservation Service, in cooperation with
North Dakota Agricultural Experiment Station, North Dakota Cooperative Extension Service, North Dakota State Soil Conservation Committee, and the Morton County Soil Conservation District.

Introduction

MORTON COUNTY is in the south-central and southwestern parts of North Dakota (fig. 1). The county has a total area of 1,228,928 acres, or 1,920.2 square miles. It has 15,232 acres of water in bodies of more than 40 acres in size. The county is bounded on the east by the Missouri River. The county seat is Mandan.

The first recorded settlements in the area were established in the 1880s. Additional information concerning the history and development of Morton County has been published by the Morton County Historical Society.

Figure 1. Location of Morton County in North Dakota.

The county is in the rolling Soft Shale Plain within the Northern Great Plains Spring Wheat Region (USDA-SCS, 1981). The county lies within the Missouri Plateau Physiographic District of the Great Plains Province (Bluemle, 1991).

Elevation in the county ranges from 2,460 feet in the western part to less than 1,600 feet in the southeastern part (Carlson, 1983). Four rivers drain the area including the Missouri River, Heart River, Cannonball River, and the Knife River. Those river valleys are entrenched an average 200 to 400 feet below the surrounding dissected plains (Ackerman, 1980).

Farming and ranching are the main economic enterprises. The county has one of the largest dairy industries in the state. The principal crops are spring wheat, other small grains, corn for silage, sunflowers, oats, peas, alfalfa, and grass-legume hay. The Morton County Soil Conservation District was organized in 1943. There are a number of small manufacturing industries in cities in Morton County. Mandan is a large railroad center with a switchyard capable of handling several trains and hundreds of cars per day. Hebron, in the western end of the county, is located near deposits of kaolinitic clays which are used in the manufacture of bricks.

The soils in the county range widely in texture, depth, and other characteristics. The loamy or clayey, moderately deep to deep soils are well suited to cropland. The sandy, alkaline, or shallow soils are best suited to rangeland or pastureland. Most of the soil parent material is residual or of residual origin. Some soil parent material located in the eastern part of the county is of glacial origin. Many of the soils are susceptible to wind or water erosion.

The first soil survey of Morton County was published in the 1908 Soil Survey of Western North Dakota (Lapham, 1910). In 1951, a Soil Survey of Morton County was published by the U.S. Department of Agriculture at a scale of 1 inch = 1 mile. A general soil map of the county was published in 1968 (Patterson, et al., 1968). The present survey provides additional information and larger scale maps and shows the soil in more detail.

About 37 percent of the county is cropland and 63 percent is rangeland, hayland, or other land (USDA-SCS, 1992). Irrigation is limited to areas along the Heart River and the Missouri River. Additional information related to agriculture in Morton County can be found in the Census of Agriculture (USDA-NASS, 1999). Additional information concerning the ground water resources in Morton County has been compiled by Ackerman (1980).

Climate

The climate of Morton County is semi-arid. The area is usually quite warm in summer with frequent spells of hot weather and occasional cool days. It is very cold in winter, when arctic air frequently surges over the area. Most precipitation falls in late spring and early summer.

Table 1, “Temperature and Precipitation,” gives data on temperature and precipitation for the survey area as recorded at New Salem, North Dakota, in the period 1961 to 1990. Table 2, “Freeze Dates in Spring and Fall,” shows probable dates of the first freeze in fall and the last freeze in spring. Table 3, “Growing Season,” provides data on length of the growing season.

In January, the average temperature is 10 degrees F, and the average daily minimum temperature is -0 degrees F. In July, the average temperature is 70 degrees F and the average daily maximum temperature is 85 degrees F.

Growing degree days are shown in Table 1. They are equivalent to “heat units.” During the month, growing degree days accumulate by the amount the average temperature each day exceeds a base temperature (40 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The average annual total precipitation in the county is about 17 inches. Of this, about 14 inches, or 80 percent, usually falls in April through September. The growing season for commonly grown crops falls within this period. Rainfall amounts occurring in 2 years out of 10 are also shown on Table 1. The information is useful in designing a management system for wet and dry years.

Average annual snowfall is about 34 inches. The average annual relative humidity at midafternoon in July is about 45 percent. The sun shines 76 percent of the possible time in July and 46 percent of the time in November. The sun shines an average of about 62 percent of the possible time annually. The prevailing wind is from the west-northwest. The average annual windspeed is about 10 miles per hour (Jensen, 1972).

How This Survey Was Made

This survey was made to provide information about the soils and miscellaneous areas in the survey area. The information includes a description of the soils and miscellaneous areas and a discussion of the suitability, limitations, and management of the soils and miscellaneous areas for specified uses. Soil scientists observed the steepness, length, and shape of the slopes; the general pattern of drainage; the kinds of crops and native plants; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down to the unconsolidated material in which the soil formed. The unconsolidated material is devoid of roots and other living organisms and has not been changed by biological activity.

Soils and miscellaneous areas in the survey area are in an orderly pattern that is related to the geology, landforms, relief, climate, and natural vegetation of the area. Each kind of soil and miscellaneous area is associated with a particular kind or segment of the landscape. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landscape, soil scientists develop a concept, or model, of how the soils were formed. Thus, during mapping, this model enables soil scientists to predict with a considerable degree of accuracy the kind of soil or miscellaneous area at a specific location on the landscape.

Individual soils on the landscape commonly merge into one another as their characteristics gradually change. To construct an accurate map, however, soil scientists must determine boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-vegetation-landscape relationships, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded characteristics of the soil profiles they studied. They noted color, texture, size, and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, soil reaction, and other features that enable them to identify soils (fig. 2). After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison and to classify soils systematically. Soil Taxonomy (Soil Survey Staff, 1999), the system of taxonomic classification used in the United States, is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After soil scientists classified and named the soils in the survey area, they compared individual soils with similar soils in the same taxonomic class in other areas so they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are collected for laboratory analyses and for engineering tests. Soil scientists interpret data from these analyses and tests as well as field-observed characteristics and soil properties to determine expected behavior of soils under different uses. Interpretations for the soils are field tested through observation of the soils in different uses and under different levels of management. Some interpretations are modified to fit local conditions, and some new interpretations may be developed to meet local needs. Data are assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management are assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can predict with a fairly high degree of accuracy that a given soil will have a high water table within certain depths in most years, but they cannot predict a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs

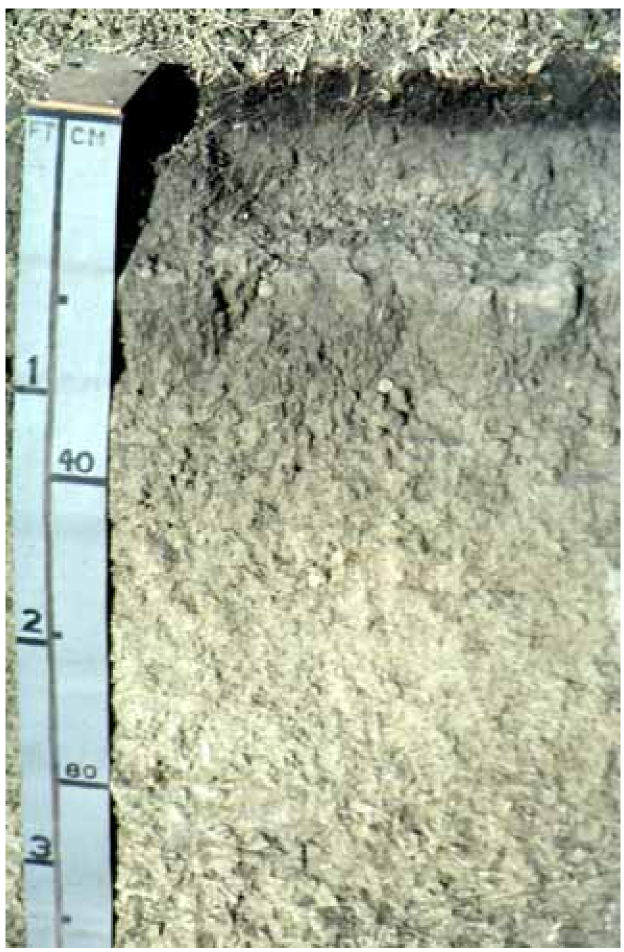

Figure 2. Profile of Janesburg silt loam. The dark brown and gray surface layers are underlain by a brown, dense, sodic subsoil.

and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

The descriptions, names, and delineations of the soils in this survey area do not fully agree with those of the soils in adjacent survey areas. Differences are the result of a better knowledge of soils, modifications in series concepts, or variations in the intensity of mapping or in the extent of the soils in the survey areas.

Survey Procedures

The general procedures used to make this survey are described in the National Soil Survey Handbook (Soil Survey Staff, 1996b) and the Soil Survey Manual (Soil Survey Staff, 1993). The Major Soils of North Dakota (Omodt et al., 1968), Soil Taxonomy (Soil Survey Staff, 1999), and Land Resource Regions and Major Land Resource Areas of the United States (USDA-SCS, 1981), were among the references used. The procedures used in determining the nature and characteristics of the soils are described under the heading “How This Survey Was Made.”

All soil mapping was done on field sheets developed from high-altitude black and white aerial photographs from the National High Altitude Photography (NHAP) Program. The scale of the field sheets was 1:24,000 or 2.64 inches to the mile. Details on these field sheets were checked with older aerial photography, color infrared photography, and in some instances, topographic maps.

Soil delineations were drawn on field sheets by traversing the land on foot, by pickup with mounted hydraulic soil probe, or by all-terrain vehicle. Traverses were planned to cross all major landforms and were at intervals close enough to locate contrasting soil areas of about 3 to 5 acres. Soils were examined to a depth of 3 to 5 feet, depending on the kind of soil. Soil properties, including color, texture, structure, horizonation, and presence of salts and stones were examined.

All map units were characterized for soil variability by transecting representative areas. A transect is a series of detailed soil examinations done in a map unit delineation to determine the range of composition of various kinds of soil and soil properties. One transect was required for each 1,000 acres of the unit mapped.

Data collected from the transects were used to determine map unit names and establish the range of composition of soil in each map unit. A statistical method explained by Brubaker and Hallmark (1991) was used for the analyses. This method predicts, at a 90 percent confidence level, the average composition in the county for each named map unit component and similar soil will be between the range given in the map unit description.

Each soil map unit was documented by at least one pedon description for each soil series identified in its name. Soil pedons were sampled for soil characterization or engineering test data. The soil analyses were made by the Natural Resources Conservation Service’s Soil Survey Laboratory at Lincoln, Nebraska and the North Dakota State Department of Transportation’s Materials and Research Laboratory.

Table 1.--Temperature and Precipitation

(Recorded in the period 1961-90 at New Salem, North Dakota.)

Month	Temperature: avg daily max	Temperature: avg daily min	Temperature: avg	Temperature: 2 years in 10 will have max temp. >than	Temperature: 2 years in 10 will have min temp. <than	Temperature: avg no. of growing degree days*	Precipitation: avg (in.)	Precipitation: 2 yrs in 10 will have less than (in.)	Precipitation: 2 yrs in 10 will have more than (in.)	Precipitation: average number of days with 0.10 inch or more
January	20.7	-0.0	10.3	50	-32	0	0.47	0.18	0.71	1
February	26.8	5.9	16.3	56	-28	2	0.44	0.16	0.67	1
March	38.7	17.0	27.8	71	-15	25	0.82	0.23	1.29	2
April	55.1	29.7	42.4	86	6	160	1.96	0.66	3.04	4
May	68.3	41.4	54.8	92	20	464	2.36	1.18	3.39	5
June	77.6	50.9	64.3	97	34	726	3.20	2.17	4.14	7
July	84.7	55.9	70.3	102	41	932	2.38	1.11	3.47	5
August	83.3	53.8	68.6	101	35	882	2.14	0.80	3.26	4
September	71.2	43.2	57.2	97	22	513	1.57	0.63	2.36	3
October	58.6	32.8	45.7	85	11	219	0.96	0.28	1.63	2
November	39.0	18.1	28.6	70	-11	28	0.55	0.08	0.93	1
December	24.6	4.3	14.4	55	-29	1	0.52	0.20	0.78	1
Yearly :										
Average	54.0	29.4	41.7	—	—	—	—	—	—	—
Extreme	106	-40	—	104	-34	—	—	—	—	—
Total	—	—	—	—	—	3952	17.37	14.22	20.37	36

* A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures,dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (Threshold: 40.0 deg. F)

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at New Salem, North Dakota.)

Probability	Temperature		
	24F or lower	28F or lower	32F or lower
Last freezing temperature in spring :			
1 year in 10 later than—	May 20	May 25	June 8
2 year in 10 later than—	May 13	May 19	June 1
5 year in 10 later than—	April 29	May 7	May 18
First freezing temperature in fall :			
1 yr in 10 earlier than—	September 23	September 11	September 6
2 yr in 10 earlier than—	September 28	September 17	September 10
5 yr in 10 earlier than—	October 8	September 28	September 19

Table 3.--Growing Season

(Recorded in the period 1961-90 at New Salem, North Dakota.)

Probability	Daily Minimum Temperature		
	# days > 24F	# days > 28F	# days > 32F
9 years in 10	131	116	94
8 years in 10	139	124	104
5 years in 10	154	141	122
2 years in 10	169	157	141
1 year in 10	177	165	151

General Soil Map Units (STATSGO)

The general soil map which precedes the detailed soil maps was derived from STATSGO (State Soil Geographic Data Base). STATSGO (USDA-NRCS, 1994) is a small scale digital general soil map of North Dakota and an accompanying data base. It shows broad areas that have a distinctive pattern of soils, relief, and drainage. These similar areas are delineated into general soil map units or soil associations. Each soil association is a unique natural landscape. Typically, they consist of one or more major soils or components and some minor soils or components. The soils making up an association can occur in another association but in a different pattern. The STATSGO map can be used to compare the suitability of large areas for general land uses. Areas of soils suitable for a practice or use can be identified on the map. Likewise, areas that are not suitable can be identified. Broad interpretive groups can be developed using STATSGO data. STATSGO maps are designed to be used primarily for multi-county and state resource evaluation and planning. Interpretive tables and maps can be prepared for North Dakota, or for smaller areas within the state. STATSGO maps can be used as part of a geographic information system (GIS).

The STATSGO map was compiled by generalizing more detailed soil survey maps. Information on the geology, topography, vegetation, and climate was also considered in the development of this map. The data base contains information on each association's acreage and composition. It also contains soil properties and interpretive data.

Maps were compiled at a scale of 1:250,000 (1 inch = 4 miles). The smallest delineations are about 1,500 acres in size. STATSGO maps are prepared nationwide at the same scale and join across county and state boundaries. The maps meet national standards for mapping conventions and scale. Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or building. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

Descriptions for STATSGO associations in Morton County begin on page 10. The composition of the named components in the association description includes soils that are similar in properties and behavioral patterns. Not all minor components are listed.

The North Dakota STATSGO map and data base are maintained by the USDA-NRCS Soils Section in Bismarck, North Dakota. For more information on the use of STATSGO, or on the availability of interpretive tables and maps, contact the state NRCS office.

76—Williams-Zahl Association, undulating to rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Williams	L	3-15	W	50-55
Zahl	L	3-15	W	30-35
MINOR COMPONENTS				
Bowbells	L	0-6	W	5-10
Parnell	SIL	0-1	VP	5-10
Wabek	L	6-30	E	1-5

* L, loam; SIL, silt loam
** VP, very poor; W, well; E, excessive

Description

These soil areas consist of undulating to rolling topography with knolls, ridges, an occasional drainageway, and some depressions containing very poorly drained soils. The dominant soils formed in medium to moderately-fine textured glacial till (fig. 3). Most areas of this association are used for cultivated crops with steeper areas used for rangeland.

Williams soils occur on convex and plane side slopes and broad, convex crests of knolls and ridges. Zahl soils occur on convex slopes and knolls and ridges. Bowbells soils occupy the swales and footslopes. Parnell soils occur in depressions and potholes. Wabek soils occur on knolls and some ridges. They have a gravelly substratum that restricts root growth. Zahl soils have a prominent "high lime" layer which occurs within plow depth. This light-colored, limy material often is exposed and mixed with dark colored surface soil by cultivation.

Major Limitations for Agricultural Use

Wind and water erosion are concerns on some soils. The very poorly drained soils generally have periods of wetness and ponding in the spring and after heavy rains. Soils with a gravelly substratum are droughty. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

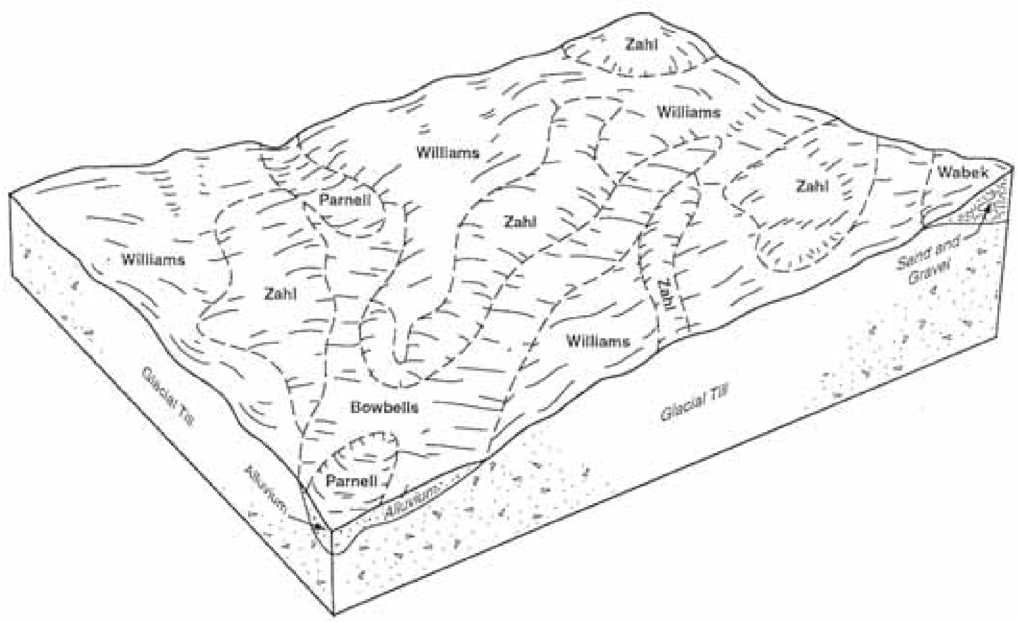

Figure 3. Typical pattern of soils and underlying materials in the Williams-Zahl association.

90—Amor-Regent-Cabba-Vebar Association, level to very steep

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Amor	L	0-15	W	25-30
Regent	SICL	3-9	W	20-25
Cabba	L	3-40	W	15-20
Vebar	FSL	0-6	W	10-15
MINOR COMPONENTS				
Belfield	SICL	0-3	W	5-10
Rhoades	L	1-9	W	5-10
Savage	CL	0-6	W	1-5

* FSL, fine sandy loam; L, loam; SICL, silty clay loam; CL, clay loam
** W, well

Description

These soil areas consist of level to very steep uplands with flats, fans, rises, and ridges. The dominant soils formed in moderately coarse to fine textured residuum. Most areas of this association are used for cultivated crops with steeper areas used for rangeland.

Amor, Regent, and Vebar soils occur on convex backslopes and summits on rises and ridges. Cabba soils occur on convex shoulder slopes on rises and ridges. Belfield and Savage soils occur on alluvial flats and fans. Rhoades soils occupy micro-lows and have a dense, sodium affected subsoil that restricts root growth.

Major Limitations for Agricultural Use

Wind erosion is a concern on some soils. Water erosion is a concern on steeper areas. Droughtiness, due to restricted root growth is a concern on most of the soils on the uplands and the sodium affected Rhoades soils. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

92—Amor-Rhoades-Cabba Association, nearly level to very steep

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Amor	L	3-15	W	40-45
Rhoades	SIL	1-9	W	15-20
Cabba	L	9-50	W	15-20
MINOR COMPONENTS				
Vebar	FSL	3-9	W	5-10
Arnegard	L	0-3	W	5-10
Daglum	L	0-9	W	5-10
Belfield	L	0-3	W	1-5

* FSL, fine sandy loam; L, loam; SIL, silt loam
** W, well

Description

These soil areas consists of nearly level to very steep topography with ridges, rises, terraces, flats, and fans. The dominant soils formed in medium to fine textured alluvium and residuum (fig. 4). Most areas of this association are used for cultivated crops with steeper areas used for rangeland.

Amor soils occur on convex footslopes on rises and convex backslopes on ridges. Rhoades and Daglum soils occur on flats and fans. They have a dense, sodium affected subsoil that restricts root growth. Cabba soils occur on convex rises and shoulder slopes on ridges. Vebar soils occur on convex backslopes on rises. Arnegard soils occur on flats. Belfield soils occur on flats, fans, and terraces.

Major Limitations for Agricultural Use

Water erosion is a concern on steeper areas. Droughtiness, due to restricted root growth, is a concern on uplands and sodium affected soils. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

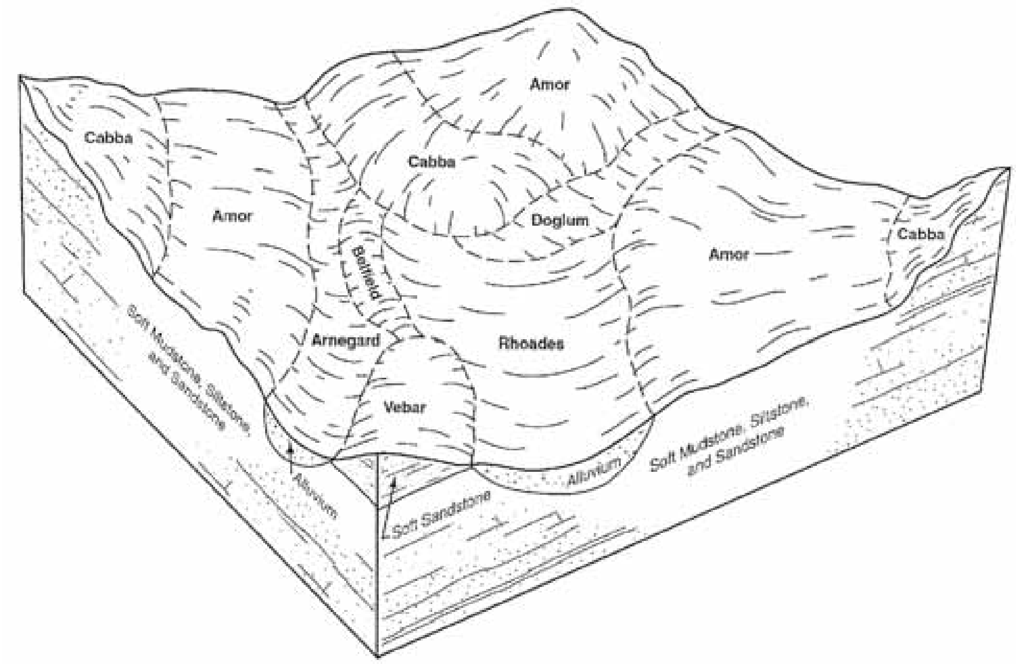

Figure 4. Typical pattern of soils and underlying materials in the Amor-Rhoades-Cabba association.

96—Belfield-Savage-Regent Association, level to gently rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Belfield	SIL	0-6	W	25-30
Savage	SIL	1-9	W	25-30
Regent	SICL	1-9	W	25-30
MINOR COMPONENTS				
Cabba	SIL	6-70	W	5-10
Moreau	SIC	3-6	W	5-10
Chama	SIL	3-15	W	1-5
Vebar	FSL	3-15	W	1-5

* FSL, fine sandy loam; L, loam; SIL, silt loam; SICL, silty clay loam; SIC, silty clay
** W, well

Description

These soil areas consist of level to gently rolling topography with fans, flats, rises, and ridges. The dominant soils formed in fine textured alluvium and residuum. Most areas of this association are used for cultivated crops with steeper areas used for rangeland.

Belfield and Savage soils occur on fans and flats. Regent, Moreau, Chama, and Vebar soils occur on convex backslopes of rises and ridges. Chama soils have a prominent “high lime” layer which occurs within plow depth. This light-colored, limy material often is exposed and mixed with dark surface soil by cultivation. Cabba soils occur on convex shoulder slopes on rises.

Major Limitations for Agricultural Use

Water erosion is a concern on steeper areas. Wind erosion is a concern on the minor components. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

98—Cabba-Brandenburg-Dogtooth Association, gently rolling to very steep

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Cabba	L	6-70	W	25-30
Brandenburg	CN-L	6-70	E	25-30
Dogtooth	SIL	6-25	W	20-25
MINOR COMPONENTS				
Sen	SIL	3-25	W	10-15
Straw	L	0-6	W	1-5
Savage	SICL	0-25	W	1-5
Vebar	FSL	1-15	W	1-5

* FSL, fine sandy loam; L, loam; SIL, silt loam; SICL, silty clay loam; CN-L, channery loam
** W, well; E, excessive

Description

These soil areas consist of gently rolling to very steep uplands with flood plains, fans, flats, hills, ridges, and rises. The dominant soils formed in medium to fine textured alluvium and residuum. Most areas of this association are used for rangeland. Lesser sloping areas are used for cultivated crops.

Cabba soils occur on convex shoulder slopes on ridges. Brandenburg soils occur on summits and shoulders of hills and ridges. They have a scoria substratum that restricts root growth. The Dogtooth soils occupy micro-lows on flats, fans, and side slopes. They have a dense, sodium affected subsoil that restricts root growth. Sen and Vebar soils occur on convex and linear backslopes and shoulder slopes on rises and ridges. Straw soils occur on flood plains. Savage soils occur on fans and footslopes.

Major Limitations for Agricultural Use

Water erosion is a concern on steep areas. Wind erosion is a concern on moderately coarse textured soils. Droughtiness, due to restricted root growth, is a concern on upland soils and sodium affected soils. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

105—Chama-Golva-Cabba Association, nearly level to very steep

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Chama	SIL	3-15	W	25-30
Golva	SIL	1-6	W	20-25
Cabba	L	6-45	W	20-25
MINOR COMPONENTS				
Belfield	SIL	0-9	W	5-10
Moreau	SIC	0-9	W	5-10
Rhoades	SIL	1-9	W	5-10
Vebar	FSL	3-15	W `	1-5

* FSL, fine sandy loam; L, loam; SIL, silt loam; SIC, silty clay
** W, well

Description

These soil areas consist of nearly level to very steep uplands with flats, fans, hills, rises, and ridges. The dominant soils formed in medium textured residuum and alluvium. Most areas of the association are used for cultivated crops with steeper areas used for rangeland.

Chama, Moreau, and Vebar soils occur on convex backslopes on rises and ridges. Chama soils have a prominent “high lime” layer which occurs within plow depth. This light colored, limy material often is exposed and mixed with dark surface soil by cultivation. Cabba soils occur on convex rises and shoulder slopes on ridges. Golva, Belfield, and Rhoades soils occur on alluvial flats and fans. Rhoades soils occupy micro-lows and have a dense, sodium affected subsoil that restricts root growth.

Major Limitations for Agricultural Use

Water erosion is a concern on steeper areas. Wind erosion is a concern on moderately coarse textured soils and the soils with a “high lime” layer. Droughtiness, due to restricted root growth, is a concern on upland and sodium affected soils. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

106—Ekalaka-Lakota-Vebar-Desart Association, level to rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Ekalaka	FSL	0-15	W	35-40
Lakota	FSL	0-9	W	15-20
Vebar	FSL	0-15	W	10-15
Desart	FSL	0-15	W	10-15
MINOR COMPONENTS				
Flasher	LFS	15-45	SE	5-10
Harriet	L	0-3	P	1-5
Velva	FSL	0-3	W	1-5

* FSL, fine sandy loam; L, loam; LFS, loamy fine sand
** P, poor; W, well; SE, somewhat excessive

Description

These soil areas consist of level to rolling topography with fans, rises, ridges, and hills. Some areas are dissected by drainageways and terraces. The dominant soils formed in moderately coarse textured alluvium and sandstone residuum (fig. 5). Most areas of this association are used for rangeland.

Ekalaka and Desart soils occur on micro-highs and Lakota soils occupy micro-lows on fans and terraces. Vebar soils occur on convex backslopes and Flasher soils occur on shoulder slopes of hills and ridges. Harriet soils occupy low lying drainageways. Velva soils occur on flood plains. The Ekalaka, Lakota, Desart, and Harriet soils have a dense, sodium affected subsoil that restricts root growth.

Major Limitations for Agricultural Use

Water erosion is a concern on steeper areas. Wind erosion and droughtiness are concerns on these soils. The poorly drained Harriet soils generally have wetness and ponding in the spring and after heavy rains. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

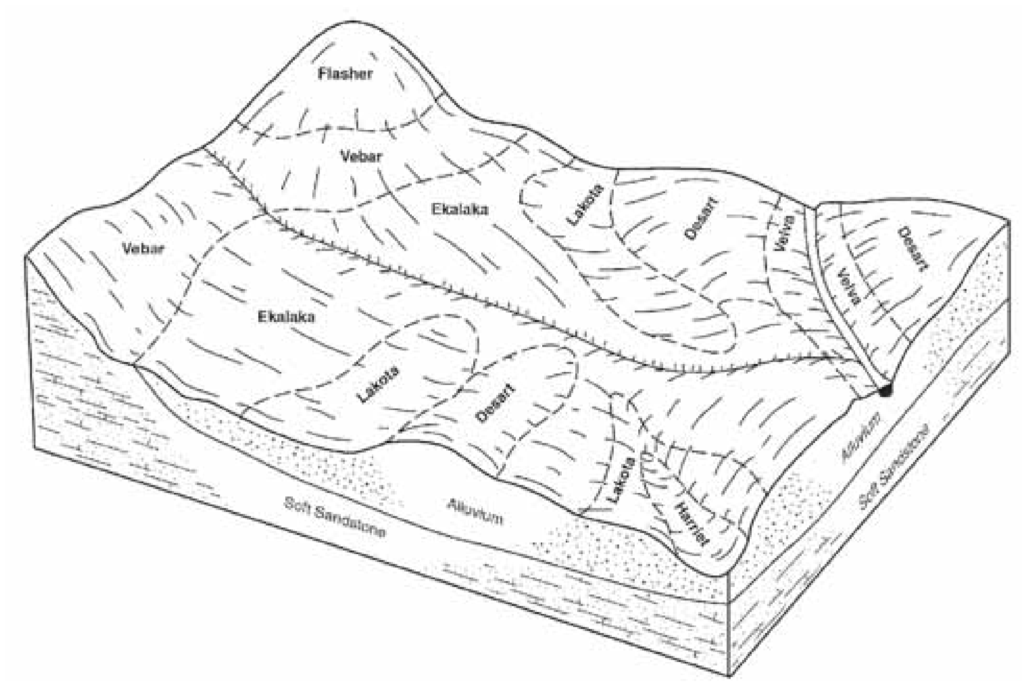

Figure 5. Typical pattern of soils and underlying materials in the Ekalaka-Lakota-Vebar-Desart association.

107—Daglum-Belfield-Rhoades-Harriet Association, level to gently rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Daglum	L	0-6	W	25-30
Belfield	SIL	0-6	W	15-20
Rhoades	L	0-9	W	10-15
Harriet	SIL	0-3	P	10-15
MINOR COMPONENTS				
Korchea	L	0-3	W	10-15
Farnuf	L	0-9	W	5-10
Regent	SICL	0-6	W	1-5

* L, loam; SIL, silt loam; SICL, silty clay loam
** P, poor; W, well

Description

These soil areas consist of level to gently rolling topography with flats, fans, rises, terraces, and drainageways. The dominant soils formed in fine textured alluvium. Most areas of this association are used for cultivated crops.

Daglum, Belfield, Farnuf, and Rhoades soils occur on flats and fans. Rhoades soils occupy micro-lows and Daglum soils occupy micro-highs. The Daglum, Harriet, and Rhoades soils have a dense, sodium affected subsoil that restricts root growth. Harriet and Korchea soils occur on terraces and in drainageways. Harriet soils occupy lower lying positions. Regent soils occur on convex rises.

Major Limitations for Agricultural Use

Droughtiness, due to restricted root growth, is a concern on sodium affected soils. The poorly drained soils generally have wetness and ponding in the spring and after heavy rains. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

108—Flasher-Vebar-Parshall Association, level to very steep

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Flasher	LFS	15-45	SE	20-25
Vebar	FSL	3-15	W	15-20
Parshall	FSL	1-6	W	10-15
MINOR COMPONENTS				
Beisigl	LFS	6-20	SE	5-10
Havrelon	SIL	0-6	W	5-10
Savage	SIL	1-3	W	5-10
Shambo	L	3-6	W	5-10

* FSL, fine sandy loam;L, loam; LFS, loamy fine sand; SIL, silt loam
** W, well; SE, somewhat excessive

Description

These soil areas consist of nearly level to very steep uplands with fans, flats, hills, and ridges dissected by drainageways, terraces, and flood plains. The dominant soils formed in moderately coarse to coarse textured alluvium and sandstone residuum. Most areas of this association are used for rangeland. Lesser sloping areas are used for cultivated crops.

Flasher soils occur on shoulder slopes of hills and ridges. Vebar and Beisigl soils occur on convex backslopes and footslopes of hills and ridges. Parshall, Savage, and Shambo soils occur on terraces, footslopes, fans, and flats. Havrelon soils occur on flood plains.

Major Limitations for Agricultural Use

Water erosion is a concern on steep areas. Wind erosion is a concern on coarse and moderately coarse textured soils. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

114—Straw-Parshall-Manning-Stady Association, level to gently rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Straw	L	0-3	W	25-30
Parshall	FSL	0-9	W	15-20
Manning	FSL	1-6	W	15-20
Stady	L	0-6	W	10-15
MINOR COMPONENTS				
Cabba	L	3-70	W	5-10
Belfield	CL	1-9	W	1-5
Vebar	FSL	1-20	W	1-5

* FSL, fine sandy loam;L, loam; CL, clay loam
** W, well

Description

These soil areas consist of level to gently rolling flood plains, terraces, fans, and ridges. The dominant soils formed in coarse textured alluvium (fig. 6). Most areas of this association are used for cultivated crops with steeper escarpments used for rangeland.

Straw soils occur on flood plains. Manning, Parshall, Stady, and Belfield soils occur on terraces and fans. Manning and Stady soils have a gravelly substratum that restricts root growth. Vebar soils occur on rises on backslopes of ridges. Cabba soils occur on shoulders of ridges.

Major Limitations for Agricultural Use

Wind erosion is a concern on moderately coarse textured soils. Water erosoin is a concern on steeper areas. Droughtiness, due to low water holding capacity, is a concern on some dominant soils. Flooding is a concern on the Straw soils. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

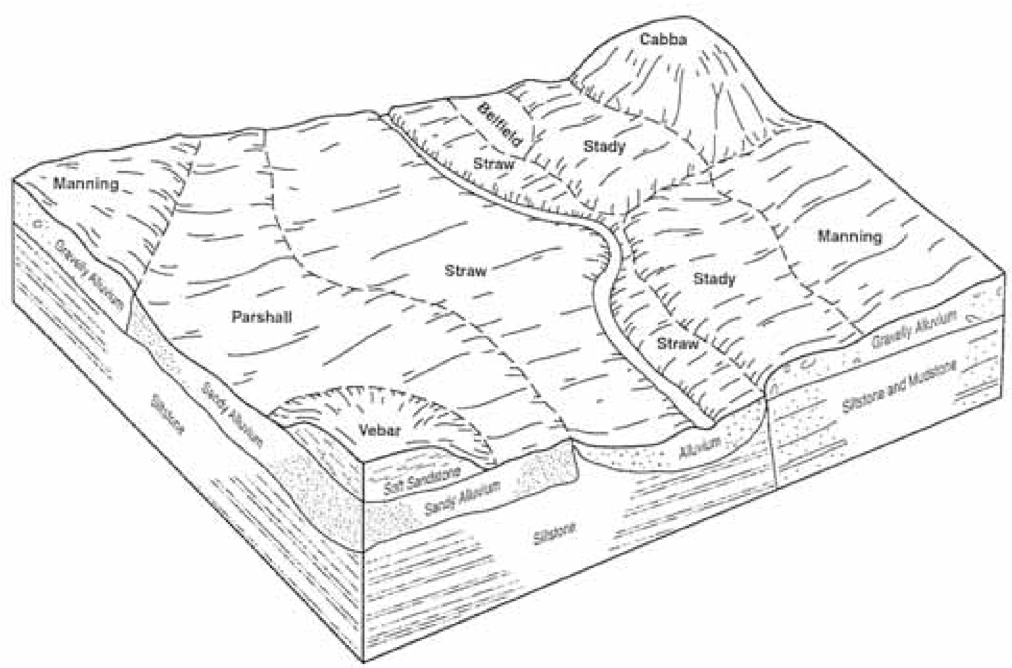

Figure 6. Typical pattern of soils and underlying materials in the Straw-Parshall-Manning-Stady association.

115—Straw-Velva Association, level to undulating

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Straw	L	0-3	W	50-55
Velva	FSL	1-6	W	5-10
MINOR COMPONENTS				
Belfield	SIL	1-3	W	5-10
Parshall	FSL	1-6	W	5-10
Vebar	FSL	6-15	W	5-10
Cabba	L	3-45	W	1-5

* FSL, fine sandy loam;bL, loam; CL, clay loam
** W, well

Description

These soil areas consist of level to undulating stream terraces and flood plains and adjacent fans, flats, and escarpments. The dominant soils formed in moderately coarse to medium textured fluvial deposits. Most areas of this association are used for cultivated crops with steeper escarpments used for rangeland.

Straw and Velva soils occur on stream terraces and flood plains. Belfield soils occur on flats. Parshall soils occur on terraces and fans. Vebar soils occur on rises on backslopes of ridges. Cabba soils occur on shoulders of ridges.

Major Limitations for Agricultural Use

Wind erosion is a concern on moderately coarse textured soils. Water erosion is a concern on steeper areas. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

118—Farland-Savage-Amor-Belfield Association, level to rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Farland	SIL	0-9	W	25-30
Savage	SICL	0-6	W	20-25
Amor	L	1-15	W	15-20
Belfield	SICL	0-6	W	15-20
MINOR COMPONENTS				
Straw	L	0-1	W	5-10
Daglum	L	0-9	W	1-5
Cabba	SIL	6-70	W	1-5

* L, loam; SIL, silt loam; SICL, silty clay loam
** W, well

Description

These soil areas consist of level to rolling flats, fans, and flood plains with some rises and ridges. The dominant soils formed in medium to fine textured residuum and alluvium (fig. 7). Most areas of this association are used for cultivated crops with steeper sloping areas used for rangeland.

Farland, Savage, Belfield, and Daglum soils occur on fans and flats. Daglum soils have a dense, sodium affected subsoil that restricts root growth. Amor soils occur on convex backslopes on ridges and rises. Straw soils occur on flood plains. Cabba soils occur on convex shoulder slopes on ridges and rises.

Major Limitations for Agricultural Use

Water erosion is a concern on steeper areas. Droughtiness, due to restricted root growth, is a concern on uplands and sodium affected soils. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

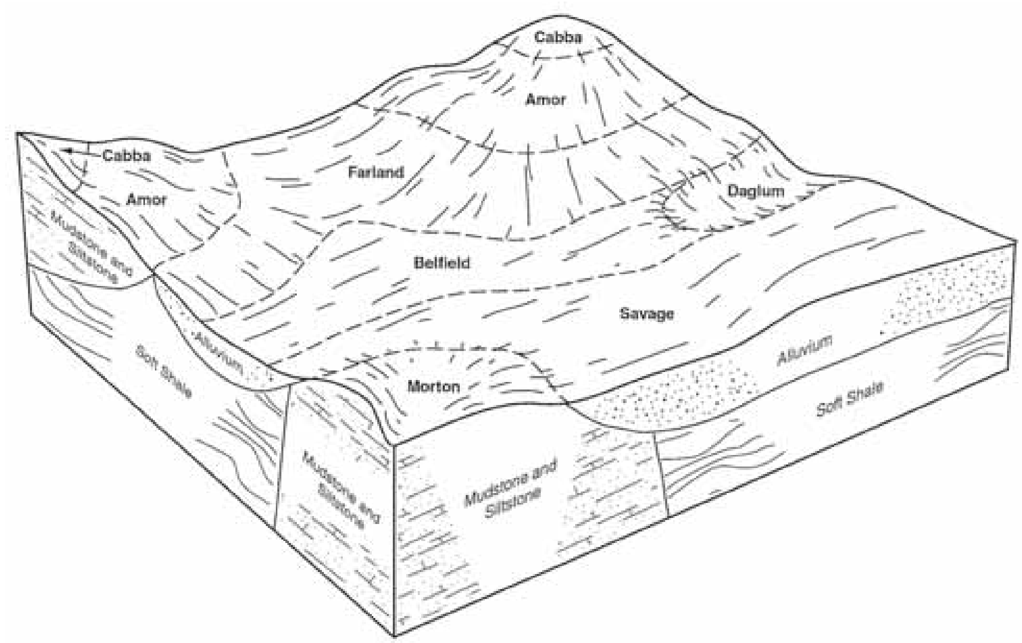

Figure 7. Typical pattern of soils and underlying materials in the Farland-Savage-Amor-Belfield association.

120—Telfer-Lihen-Parshall Association, level to rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Telfer	LFS	1-15	SE	25-30
Lihen	LFS	0-6	SE	20-25
Parshall	FSL	0-6	W	10-15
MINOR COMPONENTS				
Vebar	FSL	1-35	W	5-10
Seroco	LFS	1-35	E	5-10
Amor	L	3-15	W	5-10
Bowdle	L	1-6	W	5-10

* FSL, fine sandy loam; L, loam; LFS, loamy fine sand
* W, well; E, excessive; SE, somewhat excessive

Description

These soil areas consist of level to rolling rises, ridges, knobs, flats, and terraces. Most areas of this association are used for rangeland. The dominant soils formed in coarse to moderately coarse textured alluvium and eolian deposits.

Telfer, Lihen, and Parshall soils occur on fans. Telfer soils also occur on shoulder slopes and backslopes of ridges. Parshall soils may occupy swales on terraces and footslopes. Vebar and Amor soils occur on rises and backslopes of ridges. Seroco soils occur on knobs and side slopes of ridges. Bowdle soils occur on terraces.

Major Limitations for Agricultural Use

Wind erosion and droughtiness are concerns on these soils. Water erosion is a concern on steep areas. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

122—Vebar-Parshall Association, level to rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Vebar	FSL	1-15	W	30-35
Parshall	FSL	0-6	W	20-25
MINOR COMPONENTS				
Flasher	LFS	6-15	SE	15-20
Amor	L	3-9	W	15-20
Arnegard	L	0-3	W	5-10
Harriet	L	0-1	P	5-10

* FSL, fine sandy loam; L, loam
* P, poor; W, well; SE, somewhat excessive

Description

These soil areas consist of level to rolling uplands with fans, flats, terraces, rises, ridges, and drainageways. The dominant soils formed in moderately coarse textured alluvium and sandstone residuum (fig. 8). Most areas of this association are used for cultivated crops with steeper areas used for rangeland.

Vebar and Amor soils occur on rises and backslopes of ridges. Parshall and Arnegard soils occur on fans, flats, and terraces. Flasher soils occur on shoulders of ridges. Harriet soils occupy low-lying drainageways. They have a dense, sodium affected subsoil that restricts root growth.

Major Limitations for Agricultural Use

Water erosion is a concern on steep areas. Wind erosion and droughtiness are concerns on coarse and moderately coarse textured soils. The poorly drained soils generally have wetness and ponding in the spring and after heavy rains. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

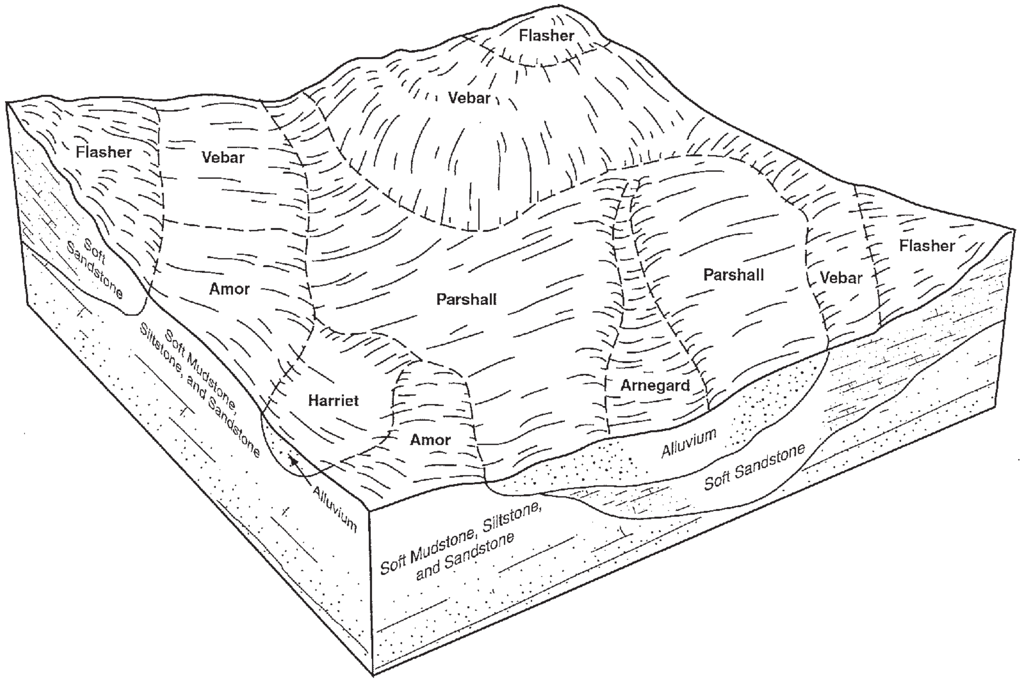

Figure 8. Typical pattern of soils and underlying materials in the Vebar-Parshall association.

123—Vebar-Amor-Cohagen Association, nearly level to very steep

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Vebar	FSL	3-15	W	40-45
Amor	L	3-15	W	20-25
Cohagen	FSL	6-50	W	15-20
MINOR COMPONENTS				
Werner	L	3-50	W	10-15
Arnegard	L	0-6	W	5-10
Daglum	SIL	0-3	W	1-5

* FSL, fine sandy loam; L, loam; SIL, silt loam
* W, well

Description

These soil areas consist of nearly level to very steep uplands with flats, knolls, and ridges dissected by drainageways. The dominant soils formed in moderately coarse to medium textured mudstone and sandstone residuum. Most areas of this association are used for rangeland. Lesser sloping areas are used for cultivated crops.

Vebar and Amor soils occur on convex and plane side slopes and broad, convex crests of knolls and ridges. Cohagen and Werner soils occur on shoulder slopes on knolls and ridges. Arnegard soils occupy footslopes, swales, and flats. Daglum soils occupy concave swales on flats, footslopes, and drainageways. They have a dense, sodium affected subsoil that resricts root growth.

Major Limitations for Agricultural Use

Water erosion is a concern on steep areas. Wind erosion is a concern on moderately coarse soils. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

124—Rhoades-Daglum-Amor Association, nearly level to rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Rhoades	L	1-9	W	25-30
Daglum	L	1-9	W	15-20
Amor	L	3-15	W	15-20
MINOR COMPONENTS				
Cabba	L	9-25	W	10-15
Korchea	L	0-2	W	5-10
Vebar	FSL	1-15	W	1-5

* FSL, fine sandy loam; L, loam
* W, well

Description

These soil areas consist of nearly level to rolling fans, flats, and flood plains with some ridges. The dominant soils formed in medium to fine textured alluvium and residuum. Most areas of this association are used for cultivated crops with steeper areas used for rangeland.

Rhoades soils occupy micro-lows and Daglum soils occur on micro-highs on flats and fans. They have a dense, sodium affected subsoil that restricts root growth. Amor and Vebar soils occur on convex footslopes on rises and convex backslopes on ridges. Cabba soils occur on convex rises and shoulder slopes on ridges. Korchea soils occur on flood plains.

Major Limitations for Agricultural Use

Droughtiness, due to restricted root growth, is a concern on upland and sodium affected soils. Wind and water erosion are concerns on some soils. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

126—Janesburg-Dogtooth-Cabba Association, level to very steep

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Janesburg	SIL	0-25	W	25-30
Dogtooth	SIL	0-25	W	25-30
Cabba	L	6-70	W	10-15
MINOR COMPONENTS				
Chama	SIL	3-45	W	5-10
Belfield	SIL	0-6	W	5-10
Vebar	FSL	1-65	W	5-10
Flasher	LFS	9-70	SE	1-5

* FSL, fine sandy loam; L, loam; SIL, silt loam; LFS, loamy fine sand
* W, well; SE, somewhat excessive

Description

These soil areas consist of level to very steep uplands with fans, hills, rises, and ridges. The dominant soils formed in medium to fine textured residuum. Most areas of this association are used for rangeland. Lesser sloping areas may be used for cultivated crops.

Cabba and Flasher soils occur on convex shoulder slopes on ridges. The Janesburg soils occur on micro-highs and the Dogtooth soils occupy micro-lows on fans and sideslopes of ridges. Belfield soils occur on fans. The Janesburg and Dogtooth soils have a dense, sodium affected subsoil that restricts root growth. Vebar and Chama soils occur on backslopes and shoulder slopes on rises and ridges.

Major Limitations for Agricultural Use

Water erosion is a concern on steep areas. Wind erosion is a concern on moderately coarse and coarse textured soils. Droughtiness, due to restricted root growth, is a concern on uplands and sodium-affected soils. For additional information concerning these soils see "Detailed Map Unit Descriptions" and "Series Descriptions." For information concerning the limitations for agriculture see Table 6.

127—Regent-Daglum-Morton Association, level to rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Regent	SICL	0-15	W	30-35
Daglum	L	1-9	W	25-30
Morton	SICL	1-15	W	20-25
MINOR COMPONENTS				
Cabba	L	6-70	W	5-10
Vebar	FSL	1-12	W	1-5
Grail	CL	0-3	W	1-5

* FSL, fine sandy loam; L, loam; SICL, silty clay loam; CL, clay loam
* W, well

Description

These soil areas consist of level to rolling flats, fans, rises, and ridges. The dominant soils formed in moderately fine to fine textured residuum and alluvium (fig. 9). Most areas of this association are used for cultivated crops with steeper areas used for rangeland.

Regent, Morton, and Vebar soils occur on rises and backslopes of ridges. Daglum soils occur on fans and footslopes of ridges. They have a dense, sodium affected subsoil that restricts root growth. Cabba soils occur on shoulders of ridges. Grail soils occur on flats.

Major Limitations for Agricultural Use

Water erosion is a concern on steeper areas. Droughtiness, due to restricted root growth, is a concern on sodium affected soils. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

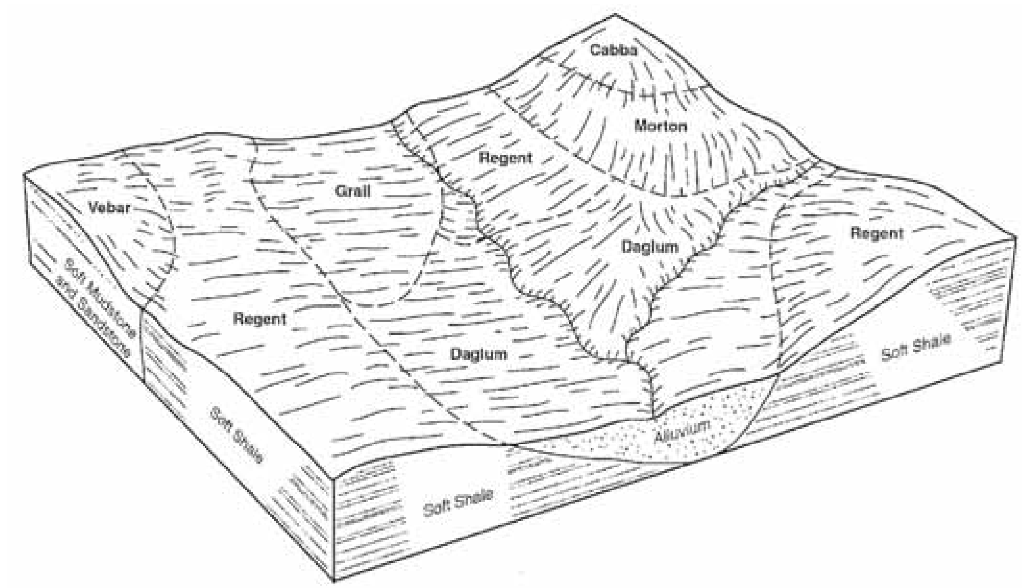

Figure 9. Typical pattern of soils and underlying materials in the Regent-Daglum-Morton association.

130—Amor-Daglum-Belfield Association, level to rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Amor	L	3-15	W	30-35
Daglum	L	0-9	W	20-25
Belfield	L	0-6	W	15-20
MINOR COMPONENTS				
Savage	CL	2-6	W	5-10
Regent	SICL	1-6	W	5-10
Cabba	L	3-70	W	5-10

* L, loam; CL, clay loam; SICL, silty clay loam
* W, well

Description

These soil areas consist of level to rolling topography with flats, fans, rises, and ridges. The dominant soils formed in medium textured residuum and fine textured alluvium. Most areas of this association are used for cultivated crops.

Amor soils occur on rises and backslopes of ridges. Daglum, Belfield, and Savage soils occur on flats and fans. Daglum soils have a dense, sodium affected subsoil that restricts root growth. Regent soils occur on rises on fans. Cabba soils occur on convex rises and shoulder slopes on ridges.

Major Limitations for Agricultural Use

Water erosion is a concern on steeper areas. Droughtiness, due to restricted root growth, is a concern on sodium affected soils. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descripitons.” For information concerning the limitations for agriculture see Table 6.

165—Banks-Velva-Breien-Telfer Association, level to steep

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Banks	LFS	0-6	E	30-35
Velva	FSL	1-3	W	20-25
Breien	FSL	0-1	SE	20-25
Telfer	LFS	0-25	E	10-15
MINOR COMPONENTS				
Straw	L	0-3	W	5-10
Virgelle	FSL	1-6	W	1-5
Wabek	L	9-35	E	1-5

* FSL, fine sandy loam; L, loam; LFS, loamy fine sand
* W, well; SE, somewhat excessive; E, excessive

Description

These soil areas consist of level to steep stream terraces, flood plains, and escarpments. The dominant soils formed in moderately coarse to coarse textured alluvium and fluvial deposits. Most areas of this association are used for cultivated crops or rangeland.

Banks and Straw soils occur on flood plains. Velva and Breien soils occur on flood plains and stream terraces. Telfer soils occur on convex backslopes and shoulder slopes on ridges. Wabek soils occur on stream and terrace escarpments. They have a gravelly substratum that restricts root growth.

Major Limitations for Agricultural Use

Water erosion is a concern on steeper areas. Wind erosion and droughtiness, due to low water holding capacity, are concerns on moderately coarse and coarse textured soils. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

166—Havrelon-Mckeen-Lohler Association, level and nearly level

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Havrelon	SIL	0-3	W	45-50
Mckeen	L	0-1	VP	20-25
Lohler	SIC	0-3	W	15-20
MINOR COMPONENTS				
Banks	LFS	0-6	E	5-10
Minnewaukan	FSL	0-3	P	1-5
Heil	SIL	0-1	P	1-5

* FSL, fine sandy loam; L, loam; LFS, loamy fine sand; SIL, silt loam, SIC, silty clay
* VP, very poor; P, poor; W, well; E, excessive

Description

These soil areas consist of level and nearly level levees and rises on flood plains and some poorly drained soils in depressions. The dominant soils formed in medium to fine textured fluvial deposits (fig. 10). Most areas of this association are used for cultivated crops, hayland, and wildlife habitat.

Havrelon, Lohler, Mckeen, and Minnewaukan soils occur on flood plains. Banks soils are on levees and flood plains. Heil soils occupy depressions and have a dense, sodium affected subsoil, that restricts root growth.

Major Limitations for Agricultural Use

Wind erosion is a concern on coarse, moderately coarse, and fine textured soils. The very poorly and poorly drained soils are generally wet and ponded in the spring and after heavy rains. Flooding is a concern on these soils. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

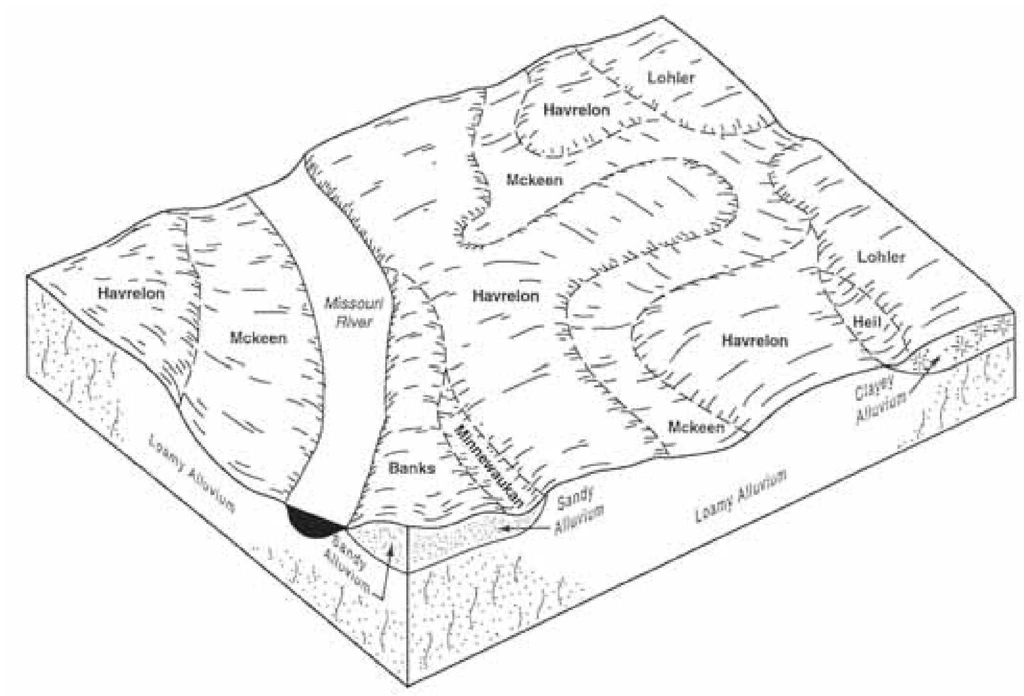

Figure 10. Typical pattern of soils and underlying materials in the Havrelon-Mckeen-Lohler association.

167—Parshall-Belfield-Farnuf Association, level to gently rolling

	SURFACE TEXTURE*	SLOPE PERCENT	DRAINAGE**	PERCENT COMPOSITION
MAJOR COMPONENTS				
Parshall	FSL	0-6	W	25-30
Belfield	SIL	0-6	W	25-30
Farnuf	L	0-9	W	20-25
MINOR COMPONENTS				
Daglum	SIL	0-9	W	10-15
Vebar	FSL	1-15	W	5-10
Flasher	LFS	3-70	SE	1-5
Harriet	SIL	0-2	P	1-5

* FSL, fine sandy loam; L, loam; LFS, loamy fine sand; SIL, silt loam
* P, poor; W, well ; SE, somewhat excessive

Description

These soil areas consist of level to gently rolling topography with flats, fans, hills, ridges, and drainageways. The dominant soils formed in moderately coarse to fine textured alluvium. Most areas of this association are used for cultivated crops.

Parshall soils occur on fans, terraces, and footslopes of ridges. Belfield, Farnuf, and Daglum soils occur on fans, flats, and footslopes. Daglum and Harriet soils have a dense, sodium affected subsoil that restricts root growth. Vebar soils occur on convex backslopes and footslopes of hills and ridges. Flasher soils occur on shoulder slopes of hills and ridges. Harriet soils occupy low lying drainageways.

Major Limitations for Agricultural Use

Wind erosion is a concern on the coarse and moderately coarse textured soils. Water erosion is a concern on steeper areas. Droughtiness, due to restricted root growth, is a concern on coarse textured or sodium affected soils. The poorly drained soils generally have wetness and ponding in the spring and after heavy rains. For additional information concerning these soils see “Detailed Map Unit Descriptions” and “Series Descriptions.” For information concerning the limitations for agriculture see Table 6.

Detailed Soil Map Units

Map units on the detailed soil maps represent soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the soil maps and interpretive tables, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses.

A map unit delineation on the detailed soil maps represents an area on the landscape and consists of one or more soils or miscellaneous areas. The soils or miscellaneous areas are called map unit components. The map unit descriptions in this section describe the setting of the map unit or where on the landscape named map unit components can be found. The composition, or the proportion, of various soils or miscellaneous areas of a map unit determine how a map unit is named.

A map unit is identified according to the taxonomic classification of the dominant soils or miscellaneous areas. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, soils and miscellaneous areas are natural phenomena, and they have the characteristic variability of all natural phenomena. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of other taxonomic classes. Consequently, every map unit is made up of the soils or miscellaneous areas for which it is named and some included areas that belong to other taxonomic classes.

Most included soils have properties similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called similar soils. They may or may not be mentioned in the map unit description. Other included soils and miscellaneous areas, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting or dissimilar soils. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. Included soils or miscellaneous areas are mentioned in the map unit descriptions. Soil interpretations in this manuscript are for named map unit components only.

A few included areas may not have been observed, and consequently they are not mentioned in the descriptions, especially where the pattern was so complex that it was impractical to make enough observations to identify all the soils and miscellaneous areas on the landscape.

The presence of included areas in a map unit in no way diminishes the usefulness or accuracy of the data. The objective of mapping is not to delineate pure taxonomic classes but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but if intensive use of small areas is planned, onsite investigation is needed to define and locate the soils and miscellaneous areas.

The map unit descriptions on the following pages give a range in composition for the named map unit components and similar soils. They also give the average component composition of named, similar, and dissimilar soils.

Soils that have profiles that are almost alike make up a soil series. Except for minor differences in texture of the surface layer or underlying layers, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of underlying layers. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into soil phases. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Havrelon fine sandy loam, 0 to 2 percent slopes, is one of the phases of the Havrelon series.

A complex consists of two or more soils or miscellaneous areas in such an intricate pattern or in such small areas that they cannot be shown separately on the maps. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Amor-Arnegard loams, 0 to 3 percent slopes, is an example.

An undifferentiated group is made up of two or more soils that could be mapped individually but are mapped as one unit because similar interpretations can be made for use and management. The pattern and proportion of the soils in the mapped areas are not uniform. An area can be made up of only one of the major soils, or it can be made up of all of them. Straw and Velva soils, channeled, is an undifferentiated group in this survey area.

This survey includes miscellaneous areas. Such areas have little or no soil material and support little or no vegetation. Pits, gravel and sand, is an example. Miscellaneous areas are shown on the soil maps. Some that are too small to be shown are identified by special symbols on the soil maps.

The map unit descriptions on the following pages give information on each named component. Information such as slope, drainage class, and depth to restrictive feature is included. There is also information concerning the management of the map unit.

An identifying symbol precedes the map unit name in each map unit description. This symbol is used to identify delineations on the soil maps.

Table 4, “Acreage and Proportionate Extent of the Soils,” gives the acreage and proportionate extent of each map unit in the survey area. Additional information about each named component and map unit inclusion can be found in “Soil Series and Their Morphology.” Hydric soils information can be found in the section “Hydric Soils.” Table 24, “Hydric Soil List,” indicates the map unit components with hydric conditions. Other tables give properties of the soils and the limitations, capabilities, and potentials for many uses. The “Glossary” defines many of the terms used in describing the soils or miscellaneous areas.

1—Tonka silt loam, 0 to 1 percent slopes

Setting:

Tonka soils occur in shallow depressions on till plains.

Map Unit Composition (percent)

Named Components

Tonka and similar soils: 55 to 95 percent

Average Component Composition

Tonka: 72 percent
Tonka, silty clay loam: 21 percent
Grail: 5 percent
Hamerly: 2 percent

Named Component Description

Tonka

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Poorly drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 13 inches; silt loam
E—13 to 19 inches; loam
Bt—19 to 34 inches; silty clay loam
2BC—34 to 50 inches; clay loam
2Cg—50 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

3—Velva fine sandy loam, 0 to 2 percent slopes

Setting:

Velva soils occur on linear flood plains and on treads on stream terraces. This map unit occurs in river valleys.

Map Unit Composition (percent)

Named Components

Velva and similar soils: 70 to 85 percent

Average Component Composition

Velva: 75 percent
Banks: 9 percent
Korchea: 8 percent
Channel: 5 percent
Breien: 2 percent
Minnewaukan: 1 percent

Named Component Description

Velva

Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: Rare
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; fine sandy loam
AC—6 to 13 inches; fine sandy loam
C—13 to 60 inches; stratified very fine sandy loam to loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, hayland, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

4—Lallie silty clay loam, ponded, 0 to 1 percent slopes

Setting:

Lallie soils occur in oxbows on flood plains in river valleys on uplands.

Map Unit Composition (percent)

Named Components

Lallie and similar soils: 65 to 100 percent

Average Component Composition

Lallie: 94 percent
Havrelon: 3 percent
Mckeen: 3 percent

Named Component Description

Lallie

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Very poorly drained
Flooding: Frequent
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
A—0 to 2 inches; silty clay loam
Cg—2 to 24 inches; silty clay loam
Ab—24 to 32 inches; silty clay
C'g—32 to 60 inches; silty clay

Map Unit Notes: This map unit may rarely flood due to protection by dam and dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

Management

Major uses: Wetland wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

5—Dimmick silty clay, 0 to 1 percent slopes

Setting:

Dimmick soils occur in depressions on uplands.

Map Unit Composition (percent)

Named Components
Dimmick and similar soils: 75 to 100 percent

Average Component Composition
Dimmick: 85 percent
Dimmick, silty clay loam: 8 percent
Heil: 7 percent

Named Component Description

Dimmick
Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Very poorly drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Oe—0 to 3 inches; moderately decomposed plant material
Ag—3 to 23 inches; silty clay
Cg—23 to 63 inches; clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

Management

Major uses: Range, hayland, and wetland wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

6—Heil silt loam, 0 to 1 percent slopes

Setting:

Heil soils occur in depressions on uplands.

Map Unit Composition (percent)

Named Components
Heil and similar soils: 80 to 95 percent

Average Component Composition
Heil: 84 percent
Heil, silty clay: 5 percent
Belfield: 3 percent
Dimmick: 3 percent
Rhoades: 3 percent
Regan: 2 percent

Named Component Description

Heil
Slope: 0 to 1 percent
Depth to Restrictive Feature: Natric; top depth ranges from 1 to 4 inches
Drainage Class: Poorly drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
E—0 to 3 inches; silt loam
Btn—3 to 24 inches; silty clay
Bg—24 to 38 inches; silty clay
Byg—38 to 52 inches; silty clay
Cg—52 to 60 inches; silty clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range, pasture, hay, and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

7—Korell loam, 0 to 2 percent slopes

Setting:

Korell soils occur on linear flood plains in river valleys (fig. 11).

Map Unit Composition (percent)

Named Components
Korell and similar soils: 65 to 85 percent

Average Component Composition
Korell: 75 percent
Straw: 7 percent
Channel: 5 percent
Velva, very fine sandy loam: 4 percent
Velva, loam: 4 percent
Daglum: 2 percent
Havrelon: 2 percent
Magnus: 1 percent

Named Component Description

Korell
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained

Figure 11. Typical area of Korell loam on a flood plain. Some areas are scarred by abandoned stream channels.

Flooding: Rare
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 8 inches; loam
Ap—0 to 8 inches; silt loam
Bw—8 to 15 inches; loam
Bk—15 to 48 inches; loam
C—48 to 60 inches; stratified fine sandy loam to clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

8—Straw loam, 0 to 2 percent slopes

Setting:

Straw soils occur on linear flood plains in river valleys on uplands.

Map Unit Composition (percent)

Named Components
Straw and similar soils: 65 to 80 percent

Average Component Composition
Straw: 67 percent
Korell: 12 percent
Velva: 8 percent
Channel: 5 percent
Arnegard: 4 percent
Havrelon, fine sandy loam: 3 percent
Belfield: 1 percent

Named Component Description

Straw
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: Rare
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
Ap—0 to 5 inches; loam
A1—5 to 23 inches; loam
A2—23 to 30 inches; loam
C—30 to 36 inches; clay loam
Ab—36 to 40 inches; clay loam
C'—40 to 66 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

9—Straw and Velva soils, channeled, 0 to 2 percent slopes

Setting:

Channeled Straw soils occur on flood plains. Channeled Velva soils occur on linear convex flood plains and on linear treads on stream terraces. This map unit occurs in river valleys on uplands.

Map Unit Composition (percent)

Named Components
Channel and similar soils: 10 to 70 percent
Straw and similar soils: 0 to 50 percent
Velva and similar soils: 0 to 50 percent

Average Component Composition
Channel: 40 percent
Straw: 27 percent
Velva: 18 percent
Korell: 6 percent
Belfield: 4 percent
Lallie, frequently flooded: 3 percent
Regan, frequently flooded: 2 percent

Named Component Description

Channel
Slope: 3 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: —-
Flooding: Frequent
Water Table: Seasonal
Ponding: None

Salt Affected: Not affected
Sodium Affected: Not affected

Straw
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: Frequent
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 5 inches; loam
A1—5 to 23 inches; loam
A2—23 to 30 inches; loam
C—30 to 36 inches; clay loam
Ab—36 to 40 inches; clay loam
C'—40 to 66 inches; clay loam

Velva
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: Frequent
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; fine sandy loam
AC—6 to 13 inches; fine sandy loam
C—13 to 60 inches; stratified fine sandy loam to very fine sandy loam to loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

Management

Major uses: Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

10—Arnegard loam, 0 to 2 percent slopes

Setting:

Arnegard soils occur on alluvial flats and in swales on uplands.

Map Unit Composition (percent)

Named Components
Arnegard and similar soils: 55 to 70 percent

Average Component Composition

Arnegard: 68 percent
Farnuf: 10 percent
Parshall: 7 percent
Belfield: 4 percent
Grail: 4 percent
Stady: 3 percent
Amor: 2 percent
Savage: 2 percent

Named Component Description

Arnegard

Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 13 inches; loam
Bw—13 to 36 inches; loam
Bk—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

10B—Arnegard loam, 2 to 6 percent slopes

Setting:

Arnegard soils occur in swales on uplands.

Map Unit Composition (percent)

Named Components

Arnegard and similar soils: 55 to 85 percent

Average Component Composition

Arnegard: 76 percent
Grail: 6 percent
Shambo: 6 percent
Belfield: 4 percent
Parshall: 4 percent

Amor: 2 percent
Wabek: 2 percent

Named Component Description

Arnegard
Slope: 2 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 13 inches; loam
Bw—13 to 36 inches; loam
Bk—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

11—Amor-Arnegard loams, 0 to 3 percent slopes

Setting:

Amor soils occur on convex rises. Arnegard soils occur on alluvial flats and in concave swales. This map unit occurs on uplands.

Map Unit Composition (percent)

Named Components
Amor and similar soils: 50 to 70 percent
Arnegard and similar soils: 10 to 20 percent

Average Component Composition
Amor: 58 percent
Reeder: 14 percent
Arnegard: 10 percent
Farnuf: 6 percent
Daglum: 3 percent
Stady: 3 percent
Vebar: 3 percent
Parshall: 2 percent
Cabba: 1 percent

Named Component Description

Amor

Slope: 0 to 3 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 8 inches; loam
Bw—8 to 19 inches; loam
Bk—19 to 31 inches; loam
Cr—31 to 60 inches; bedrock

Arnegard

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 13 inches; loam
Bw—13 to 36 inches; loam
Bk—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Eng,ineering and Soil Properties.

11B—Amor-Shambo loams, 3 to 6 percent slopes

Setting:

Amor soils occur on convex rises. Shambo soils occur on linear footslopes and toeslopes. This map unit occurs on uplands.

Map Unit Composition (percent)

Named Components

Amor and similar soils: 65 to 80 percent
Shambo and similar soils: 10 to 20 percent

Average Component Composition

Amor: 67 percent
Shambo: 15 percent
Morton: 7 percent
Chama: 4 percent
Cabba: 3 percent
Arnegard: 2 percent
Vebar: 2 percent

Named Component Description

Amor

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 8 inches; loam
Bw—8 to 19 inches; loam
Bk—19 to 31 inches; loam
Cr—31 to 60 inches; bedrock

Shambo

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 9 inches; loam
Bw1—9 to 13 inches; loam
Bw2—13 to 29 inches; loam
Bk—29 to 48 inches; loam
C—48 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

12C—Amor-Cabba loams, 6 to 9 percent slopes

Setting:

Amor soils occur on convex backslopes. Cabba soils occur on convex shoulders. This map unit occurs on hills and ridges on uplands.

Map Unit Composition (percent)

Named Components

Amor and similar soils: 30 to 45 percent
Cabba and similar soils: 25 to 35 percent

Average Component Composition

Amor: 39 percent
Cabba: 29 percent
Amor, gently sloping: 10 percent
Shambo: 9 percent
Chama: 5 percent
Cohagen: 3 percent
Regent: 3 percent
Savage: 2 percent

Named Component Description

Amor

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 8 inches; loam
Bw—8 to 19 inches; loam
Bk—19 to 31 inches; loam
Cr—31 to 60 inches; bedrock

Cabba

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
A—0 to 3 inches; loam
Bk—3 to 15 inches; loam
Cr—15 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, and hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

13D—Amor-Cabba loams, 9 to 15 percent slopes

Setting:

Amor soils occur on convex backslopes. Cabba soils occur on convex shoulders. This map unit occurs on hills and ridges on uplands.

Map Unit Composition (percent)

Named Components
Amor and similar soils: 35 to 45 percent
Cabba and similar soils: 20 to 30 percent

Average Component Composition
Amor: 42 percent
Cabba: 29 percent
Amor, moderately sloping: 5 percent
Shambo: 5 percent
Chama: 4 percent
Cohagen: 4 percent
Vebar: 3 percent
Arnegard: 2 percent
Dogtooth: 2 percent
Regent: 2 percent
Savage: 2 percent

Named Component Description

Amor
Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected

Sodium Affected: Not affected
Typical profile:
Ap—0 to 8 inches; loam
Bw—8 to 19 inches; loam
Bk—19 to 31 inches; loam
Cr—31 to 60 inches; bedrock

Cabba
Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; loam
Bk—3 to 15 inches; loam
Cr—15 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, hayland, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

15B—Chama-Cabba silt loams, 3 to 6 percent slopes

Setting:

Chama soils occur on convex backslopes. Cabba soils occur on convex shoulders. This map unit occurs on rises on uplands.

Map Unit Composition (percent)

Named Components
Chama and similar soils: 25 to 65 percent
Cabba and similar soils: 10 to 45 percent

Average Component Composition
Chama: 47 percent
Cabba: 28 percent
Sen: 12 percent
Farland: 7 percent
Cohagen: 2 percent
Grassna: 2 percent
Wayden: 2 percent

Named Component Description

Chama

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silt loam
Bw—4 to 8 inches; silt loam
Bk—8 to 34 inches; silt loam
Cr—34 to 60 inches; bedrock

Cabba

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; silt loam
Bk—3 to 15 inches; silt loam
Cr—15 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

15C—Chama-Cabba-Sen silt loams, 6 to 9 percent slopes

Setting:

Chama soils occur on convex backslopes. Cabba soils occur on shoulders. Sen soils occur on linear backslopes. This map units occur on hills on uplands.

Map Unit Composition (percent)

Named Components

Chama and similar soils: 35 to 45 percent
Cabba and similar soils: 20 to 30 percent
Sen and similar soils: 10 to 20 percent

Average Component Composition

Chama: 40 percent
Cabba: 28 percent
Sen: 17 percent
Cohagen: 4 percent
Chama, gently sloping: 3 percent
Golva: 3 percent
Grail: 3 percent
Janesburg: 1 percent
Vebar: 1 percent

Named Component Description

Chama

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silt loam
Bw—4 to 8 inches; silt loam
Bk—8 to 34 inches; silt loam
Cr—34 to 60 inches; bedrock

Cabba

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; silt loam
Bk—3 to 15 inches; silt loam
Cr—15 to 60 inches; bedrock

Sen

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches

Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; silt loam
Bw—6 to 17 inches; silt loam
Bk—17 to 34 inches; silt loam
Cr—34 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, or hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

15D—Cabba-Chama-Sen silt loams, 9 to 15 percent slopes

Setting:

Cabba soils occur on shoulders. Chama soils occur on convex backslopes. Sen soils occur on linear footslopes. This map unit occurs on hills and ridges on uplands.

Map Unit Composition (percent)

Named Components
Cabba and similar soils: 30 to 45 percent
Chama and similar soils: 20 to 35 percent
Sen and similar soils: 10 to 20 percent

Average Component Composition
Cabba: 38 percent
Chama: 26 percent
Sen: 16 percent
Vebar: 5 percent
Arnegard: 4 percent
Cabba, gently sloping: 4 percent
Janesburg: 3 percent
Golva: 2 percent
Maschetah: 2 percent

Named Component Description

Cabba
Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches

Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; silt loam
Bk—3 to 15 inches; silt loam
Cr—15 to 60 inches; bedrock

Chama
Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silt loam
Bw—4 to 8 inches; silt loam
Bk—8 to 34 inches; silt loam
Cr—34 to 60 inches; bedrock

Sen
Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; silt loam
Bw—6 to 17 inches; silt loam
Bk—17 to 34 inches; silt loam
Cr—34 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, hayland, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

15F—Cabba-Chama-Arnegard complex, 15 to 70 percent slopes

Setting:

Cabba soils occur on shoulders. Chama soils occur on convex backslopes. Arnegard soils occur on toeslopes. These soils are on ridges on uplands.

Map Unit Composition (percent)

Named Components

Cabba and similar soils: 30 to 55 percent
Chama and similar soils: 10 to 30 percent
Arnegard and similar soils: 5 to 20 percent

Average Component Composition

Cabba: 40 percent
Chama: 22 percent
Arnegard: 10 percent
Amor: 8 percent
Regent: 7 percent
Arnegard, moderately steep: 5 percent
Flasher: 3 percent
Wayden: 3 percent
Janesburg: 2 percent

Named Component Description

Cabba

Slope: 15 to 70 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; silt loam
Bk—3 to 15 inches; silt loam
Cr—15 to 60 inches; bedrock

Chama

Slope: 15 to 35 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
A—0 to 4 inches; silt loam
Bw—4 to 8 inches; silt loam
Bk—8 to 34 inches; silt loam
Cr—34 to 60 inches; bedrock

Arnegard
Slope: 3 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 13 inches; loam
Bw—13 to 36 inches; loam
Bk—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range or wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

16D—Ringling-Daglum loams, 6 to 15 percent slopes

Setting:

Ringling soils occur on summits and convex shoulders. Daglum soils occur on backslopes and footslopes. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components
Ringling and similar soils: 25 to 45 percent
Daglum and similar soils: 10 to 25 percent

Average Component Composition
Ringling: 32 percent
Daglum: 15 percent
Searing: 12 percent
Brandenburg: 11 percent
Janesburg: 9 percent
Amor: 6 percent
Regent: 6 percent
Dogtooth: 5 percent
Cabba: 4 percent

Named Component Description

Ringling

Slope: 6 to 15 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 5 to 20 inches
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; loam
Bw—5 to 17 inches; very channery loam
2Ck—17 to 42 inches; fragmental material
2C—42 to 60 inches; fragmental material

Daglum

Slope: 6 to 15 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
Ap—0 to 7 inches; loam
E—7 to 8 inches; silt loam
Btn—8 to 18 inches; clay
Bky—18 to 32 inches; clay loam
C—32 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range or pasture

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

16F—Brandenburg-Cabba-Savage complex, 6 to 70 percent slopes

Setting:

Brandenburg soils occur on summits and shoulders. Cabba soils occur on shoulders and convex backslopes. Savage soils occur on concave footslopes. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components

Brandenburg and similar soils: 20 to 35 percent
Cabba and similar soils: 10 to 25 percent
Savage and similar soils: 5 to 20 percent

Average Component Composition

Brandenburg: 26 percent
Cabba: 20 percent
Savage: 13 percent
Ringling: 11 percent
Searing: 10 percent
Amor: 8 percent
Dogtooth: 5 percent
Chama: 3 percent
Rock outcrop: 2 percent
Wayden: 2 percent

Named Component Description

Brandenburg

Slope: 6 to 70 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 0 to 20 inches
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; channery loam
C1—4 to 10 inches; very channery loam
C2—10 to 60 inches; fragmental material

Cabba

Slope: 9 to 70 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; loam
Bk—3 to 15 inches; loam
Cr—15 to 60 inches; bedrock

Savage

Slope: 6 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained

Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 7 inches; silty clay loam
Bt—7 to 25 inches; silty clay
Bk—25 to 51 inches; silty clay
C—51 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range or pasture

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

17B—Sen-Chama silt loams, 3 to 6 percent slopes

Setting:

Sen soils occur on convex backslopes. Chama soils occur on convex shoulders. This map unit occurs on rises on uplands.

Map Unit Composition (percent)

Named Components
Sen and similar soils: 40 to 70 percent
Chama and similar soils: 15 to 40 percent

Average Component Composition
Sen: 47 percent
Chama: 22 percent
Amor: 12 percent
Cabba: 8 percent
Farland: 6 percent
Grassna: 3 percent
Moreau: 2 percent

Named Component Description

Sen
Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected

Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; silt loam
Bw—6 to 17 inches; silt loam
Bk—17 to 34 inches; silt loam
Cr—34 to 60 inches; bedrock

Chama
Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silt loam
Bw—4 to 8 inches; silt loam
Bk—8 to 34 inches; silt loam
Cr—34 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

18B—Reeder-Farnuf loams, 3 to 6 percent slopes

Setting:

Reeder soils occur on convex linear backslopes. Farnuf soils occur on linear footslopes. This map unit occurs on rises on uplands.

Map Unit Composition (percent)

Named Components
Reeder and similar soils: 35 to 55 percent
Farnuf and similar soils: 10 to 25 percent

Average Component Composition
Reeder: 49 percent
Farnuf: 16 percent
Amor: 14 percent
Arnegard: 5 percent
Daglum: 4 percent
Regent: 4 percent
Savage: 4 percent

Cabba: 2 percent
Vebar: 2 percent

Named Component Description

Reeder

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 8 inches; loam
Bt—8 to 17 inches; clay loam
Bk—17 to 36 inches; loam
Cr—36 to 60 inches; bedrock

Farnuf

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 9 inches; loam
Bt—9 to 23 inches; clay loam
Bk—23 to 34 inches; loam
BC—34 to 60 inches; stratified fine sandy loam to silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

19—Farland silt loam, 0 to 2 percent slopes

Setting:

Farland soils occur on treads of terraces and on flats on uplands.

Map Unit Composition (percent)

Named Components
Farland and similar soils: 35 to 65 percent

Average Component Composition
Farland: 44 percent
Farnuf: 27 percent
Golva: 11 percent
Grail: 11 percent
Belfield: 3 percent
Chama: 2 percent
Sen: 2 percent

Named Component Description

Farland
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silt loam
Bt—4 to 18 inches; silty clay loam
Bk—18 to 34 inches; silt loam
C—34 to 60 inches; stratified loam to silt loam to silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

19B—Farland silt loam, 2 to 6 percent slopes

Setting:

Farland soils occur on linear alluvial fans on uplands.

Map Unit Composition (percent)

Named Components
Farland and similar soils: 50 to 80 percent

Average Component Composition
- Farland: 62 percent
- Farnuf: 14 percent
- Grassna: 10 percent
- Morton: 8 percent
- Grail: 5 percent
- Chama: 1 percent

Named Component Description

Farland
- Slope: 2 to 6 percent
- Depth to Restrictive Feature: None noted
- Drainage Class: Well drained
- Flooding: None
- Water Table: None
- Ponding: None
- Salt Affected: Not affected
- Sodium Affected: Not affected

Typical profile:
- A—0 to 4 inches; silt loam
- Bt—4 to 18 inches; silty clay loam
- Bk—18 to 34 inches; silt loam
- C—34 to 60 inches; stratified loam to silt loam to silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

19C—Farland silt loam, 6 to 9 percent slopes

Setting:

Farland soils occur on linear footslopes on hills on uplands.

Map Unit Composition (percent)

Named Components
- Farland and similar soils: 25 to 55 percent

Average Component Composition
- Farland: 35 percent
- Golva: 15 percent
- Farland, strongly sloping: 13 percent
- Farland, gently sloping: 10 percent
- Grail: 10 percent
- Farnuf: 9 percent

Morton: 5 percent
Daglum: 3 percent

Named Component Description

Farland
Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silt loam
Bt—4 to 18 inches; silty clay loam
Bk—18 to 34 inches; silt loam
C—34 to 60 inches; stratified loam to silt loam to silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

19D—Farland silt loam, 9 to 15 percent slopes

Setting:

Farland soils occur on concave footslopes of hills on uplands.

Map Unit Composition (percent)

Named Components
Farland and similar soils: 20 to 60 percent

Average Component Composition
Farland: 32 percent
Farnuf: 19 percent
Farland, moderately steep: 17 percent
Shambo: 9 percent
Tally: 6 percent
Grail: 5 percent
Savage: 4 percent
Amor: 3 percent
Daglum: 3 percent
Belfield: 2 percent

Named Component Description

Farland

Slope: 9 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silt loam
Bt—4 to 18 inches; silty clay loam
Bk—18 to 34 inches; silt loam
C—34 to 60 inches; stratified loam to silt loam to silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Hay, pasture, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

20—Shambo loam, 0 to 2 percent slopes

Setting:

Shambo soils occur on terraces or alluvial flats on uplands.

Map Unit Composition (percent)

Named Components

Shambo and similar soils: 40 to 55 percent

Average Component Composition

Shambo: 48 percent
Shambo, gravelly substratum: 20 percent
Arnegard: 10 percent
Farnuf: 8 percent
Stady: 5 percent
Amor: 4 percent
Parshall: 3 percent
Tally: 2 percent

Named Component Description

Shambo

Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained

Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 9 inches; loam
Bw1—9 to 13 inches; loam
Bw2—13 to 29 inches; loam
Bk—29 to 48 inches; loam
C—48 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

20B—Shambo loam, 2 to 6 percent slopes

Setting:

Shambo soils occur on linear alluvial fans and terraces on uplands.

Map Unit Composition (percent)

Named Components
Shambo and similar soils: 50 to 70 percent

Average Component Composition
Shambo: 59 percent
Arnegard: 15 percent
Farnuf: 9 percent
Shambo, gravelly substratum: 7 percent
Stady: 4 percent
Amor: 2 percent
Arnegard, level: 2 percent
Parshall: 2 percent

Named Component Description

Shambo
Slope: 2 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
A—0 to 9 inches; loam
Bw1—9 to 13 inches; loam
Bw2—13 to 29 inches; loam
Bk—29 to 48 inches; loam
C—48 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

21B—Morton-Farland silt loams, 3 to 6 percent slopes

Setting:

Morton soils occur on convex backslopes. Farland soils occur on linear footslopes. This map unit occurs rises on uplands.

Map Unit Composition (percent)

Named Components
Morton and similar soils: 40 to 70 percent
Farland and similar soils: 10 to 40 percent

Average Component Composition
Morton: 58 percent
Farland: 19 percent
Sen: 8 percent
Belfield: 4 percent
Cedarpan: 4 percent
Chama: 4 percent
Cabba: 1 percent
Heil: 1 percent
Ringling: 1 percent

Named Component Description

Morton
Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
A—0 to 5 inches; silt loam
Bt—5 to 15 inches; silty clay loam
Bk—15 to 33 inches; loam
Cr—33 to 60 inches; bedrock

Farland
Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silt loam
Bt—4 to 18 inches; silty clay loam
Bk—18 to 34 inches; silt loam
C—34 to 60 inches; stratified loam to silt loam to silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

22F—Cabba-Rock outcrop-Chama complex, 15 to 70 percent slopes

Setting:

Cabba soils occur on summits and shoulders. Rock outcrop occurs on summits and shoulders. Chama soils occur on convex backslopes. This map unit occurs on hills, buttes, and escarpments on uplands.

Map Unit Composition (percent)

Named Components
Cabba and similar soils: 25 to 60 percent
Rock outcrop and similar soils: 10 to 40 percent
Chama and similar soils: 5 to 30 percent

Average Component Composition
Cabba: 41 percent
Rock outcrop: 28 percent
Chama: 13 percent
Cohagen: 10 percent
Amor: 2 percent

Dogtooth: 2 percent
Savage: 2 percent
Wayden: 2 percent

Named Component Description

Cabba

Slope: 15 to 70 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; silt loam
Bk—3 to 15 inches; silt loam
Cr—15 to 60 inches; bedrock

Rock outcrop

Slope: 9 to 99 percent
Depth to Restrictive Feature: Bedrock (lithic); top depth ranges from 0 to 1 inches
Drainage Class: —-
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Chama

Slope: 15 to 35 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silt loam
Bw—4 to 8 inches; silt loam
Bk—8 to 34 inches; silt loam
Cr—34 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

23C—Morton-Cabba silt loams, 3 to 9 percent slopes

Setting:

The Morton soils occurs on convex backslopes. The Cabba soils occurs on convex shoulders. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components

Morton and similar soils: 30 to 60 percent
Cabba and similar soils: 5 to 25 percent

Average Component Composition

Morton: 40 percent
Morton, gently sloping: 25 percent
Cabba: 10 percent
Chama: 9 percent
Reeder: 6 percent
Farland: 5 percent
Grail: 4 percent
Regan: 1 percent

Named Component Description

Morton

Slope: 3 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; silt loam
Bt—5 to 15 inches; silty clay loam
Bk—15 to 33 inches; loam
Cr—33 to 60 inches; bedrock

Cabba

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
A—0 to 3 inches; silt loam
Bk—3 to 15 inches; silt loam
Cr—15 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

26—Grail silty clay loam, 0 to 2 percent slopes

Setting:

Grail soils occur on alluvial flats on uplands.

Map Unit Composition (percent)

Named Components
Grail and similar soils: 35 to 60 percent

Average Component Composition
Grail: 49 percent
Grail, silt loam: 20 percent
Belfield: 10 percent
Lawther: 7 percent
Savage: 7 percent
Farland: 5 percent
Regent: 2 percent

Named Component Description

Grail
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 10 inches; silty clay loam
Bt—10 to 24 inches; silty clay
Bk—24 to 52 inches; silty clay loam
C—52 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

27—Belfield-Grail silty clay loams, 0 to 2 percent slopes

Setting:

Belfield and Grail soils occur on alluvial flats on uplands.

Map Unit Composition (percent)

Named Components
Belfield and similar soils: 45 to 60 percent
Grail and similar soils: 25 to 35 percent

Average Component Composition
Belfield: 49 percent
Grail: 26 percent
Savage: 7 percent
Daglum: 6 percent
Farnuf: 4 percent
Arnegard: 2 percent
Lawther: 2 percent
Regent: 2 percent
Straw: 2 percent

Named Component Description

Belfield
Slope: 0 to 2 percent
Depth to Restrictive Feature: None
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 9 inches; silty clay loam
E/B—9 to 12 inches; silty clay loam
Btn1—12 to 17 inches; silty clay
Btn2—17 to 24 inches; silty clay loam
Bk—24 to 43 inches; silty clay loam
C—43 to 60 inches; clay loam

Grail
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained

Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 10 inches; silty clay loam
Bt—10 to 24 inches; silty clay
Bk—24 to 52 inches; silty clay loam
C—52 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soilreaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

27B—Grail-Belfield silty clay loams, 2 to 6 percent slopes

Setting:

The Grail and Belfield soils occur on terraces and alluvial fans on uplands.

Map Unit Composition (percent)

Named Components
Belfield and similar soils: 25 to 45 percent
Grail and similar soils: 25 to 45 percent

Average Component Composition
Belfield: 33 percent
Grail: 33 percent
Savage: 11 percent
Farnuf: 10 percent
Daglum: 8 percent
Regent: 3 percent
Belfield, fine sandy loam: 2 percent

Named Component Description

Belfield
Slope: 2 to 6 percent
Depth to Restrictive Feature: None
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches

Typical profile:
A—0 to 9 inches; silty clay loam
E/B—9 to 12 inches; silty clay loam
Btn1—12 to 17 inches; silty clay
Btn2—17 to 24 inches; silty clay loam
Bk—24 to 43 inches; silty clay loam
C—43 to 60 inches; clay loam

Grail
Slope: 2 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 10 inches; silty clay loam
Bt—10 to 24 inches; silty clay
Bk—24 to 52 inches; silty clay loam
C—52 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

28—Belfield-Daglum silt loams, 0 to 2 percent slopes

Setting:

Belfield soils occur on micro-highs. Daglum soils occur in micro-lows. This map unit occurs on terraces and alluvial flats on uplands.

Map Unit Composition (percent)

Named Components
Belfield and similar soils: 35 to 55 percent
Daglum and similar soils: 20 to 45 percent

Average Component Composition
Belfield: 45 percent
Daglum: 32 percent
Daglum, silty clay: 8 percent
Grail: 5 percent
Savage: 5 percent
Rhoades: 3 percent
Regent: 2 percent

Named Component Description

Belfield

Slope: 0 to 2 percent
Depth to Restrictive Feature: None
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 9 inches; silt loam
E/B—9 to 12 inches; silty clay loam
Btn1—12 to 17 inches; silty clay
Btn2—17 to 24 inches; silty clay loam
Bk—24 to 43 inches; silty clay loam
C—43 to 60 inches; clay loam

Daglum

Slope: 0 to 2 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
Ap—0 to 7 inches; silt loam
E—7 to 8 inches; silt loam
Btn—8 to 18 inches; clay
Bky—18 to 32 inches; clay loam
C—32 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

28B—Belfield-Daglum silt loams, 2 to 6 percent slopes

Setting:

Belfield soils occur on micro-highs. Daglum soils occur in micro-lows. This map unit occurs on alluvial fans on uplands.

Map Unit Composition (percent)

Named Components

Belfield and similar soils: 30 to 55 percent
Daglum and similar soils: 25 to 45 percent

Average Component Composition

Belfield: 43 percent
Daglum: 35 percent
Farland: 7 percent
Grail: 6 percent
Rhoades: 5 percent
Reeder: 3 percent
Slickspots: 1 percent

Named Component Description

Belfield

Slope: 2 to 6 percent
Depth to Restrictive Feature: None
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 9 inches; silt loam
E/B—9 to 12 inches; silty clay loam
Btn1—12 to 17 inches; silty clay
Btn2—17 to 24 inches; silty clay loam
Bk—24 to 43 inches; silty clay loam
C—43 to 60 inches; clay loam

Daglum

Slope: 2 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
Ap—0 to 7 inches; silt loam
E—7 to 8 inches; silt loam
Btn—8 to 18 inches; clay
Bky—18 to 32 inches; clay loam
C—32 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

29—Savage silty clay loam, 0 to 2 percent slopes

Setting:

Savage soils occur on alluvial flats on uplands. (fig. 12)

Map Unit Composition (percent)

Named Components
Savage and similar soils: 55 to 70 percent

Average Component Composition
Savage: 61 percent
Grail: 17 percent
Belfield: 8 percent
Farnuf: 5 percent
Regent: 3 percent
Daglum: 2 percent
Lawther: 2 percent
Parshall: 2 percent

Figure 12. Typical area of Savage silty clay loam. Returning crop residue to the soil increases the rate of water infiltration and maintains tilth.

Named Component Description

Savage

Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 7 inches; silty clay loam
Bt—7 to 25 inches; silty clay
Bk—25 to 51 inches; silty clay
C—51 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

29B—Savage silty clay loam, 2 to 6 percent slopes

Setting:

Savage soils occur on linear footslopes on alluvial fans on uplands.

Map Unit Composition (percent)

Named Components

Savage and similar soils: 55 to 70 percent

Average Component Composition

Savage: 67 percent
Grail: 11 percent
Farland: 7 percent
Regent: 4 percent
Shambo: 4 percent
Daglum: 3 percent
Amor: 2 percent
Stady: 2 percent

Named Component Description

Savage

Slope: 2 to 6 percent
Depth to Restrictive Feature: None noted

Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 7 inches; silty clay loam
Bt—7 to 25 inches; silty clay
Bk—25 to 51 inches; silty clay
C—51 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

29C—Savage silty clay loam, 6 to 9 percent slopes

Setting:

Savage soils occur on concave linear footslopes along ridges on uplands.

Map Unit Composition (percent)

Named Components
Savage and similar soils: 45 to 75 percent

Average Component Composition
Savage: 58 percent
Savage, gently sloping: 8 percent
Farnuf: 7 percent
Daglum: 6 percent
Regent: 6 percent
Farland: 5 percent
Reeder: 5 percent
Grail: 3 percent
Maschetah: 2 percent

Named Component Description

Savage
Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None

Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 7 inches; silty clay loam
Bt—7 to 25 inches; silty clay
Bk—25 to 51 inches; silty clay
C—51 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

30—Regent-Savage silty clay loams, 0 to 3 percent slopes

Setting:

Regent soils occur on slight rises on flats. Savage soils occur on flats. This map unit occurs on uplands.

Map Unit Composition (percent)

Named Components
Regent and similar soils: 55 to 80 percent
Savage and similar soils: 10 to 30 percent

Average Component Composition
Regent: 63 percent
Savage: 16 percent
Reeder: 7 percent
Grail: 5 percent
Moreau: 4 percent
Belfield: 3 percent
Janesburg: 2 percent

Named Component Description

Regent
Slope: 0 to 3 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
A—0 to 10 inches; silty clay loam
Bt—10 to 26 inches; silty clay
Bk—26 to 39 inches; silty clay loam
Cr—39 to 60 inches; bedrock

Savage
Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 7 inches; silty clay loam
Bt—7 to 25 inches; silty clay
Bk—25 to 51 inches; silty clay
C—51 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

30B—Regent-Savage silty clay loams, 3 to 6 percent slopes

Setting:

Regent soils occur on convex backslopes. Savage soils occur on concave footslopes. This map unit occurs on rises on uplands.

Map Unit Composition (percent)

Named Components
Regent and similar soils: 60 to 75 percent
Savage and similar soils: 10 to 20 percent

Average Component Composition

Regent: 71 percent
Savage: 15 percent
Moreau: 6 percent
Cabba: 2 percent
Chama: 2 percent
Daglum: 2 percent
Wayden: 2 percent

Named Component Description

Regent

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 10 inches; silty clay loam
Bt—10 to 26 inches; silty clay
Bk—26 to 39 inches; silty clay loam
Cr—39 to 60 inches; bedrock

Savage

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 7 inches; silty clay loam
Bt—7 to 25 inches; silty clay
Bk—25 to 51 inches; silty clay
C—51 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

30C—Regent-Savage silty clay loams, 6 to 9 percent slopes

Setting:

Regent soils occur on convex linear backslopes. Savage soils occur on concave linear footslopes. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components

Regent and similar soils: 35 to 60 percent
Savage and similar soils: 10 to 25 percent

Average Component Composition

Regent: 49 percent
Reeder: 15 percent
Savage: 15 percent
Cabba: 6 percent
Farnuf: 5 percent
Grail: 3 percent
Moreau: 3 percent
Chama: 2 percent
Janesburg: 2 percent

Named Component Description

Regent

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 10 inches; silty clay loam
Bt—10 to 26 inches; silty clay
Bk—26 to 39 inches; silty clay loam
Cr—39 to 60 inches; bedrock

Savage

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 7 inches; silty clay loam
Bt—7 to 25 inches; silty clay
Bk—25 to 51 inches; silty clay
C—51 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

31B—Regent-Janesburg complex, 0 to 6 percent slopes

Setting:

Regent soils occur on convex backslopes. Janesburg soils occur on linear backslopes and footslopes. This map unit occurs on rises on uplands.

Map Unit Composition (percent)

Named Components
Regent and similar soils: 35 to 50 percent
Janesburg and similar soils: 20 to 35 percent

Average Component Composition
Regent: 38 percent
Janesburg: 28 percent
Belfield: 9 percent
Reeder: 9 percent
Dogtooth: 7 percent
Moreau: 4 percent
Savage: 4 percent
Chama: 1 percent

Named Component Description

Regent
Slope: 0 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 10 inches; silty clay loam
Bt—10 to 26 inches; silty clay
Bk—26 to 39 inches; silty clay loam
Cr—39 to 60 inches; bedrock

Janesburg
Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 2 to 13 inches
Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None

Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 8 inches; silt loam
E—8 to 10 inches; silt loam
Btn—10 to 21 inches; silty clay
BCk—21 to 26 inches; silt loam
Cr—26 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

31C—Regent-Janesburg complex, 6 to 9 percent slopes

Setting:

Regent soils occur on convex linear. Janesburg soils occur on linear backslopes and footslopes. This map unit occurs on hills on uplands.

Map Unit Composition (percent)

Named Components
Regent and similar soils: 25 to 35 percent
Janesburg and similar soils: 25 to 35 percent

Average Component Composition
Regent: 32 percent
Janesburg: 31 percent
Regent, gently sloping: 12 percent
Belfield: 6 percent
Dogtooth: 6 percent
Moreau: 4 percent
Savage: 4 percent
Wayden: 3 percent
Chama: 2 percent

Named Component Description

Regent
Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None

Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 10 inches; silty clay loam
Bt—10 to 26 inches; silty clay
Bk—26 to 39 inches; silty clay loam
Cr—39 to 60 inches; bedrock

Janesburg
Slope: 6 to 9 percent
Depth to Restrictive Feature: Natric; top depth ranges from 2 to 13 inches
Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 8 inches; silt loam
E—8 to 10 inches; silt loam
Btn—10 to 21 inches; silty clay
BCk—21 to 26 inches; silt loam
Cr—26 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

35B—Moreau silty clay, 0 to 6 percent slopes

Setting:

Moreau soils occur on convex rises on uplands.

Map Unit Composition (percent)

Named Components
Moreau and similar soils: 35 to 60 percent

Average Component Composition
Moreau: 46 percent
Moreau, silty clay loam: 18 percent
Wayden: 9 percent
Savage: 8 percent
Regent: 7 percent
Lawther: 6 percent

Janesburg: 4 percent
Chama: 2 percent

Named Component Description

Moreau

Slope: 0 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; silty clay
Bw—6 to 13 inches; silty clay
Bk—13 to 35 inches; silty clay
Cr—35 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

35C—Moreau-Wayden silty clays, 6 to 9 percent slopes

Setting:

Moreau soils occur on convex backslopes. Wayden soils occur on convex shoulders. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components

Moreau and similar soils: 30 to 60 percent
Wayden and similar soils: 10 to 40 percent

Average Component Composition

Moreau: 46 percent
Wayden: 17 percent
Lawther: 9 percent
Regent: 9 percent
Janesburg: 6 percent
Moreau, strongly sloping: 5 percent
Cabba: 3 percent

Savage: 3 percent
Dogtooth: 2 percent

Named Component Description

Moreau

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; silty clay
Bw—6 to 13 inches; silty clay
Bk—13 to 35 inches; silty clay
Cr—35 to 60 inches; bedrock

Wayden

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; silty clay
C—3 to 15 inches; silty clay
Cr—15 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

35D—Moreau-Wayden silty clays, 9 to 15 percent slopes

Setting:

Moreau soils occur on convex backslopes. Wayden soils occur on convex shoulders. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components

Moreau and similar soils: 25 to 60 percent
Wayden and similar soils: 15 to 45 percent

Average Component Composition

Moreau: 42 percent
Wayden: 22 percent
Regent: 10 percent
Janesburg: 8 percent
Cabba: 7 percent
Farland: 3 percent
Lawther: 3 percent
Wabek: 3 percent
Reeder: 2 percent

Named Component Description

Moreau

Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; silty clay
Bw—6 to 13 inches; silty clay
Bk—13 to 35 inches; silty clay
Cr—35 to 60 inches; bedrock

Wayden

Slope: 9 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; silty clay
C—3 to 15 inches; silty clay
Cr—15 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range or pasture

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

36—Lawther silty clay, 0 to 2 percent slopes

Setting:

Lawther soils occur on alluvial flats and terraces on uplands.

Map Unit Composition (percent)

Named Components
Lawther and similar soils: 65 to 80 percent

Average Component Composition
Lawther: 77 percent
Savage: 11 percent
Belfield: 4 percent
Moreau: 4 percent
Daglum: 3 percent
Cabba: 1 percent

Named Component Description

Lawther
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 10 inches; silty clay
Bss—10 to 33 inches; silty clay
Bk—33 to 47 inches; silty clay
C—47 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

38B—Searing-Ringling loams, 0 to 6 percent slopes

Setting:

Searing soils occur on concave linear backslopes and footslopes. Ringling soils occur on shoulders. This map unit occurs on rises on uplands.

Map Unit Composition (percent)

Named Components
- Searing and similar soils: 45 to 70 percent
- Ringling and similar soils: 15 to 35 percent

Average Component Composition
- Searing: 60 percent
- Ringling: 19 percent
- Farnuf: 7 percent
- Belfield: 5 percent
- Amor: 3 percent
- Brandenburg: 2 percent
- Cabba: 2 percent
- Chama: 2 percent

Named Component Description

Searing
- Slope: 0 to 6 percent
- Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 20 to 40 inches
- Drainage Class: Well drained
- Flooding: None
- Water Table: None
- Ponding: None
- Salt Affected: Not affected
- Sodium Affected: Not affected

Typical profile:
- A—0 to 8 inches; loam
- Bw—8 to 23 inches; loam
- C1—23 to 33 inches; channery loam
- 2C2—33 to 60 inches; fragmental material

Ringling
- Slope: 2 to 6 percent
- Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 12 to 20 inches
- Drainage Class: Excessively drained
- Flooding: None
- Water Table: None
- Ponding: None
- Salt Affected: Not affected
- Sodium Affected: Not affected

Typical profile:
- A—0 to 5 inches; loam
- Bw—5 to 17 inches; very channery loam

2Ck—17 to 42 inches; fragmental material
2C—42 to 60 inches; fragmental material

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, hayland, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

40C—Rhoades-Slickspots-Daglum complex, 0 to 9 percent slopes

Setting:

Rhoades soils and slickspots occur in micro-lows. Daglum soils occur on micro-highs. This map unit occurs on alluvial flats and alluvial fans on uplands.

Map Unit Composition (percent)

Named Components
Rhoades and similar soils: 35 to 55 percent
Slickspots and similar soils: 15 to 30 percent
Daglum and similar soils: 10 to 25 percent

Average Component Composition
Rhoades: 40 percent
Slickspots: 21 percent
Daglum: 16 percent
Dogtooth: 12 percent
Rhoades: 5 percent
Belfield: 3 percent
Ekalaka: 2 percent
Harriet: 1 percent

Named Component Description

Rhoades
Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 1 to 5 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
E—0 to 3 inches; silt loam
Btn—3 to 8 inches; silty clay

Btknyz—8 to 14 inches; silty clay
Bky—14 to 46 inches; silty clay
C—46 to 60 inches; silty clay loam

Slickspots
Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
H1—0 to 2 inches; silty clay
H2—2 to 60 inches; stratified loam to silty clay

Daglum
Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
Ap—0 to 7 inches; silt loam
E—7 to 8 inches; silt loam
Btn—8 to 18 inches; clay
Bky—18 to 32 inches; clay loam
C—32 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

41B—Daglum-Rhoades complex, 0 to 6 percent slopes

Setting:

Daglum soils occur on micro-highs. Rhoades soils occur on micro-lows. This map unit occurs on alluvial flats and fans on uplands.

Map Unit Composition (percent)

Named Components

Daglum and similar soils: 35 to 65 percent
Rhoades and similar soils: 10 to 40 percent

Average Component Composition

Daglum: 50 percent
Rhoades: 25 percent
Belfield: 13 percent
Savage: 7 percent
Farland: 2 percent
Grail: 2 percent
Heil: 1 percent

Named Component Description

Daglum

Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
Ap—0 to 7 inches; silt loam
E—7 to 8 inches; silt loam
Btn—8 to 18 inches; clay
Bky—18 to 32 inches; clay loam
C—32 to 60 inches; clay loam

Rhoades

Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 1 to 5 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
E—0 to 3 inches; loam
Btn—3 to 8 inches; silty clay
Btknyz—8 to 14 inches; silty clay
Bky—14 to 46 inches; silty clay
C—46 to 60 inches; silty clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, hayland, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

41C—Daglum-Rhoades complex, bedrock substratum, 6 to 9 percent slopes

Setting:

Daglum soils occur on micro highs. Rhoades soils occupy micro lows. This map unit occurs on footslopes on ridges on uplands.

Map Unit Composition (percent)

Named Components
Daglum and similar soils: 25 to 55 percent
Rhoades and similar soils: 15 to 40 percent

Average Component Composition
Daglum: 34 percent
Rhoades: 26 percent
Dogtooth: 13 percent
Belfield, bedrock substratum: 8 percent
Janesburg: 7 percent
Moreau: 5 percent
Slickspots: 5 percent
Cabba: 2 percent

Named Component Description

Daglum
Slope: 6 to 9 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 5 inches; loam
E—5 to 8 inches; clay loam
Btn—8 to 18 inches; clay
Bz—18 to 26 inches; silty clay
C—26 to 45 inches; silty clay
Cr—45 to 60 inches; bedrock

Rhoades
Slope: 6 to 9 percent
Depth to Restrictive Feature: Natric; top depth ranges from 1 to 5 inches
Drainage Class: Well drained
Flooding: None

Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
E—0 to 4 inches; silt loam
Btn—4 to 11 inches; clay loam
Bky—11 to 49 inches; clay loam
Cr—49 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range, pasture, or hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

42F—Dogtooth-Janesburg-Cabba complex, 6 to 30 percent slopes

Setting:

Dogtooth soils occur on micro-lows on fans or side slopes. Janesburg soils occur on micro-highs on fans or side slopes. Cabba soils occur on convex shoulders. This map unit occurs on hills on uplands.

Map Unit Composition (percent)

Named Components
Dogtooth and similar soils: 25 to 40 percent
Janesburg and similar soils: 15 to 25 percent
Cabba and similar soils: 10 to 25 percent

Average Component Composition
Dogtooth: 33 percent
Janesburg: 22 percent
Cabba: 20 percent
Moreau: 7 percent
Wayden: 4 percent
Amor: 3 percent
Chama: 3 percent
Ekalaka: 3 percent
Regan: 3 percent
Slickspots: 2 percent

Named Component Description

Dogtooth
Slope: 6 to 25 percent
Depth to Restrictive Feature: Natric; top depth ranges from 2 to 4 inches
Bedrock (paralithic); top depth ranges from 20 to 40 inches

Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
E—0 to 2 inches; silt loam
Btn—2 to 8 inches; silty clay
Btkn—8 to 13 inches; silty clay
Bky—13 to 21 inches; silty clay
Cr—21 to 60 inches; bedrock

Janesburg
Slope: 6 to 25 percent
Depth to Restrictive Feature: Natric; top depth ranges from 2 to 13 inches
Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 8 inches; silt loam
E—8 to 10 inches; silt loam
Btn—10 to 21 inches; silty clay
BCk—21 to 26 inches; silt loam
Cr—26 to 60 inches; bedrock

Cabba
Slope: 9 to 30 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; loam
Bk—3 to 15 inches; loam
Cr—15 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

43C—Rhoades-Daglum fine sandy loams, 0 to 9 percent slopes

Setting:

Rhoades soils occupy micro lows. Daglum soils occur on micro highs. This map unit occurs on alluvial fans and on footslopes on ridges on uplands.

Map Unit Composition (percent)

Named Components

Rhoades and similar soils: 25 to 55 percent
Daglum and similar soils: 15 to 45 percent

Average Component Composition

Rhoades: 31 percent
Daglum: 28 percent
Ekalaka: 16 percent
Desart: 7 percent
Daglum: 5 percent
Rhoades: 5 percent
Banks: 2 percent
Harriet: 2 percent
Slickspots: 2 percent
Heil: 1 percent
Stirum: 1 percent

Named Component Description

Rhoades

Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 1 to 5 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
E—0 to 3 inches; fine sandy loam
Btn—3 to 8 inches; silty clay
Btknyz—8 to 14 inches; silty clay
Bky—14 to 46 inches; silty clay
C—46 to 60 inches; silty clay loam

Daglum

Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 4 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches

Typical profile:
Ap—0 to 7 inches; fine sandy loam
E—7 to 8 inches; silt loam
Btn—8 to 18 inches; clay
Bky—18 to 32 inches; clay loam
C—32 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range, pasture, or hay

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

44B—Ekalaka-Lakota fine sandy loams, 0 to 6 percent slopes

Setting:

Ekalaka soils occur on micro-highs. Lakota soils occur in micro-lows. This map unit occurs on fans and terraces on uplands (fig. 13).

Figure 13. The dense, sodium affected subsoil and soluble salts in the Ekalaka-Lakota soils limit forage production as rangeland. Badland is in the background.

Map Unit Composition (percent)

Named Components

Ekalaka and similar soils: 40 to 55 percent
Lakota and similar soils: 25 to 45 percent

Average Component Composition

Ekalaka: 50 percent
Lakota: 32 percent
Desart: 12 percent
Daglum: 3 percent
Belfield: 2 percent
Harriet: 1 percent

Named Component Description

Ekalaka

Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 5 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 6 inches; fine sandy loam
E—6 to 12 inches; fine sandy loam
Btn—12 to 17 inches; fine sandy loam
Bz—17 to 33 inches; fine sandy loam
C—33 to 60 inches; stratified fine sandy loam to sand

Lakota

Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 2 to 10 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 4 inches; fine sandy loam
E—4 to 8 inches; loamy fine sand
Btn—8 to 14 inches; fine sandy loam
Bz—14 to 34 inches; fine sandy loam
C—34 to 50 inches; loamy fine sand
Cr—50 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range, pasture, or hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

45—Harriet silt loam, 0 to 2 percent slopes

Setting:

Harriet soils occur on linear flood plains on uplands.

Map Unit Composition (percent)

Named Components
Harriet and similar soils: 75 to 90 percent

Average Component Composition
Harriet: 80 percent
Regan: 6 percent
Slickspots: 5 percent
Rhoades: 4 percent
Heil: 3 percent
Daglum: 2 percent

Named Component Description

Harriet
Slope: 0 to 2 percent
Depth to Restrictive Feature: Natric; top depth ranges from 0 to 5 inches
Drainage Class: Poorly drained
Flooding: Occasional
Water Table: Seasonal
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
E—0 to 2 inches; silt loam
Btn—2 to 18 inches; clay loam
Bz1—18 to 28 inches; loam
2Bz2—28 to 38 inches; very fine sandy loam
3Ab—38 to 40 inches; clay loam
3C—40 to 60 inches; stratified very fine sandy loam to silty clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

46C—Lakota-Ekalaka fine sandy loams, gullied, 0 to 9 percent slopes

Setting:

Lakota soils occur in micro-lows. Ekalaka soils occur on micro-highs. This map unit occurs on fans and terraces on uplands.

Map Unit Composition (percent)

Named Components

Lakota and similar soils: 35 to 55 percent
Ekalaka and similar soils: 35 to 55 percent

Average Component Composition

Lakota: 45 percent
Ekalaka: 40 percent
Desart: 7 percent
Daglum: 3 percent
Slickspots: 3 percent
Telfer: 2 percent

Named Component Description

Lakota

Slope: 0 to 9 percent
Depth to Restrictive Feature: Natric; top depth ranges from 2 to 10 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 4 inches; fine sandy loam
E—4 to 8 inches; loamy fine sand
Btn—8 to 14 inches; fine sandy loam
Bz—14 to 34 inches; fine sandy loam
C—34 to 50 inches; loamy fine sand
Cr—50 to 60 inches; bedrock

Ekalaka

Slope: 0 to 9 percent
Depth to Restrictive Feature: Natric; top depth ranges from 5 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 6 inches; fine sandy loam
E—6 to 12 inches; fine sandy loam
Btn—12 to 17 inches; fine sandy loam
Bz—17 to 33 inches; fine sandy loam
C—33 to 60 inches; stratified fine sandy loam to sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

47B—Dogtooth-Janesburg silt loams, 0 to 6 percent slopes

Setting:

Dogtooth soils occur on micro-lows. Janesburg soils occur on micro-highs. This map unit occurs on linear fans and flats on uplands.

Map Unit Composition (percent)

Named Components
Dogtooth and similar soils: 50 to 65 percent
Janesburg and similar soils: 25 to 40 percent

Average Component Composition
Dogtooth: 59 percent
Janesburg: 27 percent
Daglum: 5 percent
Regent: 2 percent
Savage: 2 percent
Slickspots: 2 percent
Wayden: 2 percent
Chama: 1 percent

Named Component Description

Dogtooth
Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 2 to 4 inches
Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
E—0 to 2 inches; silt loam
Btn—2 to 8 inches; silty clay
Btkn—8 to 13 inches; silty clay
Bky—13 to 21 inches; silty clay
Cr—21 to 60 inches; bedrock

Janesburg

Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 2 to 13 inches
Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches

Typical profile:
A—0 to 8 inches; silt loam
E—8 to 10 inches; silt loam
Btn—10 to 21 inches; silty clay
BCk—21 to 26 inches; silt loam
Cr—26 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range, pasture, or hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

48B—Desart-Ekalaka-Telfer complex, 0 to 6 percent slopes

Setting:

Desart and Ekalaka soils occur on linear alluvial fans and flats. Telfer soils occur on convex linear rises. This map unit occurs on uplands.

Map Unit Composition (percent)

Named Components

Desart and similar soils: 35 to 55 percent
Ekalaka and similar soils: 20 to 35 percent
Telfer and similar soils: 10 to 25 percent

Average Component Composition

Desart: 42 percent
Ekalaka: 26 percent
Telfer: 15 percent
Parshall: 6 percent
Lakota: 4 percent
Lihen: 4 percent
Daglum: 3 percent

Named Component Description

Desart

Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 15 to 30 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 20 inches; fine sandy loam
E—20 to 24 inches; loamy fine sand
Btn—24 to 31 inches; fine sandy loam
C—31 to 60 inches; loamy fine sand

Ekalaka

Slope: 0 to 6 percent
Depth to Restrictive Feature: Natric; top depth ranges from 5 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
A—0 to 6 inches; fine sandy loam
E—6 to 12 inches; fine sandy loam
Btn—12 to 17 inches; fine sandy loam
Bz—17 to 33 inches; fine sandy loam
C—33 to 60 inches; stratified fine sandy loam to sand

Telfer

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loamy fine sand
C—6 to 60 inches; fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Pasture, hayland, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

49B—Lefor fine sandy loam, 0 to 6 percent slopes

Setting:

Lefor soils occur on linear backslopes on rises on uplands.

Map Unit Composition (percent)

Named Components
Lefor and similar soils: 70 to 90 percent

Average Component Composition
Lefor: 78 percent
Parshall: 9 percent
Vebar: 4 percent
Belfield: 2 percent
Cohagen: 2 percent
Dogtooth: 2 percent
Lihen: 2 percent
Heil: 1 percent

Named Component Description

Lefor
Slope: 0 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 7 inches; fine sandy loam
B/E—7 to 15 inches; fine sandy loam
Bt—15 to 30 inches; sandy clay loam
Bk—30 to 36 inches; fine sandy loam
Cr—36 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland or hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

51D—Vebar-Flasher-Tally complex, 9 to 15 percent slopes

Setting:

Vebar soils occur on convex backslopes. Flasher soils occur on shoulders. Tally soils occur on concave footslopes. This map unit occurs on hills and ridges on uplands.

Map Unit Composition (percent)

Named Components
- Vebar and similar soils: 25 to 35 percent
- Flasher and similar soils: 15 to 25 percent
- Tally and similar soils: 10 to 20 percent

Average Component Composition
- Vebar: 32 percent
- Flasher: 16 percent
- Tally: 15 percent
- Cohagen: 12 percent
- Vebar, moderately sloping: 7 percent
- Beisigl: 6 percent
- Parshall: 5 percent
- Amor: 4 percent
- Telfer: 3 percent

Named Component Description

Vebar
- Slope: 9 to 15 percent
- Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
- Drainage Class: Well drained
- Flooding: None
- Water Table: None
- Ponding: None
- Salt Affected: Not affected
- Sodium Affected: Not affected
- **Typical profile:**
- A—0 to 5 inches; fine sandy loam
- Bw—5 to 26 inches; fine sandy loam
- BCk—26 to 32 inches; fine sandy loam
- Cr—32 to 60 inches; bedrock

Flasher
- Slope: 9 to 15 percent
- Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
- Drainage Class: Somewhat excessively drained
- Flooding: None
- Water Table: None
- Ponding: None
- Salt Affected: Not affected

Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loamy fine sand
AC—6 to 10 inches; loamy fine sand
Cr—10 to 60 inches; bedrock

Tally
Slope: 9 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; fine sandy loam
Bw—6 to 32 inches; fine sandy loam
Bk—32 to 60 inches; fine sandy loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

51F—Flasher-Vebar-Parshall complex, 9 to 35 percent slopes

Setting:

Flasher soils occur on shoulders. Vebar soils occur on linear backslopes. Parshall soils occur on concave footslopes and in swales. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components
Flasher and similar soils: 25 to 40 percent
Vebar and similar soils: 20 to 30 percent
Parshall and similar soils: 10 to 20 percent

Average Component Composition
Flasher: 32 percent
Vebar: 22 percent
Parshall: 15 percent
Beisigl: 11 percent
Telfer: 10 percent
Cohagen: 5 percent

Amor: 4 percent
Rock outcrop: 1 percent

Named Component Description

Flasher

Slope: 9 to 35 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loamy fine sand
AC—6 to 10 inches; loamy fine sand
Cr—10 to 60 inches; bedrock

Vebar

Slope: 15 to 35 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; fine sandy loam
Bw—5 to 26 inches; fine sandy loam
BCk—26 to 32 inches; fine sandy loam
Cr—32 to 60 inches; bedrock

Parshall

Slope: 9 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 12 inches; fine sandy loam
Bw—12 to 29 inches; fine sandy loam
Bk—29 to 48 inches; fine sandy loam
BCk—48 to 60 inches; loamy fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range or wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

52B—Vebar-Parshall fine sandy loams, 0 to 6 percent slopes

Setting:

Vebar soils occur on convex rises. Parshall soils occur in concave swales. This map unit occurs on uplands.

Map Unit Composition (percent)

Named Components

Vebar and similar soils: 40 to 50 percent
Parshall and similar soils: 15 to 25 percent

Average Component Composition

Vebar: 46 percent
Parshall: 19 percent
Tally: 12 percent
Beisigl: 7 percent
Arnegard: 6 percent
Flasher: 4 percent
Amor: 3 percent
Cohagen: 3 percent

Named Component Description

Vebar

Slope: 0 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; fine sandy loam
Bw—5 to 26 inches; fine sandy loam
BCk—26 to 32 inches; fine sandy loam
Cr—32 to 60 inches; bedrock

Parshall

Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None

Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 12 inches; fine sandy loam
Bw—12 to 29 inches; fine sandy loam
Bk—29 to 48 inches; fine sandy loam
BCk—48 to 60 inches; loamy fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, hayland, or pasture

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

53B—Tally-Parshall fine sandy loams, 0 to 6 percent slopes

Setting:

The Tally soils occur on footslopes and toeslopes and the Parshall soils occur on toeslopes and in swales on alluvial fans on uplands. The Tally soils occur on risers and the Parshall soils occur on treads on terraces along river valleys.

Map Unit Composition (percent)

Named Components
Tally and similar soils: 40 to 65 percent
Parshall and similar soils: 20 to 40 percent

Average Component Composition
Tally: 50 percent
Parshall: 28 percent
Shambo: 7 percent
Arnegard: 4 percent
Lihen: 4 percent
Krem: 3 percent
Ekalaka: 2 percent
Lefor: 2 percent

Named Component Description

Tally
Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None

Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; fine sandy loam
Bw—6 to 32 inches; fine sandy loam
Bk—32 to 60 inches; fine sandy loam

Parshall
Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 12 inches; fine sandy loam
Bw—12 to 29 inches; fine sandy loam
Bk—29 to 48 inches; fine sandy loam
BCk—48 to 60 inches; loamy fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

53C—Tally-Parshall fine sandy loams, 6 to 9 percent slopes

Setting:

Tally soils occur on convex backslopes. Parshall soils occur on concave footslopes. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components
Tally and similar soils: 45 to 70 percent
Parshall and similar soils: 15 to 35 percent

Average Component Composition
Tally: 61 percent
Parshall: 19 percent
Parshall, gently sloping: 4 percent
Tally, strongly sloping: 4 percent
Telfer: 4 percent
Vebar: 4 percent

Cohagen: 2 percent
Grail: 1 percent
Manning: 1 percent

Named Component Description

Tally
Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; fine sandy loam
Bw—6 to 32 inches; fine sandy loam
Bk—32 to 60 inches; fine sandy loam

Parshall
Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 12 inches; fine sandy loam
Bw—12 to 29 inches; fine sandy loam
Bk—29 to 48 inches; fine sandy loam
BCk—48 to 60 inches; loamy fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

54C—Vebar-Flasher complex, 6 to 9 percent slopes

Setting:

The Vebar soils occur on convex backslopes. The Flasher soils occur on convex shoulders. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components

Vebar and similar soils: 45 to 70 percent
Flasher and similar soils: 5 to 20 percent

Average Component Composition

Vebar: 54 percent
Tally: 12 percent
Flasher: 10 percent
Cohagen: 9 percent
Beisigl: 6 percent
Amor: 4 percent
Arnegard: 2 percent
Zahl: 2 percent
Peta, fine sandy loam: 1 percent

Named Component Description

Vebar

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; fine sandy loam
Bw—5 to 26 inches; fine sandy loam
BCk—26 to 32 inches; fine sandy loam
Cr—32 to 60 inches; bedrock

Flasher

Slope: 6 to 9 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loamy fine sand
AC—6 to 10 inches; loamy fine sand
Cr—10 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

55B—Beisigl-Lihen loamy fine sands, 0 to 6 percent slopes

Setting:

Beisigl soils occur on convex backslopes. Lihen soils occur on linear footslopes. This map unit occurs on rises on uplands.

Map Unit Composition (percent)

Named Components
Beisigl and similar soils: 35 to 55 percent
Lihen and similar soils: 20 to 35 percent

Average Component Composition
Beisigl: 46 percent
Lihen: 29 percent
Seroco: 10 percent
Flasher: 9 percent
Parshall: 4 percent
Vebar: 2 percent

Named Component Description

Beisigl
Slope: 0 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; loamy fine sand
Bk—5 to 27 inches; loamy fine sand
Cr—27 to 60 inches; bedrock

Lihen
Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
A1—0 to 9 inches; loamy fine sand
A2—9 to 24 inches; loamy sand
Bk—24 to 32 inches; sand
C—32 to 60 inches; sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range, hayland, or pasture

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

56—Parshall fine sandy loam, 0 to 2 percent slopes

Setting:

Parshall soils occur on treads on terraces along river valleys and on toeslopes and in swales on alluvial flats on uplands.

Map Unit Composition (percent)

Named Components
Parshall and similar soils: 60 to 85 percent

Average Component Composition
Parshall: 68 percent
Tally: 10 percent
Arnegard: 6 percent
Lihen: 6 percent
Manning: 3 percent
Stady: 3 percent
Ekalaka: 2 percent
Vebar: 2 percent

Named Component Description

Parshall
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 12 inches; fine sandy loam
Bw—12 to 29 inches; fine sandy loam
Bk—29 to 48 inches; fine sandy loam
BCk—48 to 60 inches; loamy fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

57D—Beisigl-Flasher loamy fine sands, 6 to 15 percent slopes

Setting:

The Beisigl soils occur on convex backslopes. The Flasher soils occur on shoulders. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components
Beisigl and similar soils: 35 to 45 percent
Flasher and similar soils: 20 to 30 percent

Average Component Composition
Beisigl: 42 percent
Flasher: 28 percent
Telfer: 13 percent
Vebar: 12 percent
Parshall: 5 percent

Named Component Description

Beisigl
Slope: 6 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; loamy fine sand
Bk—5 to 27 inches; loamy fine sand
Cr—27 to 60 inches; bedrock

Flasher
Slope: 6 to 15 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
Drainage Class: Somewhat excessively drained

Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loamy fine sand
AC—6 to 10 inches; loamy fine sand
Cr—10 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

58B—Lihen-Parshall complex, 0 to 6 percent slopes

Setting:

Lihen soils occur on convex rises. Parshall soils occur in concave swales. This map unit occurs on uplands.

Map Unit Composition (percent)

Named Components
Lihen and similar soils: 35 to 50 percent
Parshall and similar soils: 10 to 20 percent

Average Component Composition
Lihen: 38 percent
Parshall: 15 percent
Telfer: 15 percent
Tally: 9 percent
Stady: 7 percent
Lihen, fine sandy loam: 6 percent
Seroco: 3 percent
Shambo: 3 percent
Beisigl: 2 percent
Manning: 2 percent

Named Component Description

Lihen
Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None

Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A1—0 to 9 inches; loamy fine sand
A2—9 to 24 inches; loamy sand
Bk—24 to 32 inches; sand
C—32 to 60 inches; sand

Parshall
Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 12 inches; fine sandy loam
Bw—12 to 29 inches; fine sandy loam
Bk—29 to 48 inches; fine sandy loam
BCk—48 to 60 inches; loamy fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, or hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

59F—Flasher-Rock outcrop-Vebar complex, 9 to 70 percent slopes

Setting:

Flasher soils occur on shoulders. Rock outcrop occurs on shoulders. Vebar soils occur on linear summits and backslopes. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components
Flasher and similar soils: 25 to 40 percent
Rock outcrop and similar soils: 15 to 30 percent
Vebar and similar soils: 10 to 20 percent

Average Component Composition
Flasher: 35 percent
Rock outcrop: 22 percent
Vebar: 13 percent
Beisigl: 11 percent

Tally: 6 percent
Cohagen: 4 percent
Telfer: 4 percent
Amor: 3 percent
Cabba: 2 percent

Named Component Description

Flasher

Slope: 9 to 70 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loamy fine sand
AC—6 to 10 inches; loamy fine sand
Cr—10 to 60 inches; bedrock

Rock outcrop

Slope: 9 to 99 percent
Depth to Restrictive Feature: Bedrock (lithic); top depth ranges from 0 to 1 inches
Drainage Class: —-
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Vebar

Slope: 15 to 50 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; fine sandy loam
Bw—5 to 26 inches; fine sandy loam
BCk—26 to 32 inches; fine sandy loam
Cr—32 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

60D—Wabek-Manning complex, 6 to 15 percent slopes

Setting:

Wabek soils occur on summits and shoulders. Manning soils occur on backslopes and footslopes. This map unit occurs on ridges on terraces on uplands.

Map Unit Composition (percent)

Named Components
Wabek and similar soils: 15 to 40 percent
Manning and similar soils: 5 to 30 percent

Average Component Composition
Wabek: 27 percent
Manning: 18 percent
Wabek, sandy loam: 14 percent
Wabek, very gravelly loam: 11 percent
Tally: 8 percent
Williams: 7 percent
Bowdle: 5 percent
Lehr: 5 percent
Telfer: 3 percent
Chama: 2 percent

Named Component Description

Wabek
Slope: 6 to 15 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 7 to 14 inches
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; loam
Bk—5 to 9 inches; gravelly sandy loam
C—9 to 60 inches; very gravelly coarse sand

Manning
Slope: 6 to 15 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 24 to 40 inches
Drainage Class: Somewhat excessively drained

Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 5 inches; fine sandy loam
Bw—5 to 18 inches; fine sandy loam
Bk—18 to 25 inches; fine sandy loam
2C—25 to 60 inches; sand and gravel

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

62B—Manning fine sandy loam, 0 to 6 percent slopes

Setting:

Manning soils occur on treads on terraces along river valleys.

Map Unit Composition (percent)

Named Components
Manning and similar soils: 55 to 70 percent

Average Component Composition
Manning: 66 percent
Parshall: 12 percent
Stady: 12 percent
Shambo, gravelly substratum: 4 percent
Wabek: 4 percent
Vebar: 2 percent

Named Component Description

Manning
Slope: 0 to 6 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 24 to 40 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
Ap—0 to 5 inches; fine sandy loam
Bw—5 to 18 inches; fine sandy loam
Bk—18 to 25 inches; fine sandy loam
2C—25 to 60 inches; sand and gravel

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

Management

Major uses: Cropland or hayland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

63B—Lehr-Stady loams, 0 to 6 percent slopes

Setting:

The Lehr soils occur on risers. The Stady soils occur on treads. This map unit occurs on terraces along river valleys.

Map Unit Composition (percent)

Named Components
Lehr and similar soils: 30 to 50 percent
Stady and similar soils: 15 to 35 percent

Average Component Composition
Lehr: 37 percent
Stady: 27 percent
Bowdle: 16 percent
Shambo: 6 percent
Manning: 5 percent
Wanagan: 5 percent
Wabek: 4 percent

Named Component Description

Lehr
Slope: 0 to 6 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 14 to 20 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; loam
Bw—6 to 11 inches; loam
Bk1—11 to 15 inches; loam

2Bk2—15 to 22 inches; gravelly loamy coarse sand
2C—22 to 60 inches; very gravelly coarse sand

Stady
Slope: 0 to 6 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; loam
Bw—6 to 15 inches; loam
Bk—15 to 29 inches; loam
2C—29 to 60 inches; sand and gravel

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

64—Stady loam, 0 to 3 percent slopes

Setting:

Stady soils occur on treads on terraces along river valleys.

Map Unit Composition (percent)

Named Components
Stady and similar soils: 30 to 55 percent

Average Component Composition
Stady: 41 percent
Bowdle: 31 percent
Arnegard: 15 percent
Lehr: 6 percent
Belfield: 2 percent
Manning: 2 percent
Marysland: 2 percent
Amor: 1 percent

Named Component Description

Stady
Slope: 0 to 3 percent

Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; loam
Bw—6 to 15 inches; loam
Bk—15 to 29 inches; loam
2C—29 to 60 inches; sand and gravel

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

65—Wanagan loam, 0 to 3 percent slopes

Setting:

Wanagan soils occur on linear treads and risers of stream terraces along uplands.

Map Unit Composition (percent)

Named Components
Wanagan and similar soils: 70 to 100 percent

Average Component Composition
Wanagan: 76 percent
Shambo, gravelly substratum: 14 percent
Lehr: 5 percent
Stady: 5 percent

Named Component Description

Wanagan
Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
A—0 to 7 inches; loam
Bw—7 to 14 inches; loam
Bk—14 to 18 inches; loam
2BCk—18 to 26 inches; very gravelly sandy clay loam
2C—26 to 60 inches; extremely gravelly loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

66F—Wabek-Cabba-Shambo complex, 6 to 35 percent slopes

Setting:

Wabek soils occur on convex summits and shoulders. Cabba soils occur on convex shoulders and backslopes. Shambo soils occur on linear footslopes. This map unit occurs on ridges on uplands.

Map Unit Composition (percent)

Named Components
Wabek and similar soils: 20 to 40 percent
Cabba and similar soils: 10 to 20 percent
Shambo and similar soils: 10 to 20 percent

Average Component Composition
Wabek: 30 percent
Cabba: 15 percent
Shambo: 13 percent
Lehr: 8 percent
Flasher: 7 percent
Parshall: 7 percent
Amor: 6 percent
Manning: 4 percent
Vebar: 4 percent
Regent: 3 percent
Telfer: 3 percent

Named Component Description

Wabek
Slope: 9 to 35 percent
Depth to Restrictive Feature: Strongly contrasting textural stratification; top depth ranges from 7 to 14 inches

Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; loam
Bk—5 to 9 inches; gravelly sandy loam
C—9 to 60 inches; very gravelly coarse sand

Cabba
Slope: 9 to 35 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; loam
Bk—3 to 15 inches; loam
Cr—15 to 60 inches; bedrock

Shambo
Slope: 6 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 9 inches; loam
Bw1—9 to 13 inches; loam
Bw2—13 to 29 inches; loam
Bk—29 to 48 inches; loam
C—48 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

67B—Virgelle fine sandy loam, 0 to 6 percent slopes

Setting:

Virgelle soils occur on linear treads on stream terraces along river valleys.

Map Unit Composition (percent)

Named Components
Virgelle and similar soils: 20 to 40 percent

Average Component Composition
Virgelle: 33 percent
Virgelle, loamy fine sand: 18 percent
Lihen: 14 percent
Parshall: 10 percent
Krem: 9 percent
Telfer: 6 percent
Farnuf: 4 percent
Belfield: 3 percent
Flaxton: 3 percent

Named Component Description

Virgelle
Slope: 0 to 6 percent
Depth to Restrictive Feature: Abrupt textural change; top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 9 inches; fine sandy loam
Bw—9 to 17 inches; loamy fine sand
C—17 to 27 inches; loamy fine sand
2Btb—27 to 35 inches; clay
2Bkyb—35 to 60 inches; clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, hayland, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

68D—Telfer loamy fine sand, 6 to 15 percent slopes

Setting:

The Telfer soils occur on shoulders and convex backslopes of ridges on uplands.

Map Unit Composition (percent)

Named Components
Telfer and similar soils: 50 to 80 percent

Average Component Composition
Telfer: 62 percent
Lihen: 18 percent
Beisigl: 5 percent
Schaller: 5 percent
Tally: 3 percent
Telfer, fine sandy loam: 3 percent
Vebar: 3 percent
Ekalaka: 1 percent

Named Component Description

Telfer
Slope: 6 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loamy fine sand
C—6 to 60 inches; fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

68E—Telfer loamy fine sand, 15 to 25 percent slopes

Setting:

The Telfer soils occur on shoulders and convex backslopes of ridges on uplands.

Map Unit Composition (percent)

Named Components
Telfer and similar soils: 65 to 85 percent

Average Component Composition
Telfer: 77 percent
Parshall: 5 percent
Schaller: 4 percent
Shambo: 4 percent
Tally: 4 percent
Linton: 3 percent
Seroco: 2 percent
Whitebird: 1 percent

Named Component Description

Telfer
Slope: 15 to 25 percent
Depth to Restrictive Feature: None noted
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loamy fine sand
C—6 to 60 inches; fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

70—Bowbells loam, 0 to 3 percent slopes

Setting:

The Bowbells soils occurs on flats and in swales on till plains.

Map Unit Composition (percent)

Named Components
Bowbells and similar soils: 55 to 85 percent

Average Component Composition

Bowbells: 73 percent
Grail: 9 percent
Williams: 7 percent
Tonka: 4 percent
Bowdle: 3 percent
Hamerly: 2 percent
Parnell: 1 percent
Regan: 1 percent

Named Component Description

Bowbells

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loam
Bt1—6 to 14 inches; clay loam
Bt2—14 to 23 inches; clay loam
Bk—23 to 36 inches; loam
C—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

71—Williams-Bowbells loams, 0 to 3 percent slopes

Setting:

Williams soils occur on rises. Bowbells soils occupy swales. This map unit occurs on till plains.

Map Unit Composition (percent)

Named Components

Williams and similar soils: 40 to 65 percent
Bowbells and similar soils: 30 to 55 percent

Average Component Composition

Williams: 47 percent
Bowbells: 37 percent

Max: 6 percent
Temvik: 5 percent
Tonka: 2 percent
Heil: 1 percent
Manning: 1 percent
Reeder: 1 percent

Named Component Description

Williams

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Bowbells

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loam
Bt1—6 to 14 inches; clay loam
Bt2—14 to 23 inches; clay loam
Bk—23 to 36 inches; loam
C—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

71B—Williams-Bowbells loams, 3 to 6 percent slopes

Setting:

Williams soils occur on rises. Bowbells soils occupy swales. This map unit occurs on till plains.

Map Unit Composition (percent)

Named Components

Williams and similar soils: 50 to 70 percent
Bowbells and similar soils: 20 to 40 percent

Average Component Composition

Williams: 60 percent
Bowbells: 27 percent
Max: 5 percent
Zahl: 5 percent
Reeder: 1 percent
Tonka: 1 percent
Vebar: 1 percent

Named Component Description

Williams

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Bowbells

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: None
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loam
Bt1—6 to 14 inches; clay loam
Bt2—14 to 23 inches; clay loam
Bk—23 to 36 inches; loam
C—36 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

73B—Williams-Reeder loams, 3 to 6 percent slopes

Setting:

The Williams soils occur on flats. The Reeder soils occur on rises. This map unit occurs on till mantled uplands.

Map Unit Composition (percent)

Named Components
Williams and similar soils: 35 to 65 percent
Reeder and similar soils: 15 to 35 percent

Average Component Composition
Williams: 45 percent
Reeder: 23 percent
Bowbells: 12 percent
Farnuf: 8 percent
Amor: 7 percent
Zahl: 2 percent
Krem: 1 percent
Stady: 1 percent
Tonka: 1 percent

Named Component Description

Williams
Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Reeder

Slope: 3 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 8 inches; loam
Bt—8 to 17 inches; clay loam
Bk—17 to 36 inches; loam
Cr—36 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

76C—Williams-Zahl loams, 6 to 9 percent slopes

Setting:

Williams soils occur on summits and backslopes. Zahl soils occur on shoulders. This map unit occurs on ridges on till plains.

Map Unit Composition (percent)

Named Components

Williams and similar soils: 25 to 45 percent
Zahl and similar soils: 30 to 50 percent

Average Component Composition

Williams: 35 percent
Zahl: 35 percent
Bowbells: 10 percent
Cabba: 5 percent
Amor: 4 percent
Max: 4 percent
Williams, undulating: 4 percent
Zahl, rolling: 2 percent
Noonan: 1 percent

Named Component Description

Williams

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Zahl

Slope: 6 to 9 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; loam
Bk—5 to 20 inches; loam
C—20 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

76D—Zahl-Williams loams, 9 to 15 percent slopes

Setting:

Zahl soils occur on summits and shoulders. Williams soils occur on backslopes and footslopes. This map unit occurs on ridges on till plains.

Map Unit Composition (percent)

Named Components
Zahl and similar soils: 40 to 60 percent
Williams and similar soils: 15 to 35 percent

Average Component Composition
Zahl: 45 percent
Williams: 21 percent
Max: 15 percent
Bowbells: 10 percent
Reeder: 3 percent
Cabba: 2 percent
Chama: 2 percent
Wabek: 2 percent

Named Component Description

Zahl
Slope: 9 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; loam
Bk—5 to 20 inches; loam
C—20 to 60 inches; clay loam

Williams
Slope: 9 to 15 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Pasture, hayland, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

76F—Zahl-Williams loams, dissected, 15 to 45 percent slopes

Setting:

Zahl soils occur on summits and shoulders. Willams soils occur on backslopes and footslopes. This map unit occurs on ridges on till plains.

Map Unit Composition (percent)

Named Components

Zahl and similar soils: 40 to 65 percent
Williams and similar soils: 10 to 30 percent

Average Component Composition

Zahl: 50 percent
Williams: 24 percent
Shambo: 11 percent
Bowbells: 8 percent
Cabba: 2 percent
Rhoades: 2 percent
Wabek: 2 percent
Belfield: 1 percent

Named Component Description

Zahl

Slope: 15 to 45 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; loam
Bk—5 to 20 inches; loam
C—20 to 60 inches; clay loam

Williams

Slope: 15 to 25 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; loam

Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

77—Temvik-Wilton silt loams, 0 to 3 percent slopes

Setting:

Temvik soils occur on slight rises. Wilton soils occur on flats and in swales. This map unit occurs on silty loess-mantled till plains.

Map Unit Composition (percent)

Named Components
Temvik and similar soils: 45 to 65 percent
Wilton and similar soils: 25 to 45 percent

Average Component Composition
Temvik: 51 percent
Wilton: 38 percent
Williams: 9 percent
Grassna: 2 percent

Named Component Description

Temvik
Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 7 inches; silt loam
Bw—7 to 24 inches; silt loam
2Bk—24 to 44 inches; clay loam
2C—44 to 60 inches; clay loam

Wilton
Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted

Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 8 inches; silt loam
Bw—8 to 27 inches; silt loam
2Bk—27 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

77B—Temvik-Williams silt loams, 3 to 6 percent slopes

Setting:

Temvik soils occur on flats. Williams soils occur on footslopes of rises. This map unit occurs on silty loess-mantled till plains.

Map Unit Composition (percent)

Named Components
Temvik and similar soils: 40 to 60 percent
Williams and similar soils: 10 to 25 percent

Average Component Composition
Temvik: 50 percent
Wilton: 21 percent
Williams: 16 percent
Max: 5 percent
Bryant: 3 percent
Zahl: 3 percent
Flaxton: 2 percent

Named Component Description

Temvik
Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected

Typical profile:
Ap—0 to 7 inches; silt loam
Bw—7 to 24 inches; silt loam
2Bk—24 to 44 inches; clay loam
2C—44 to 60 inches; clay loam

Williams
Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; silt loam
Bt1—6 to 10 inches; clay loam
Bt2—10 to 15 inches; clay loam
Btk—15 to 24 inches; clay loam
Bk—24 to 36 inches; clay loam
C—36 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

80—Breien fine sandy loam, 0 to 2 percent slopes

Setting:

Breien soils occur on flood plains and on treads on terraces. This map unit occurs in river valleys on uplands.

Map Unit Composition (percent)

Named Components
Breien and similar soils: 50 to 80 percent

Average Component Composition
Breien: 67 percent
Velva: 11 percent
Banks: 8 percent
Channel: 5 percent
Banks, loamy fine sand: 4 percent
Breien, loam: 4 percent
Ekalaka: 1 percent

Named Component Description

Breien

Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat excessively drained
Flooding: Rare
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 6 inches; fine sandy loam
C1—6 to 15 inches; fine sandy loam
C2—15 to 60 inches; stratified sand to fine sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland, pasture, hayland, or range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

82—Mckeen loam, 0 to 1 percent slopes

Setting:

McKeen soils occur on flats on flood plains in river valleys.

Map Unit Composition (percent)

Named Components

Mckeen and similar soils: 60 to 85 percent

Average Component Composition

Mckeen: 73 percent
Lallie: 21 percent
Scorio, saline: 5 percent
Scorio, silty clay loam: 1 percent

Named Component Description

Mckeen

Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Very poorly drained
Flooding: Frequent
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected

Sodium Affected: Not affected
Typical profile:
A—0 to 2 inches; loam
C—2 to 12 inches; loam
Ab—12 to 15 inches; silty clay
2Cg—15 to 60 inches; stratified loamy fine sand to silty clay
Map Unit Notes: This map unit is rarely flooded as a result of protection by dam and dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

83—Mckeen loam, ponded, 0 to 1 percent slopes

Setting:

Ponded McKeen soils occur in oxbows on flood plains in river valleys.

Map Unit Composition (percent)

Named Components
Mckeen and similar soils: 70 to 90 percent

Average Component Composition
Mckeen: 78 percent
Mckeen, fine sandy loam: 15 percent
Lallie: 7 percent

Named Component Description

Mckeen
Slope: 0 to 1 percent
Depth to Restrictive Feature: None noted
Drainage Class: Very poorly drained
Flooding: Frequent
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 2 inches; loam
C—2 to 12 inches; loam
Ab—12 to 15 inches; silty clay
2Cg—15 to 60 inches; stratified loamy fine sand to silty clay

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Wetland wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

85B—Banks loamy fine sand, 0 to 6 percent slopes

Setting:

Banks soils occur on flats and levees of flood plains in river valleys.

Map Unit Composition (percent)

Named Components
Banks and similar soils: 60 to 85 percent

Average Component Composition
Banks: 70 percent
Banks, fine sandy loam: 14 percent
Banks, silty clay loam: 10 percent
Trembles: 4 percent
Havrelon: 2 percent

Named Component Description

Banks
Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat excessively drained
Flooding: Occasional
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; loamy fine sand
C1—4 to 30 inches; fine sand
C2—30 to 60 inches; loamy fine sand
Map Unit Notes: This map unit may rarely flood due to protection by dam and dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Hayland, range, or wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

86—Havrelon fine sandy loam, 0 to 2 percent slopes

Setting:

Haverlon soils occur on linear flood plains in river valleys.

Map Unit Composition (percent)

Named Components
Havrelon and similar soils: 75 to 95 percent

Average Component Composition
Havrelon: 78 percent
Havrelon, loamy fine sand: 7 percent
Channel: 5 percent
Banks: 4 percent
Trembles: 4 percent
Banks, loamy fine sand: 2 percent

Named Component Description

Havrelon
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: Occasional
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 13 inches; fine sandy loam
C—13 to 60 inches; stratified very fine sandy loam to silty clay loam
Map Unit Notes: This map unit may rarely flood due to protection by dam and dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

87—Minnewaukan fine sandy loam, 0 to 2 percent slopes

Setting:

Minnewaukan soils occur on linear flood plains in river valleys.

Map Unit Composition (percent)

Named Components

Minnewaukan and similar soils: 55 to 95 percent

Average Component Composition

Minnewaukan: 82 percent
Minnewaukan, loamy fine sand: 10 percent
Banks: 5 percent
Mckeen: 3 percent

Named Component Description

Minnewaukan

Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Poorly drained
Flooding: Frequent
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; fine sandy loam
AC—3 to 5 inches; loamy coarse sand
Cg—5 to 60 inches; stratified fine sand to loamy sand
Map Unit Notes: This map unit may rarely flood due to protection by dam and dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range or wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

88—Havrelon silt loam, 0 to 2 percent slopes

Setting:

Havrelon soils occur on linear flood plains in river valleys.

Map Unit Composition (percent)

Named Components

Havrelon and similar soils: 70 to 90 percent

Average Component Composition

Havrelon: 73 percent
Havrelon, fine sandy loam: 7 percent
Channel: 5 percent
Banks: 4 percent
Havrelon, silty clay loam: 4 percent
Ridgelawn: 3 percent
Trembles: 3 percent
Lallie: 1 percent

Named Component Description

Havrelon

Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: Occasional
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 13 inches; silt loam
C—13 to 60 inches; stratified very fine sandy loam to silty clay loam
Map Unit Notes: This map unit is rarely flooded as a result of protection by dam or dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

91—Lohler silty clay, 0 to 2 percent slopes

Setting:

Lohler soils occur on linear flood plains in river valleys on uplands.

Map Unit Composition (percent)

Named Components

Lohler and similar soils: 40 to 70 percent

Average Component Composition

Lohler: 47 percent
Lohler, silty clay loam: 36 percent
Havrelon: 9 percent
Lallie: 3 percent
Ridgelawn: 3 percent
Harriet: 1 percent
Heil: 1 percent

Named Component Description

Lohler

Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: Occasional
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 8 inches; silty clay
C—8 to 60 inches; silty clay
Map Unit Notes: This map unit is rarely flooded as a result of protection by dam or dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

98—Mandan-Linton silt loams, 0 to 3 percent slopes

Setting:

Mandan soils occur in swales on flats. Linton soils occur on convex linear rises on flats. This map unit occurs on loess mantled uplands. (fig. 14)

Map Unit Composition (percent)

Named Components

Mandan and similar soils: 50 to 75 percent
Linton and similar soils: 5 to 25 percent

Average Component Composition

Mandan: 59 percent
Linton: 15 percent
Grassna: 11 percent
Bryant: 7 percent

Belfield: 3 percent
Parshall: 3 percent
Omio: 2 percent

Named Component Description

Mandan

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 20 inches; silt loam
Bw—20 to 29 inches; silt loam
Bk—29 to 47 inches; silt loam
2C—47 to 60 inches; loam

Linton

Slope: 0 to 3 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None

Figure 14. Linton and Mandan soils are highly productive and most areas are cultivated. Leaving tall stubble on the surface will help trap snow and increase moisture levels.

Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 7 inches; silt loam
Bw—7 to 17 inches; silt loam
Bk—17 to 29 inches; silt loam
C—29 to 60 inches; silt loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

98B—Linton-Mandan silt loams, 3 to 6 percent slopes

Setting:

Linton soils occur on convex backslopes. Mandan soils occur in swales. This map unit occurs on rises on loess mantled uplands.

Map Unit Composition (percent)

Named Components
Linton and similar soils: 40 to 65 percent
Mandan and similar soils: 15 to 35 percent

Average Component Composition
Linton: 50 percent
Mandan: 24 percent
Omio: 12 percent
Grassna: 6 percent
Bryant: 5 percent
Sutley: 2 percent
Stady: 1 percent

Named Component Description

Linton
Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Ap—0 to 7 inches; silt loam

Bw—7 to 17 inches; silt loam
Bk—17 to 29 inches; silt loam
C—29 to 60 inches; silt loam

Mandan

Slope: 3 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 20 inches; silt loam
Bw—20 to 29 inches; silt loam
Bk—29 to 47 inches; silt loam
2C—47 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

99F—Badland, outcrop-Cabba complex, 9 to 70 percent slopes

Setting:

Badland, outcrop occurs on barren shoulders and backslopes. Cabba soils occur on shoulders. This map unit occurs on escarpments on uplands.

Map Unit Composition (percent)

Named Components

Badland, outcrop and similar soils: 40 to 65 percent
Cabba and similar soils: 20 to 40 percent

Average Component Composition

Badland, outcrop: 51 percent
Cabba: 32 percent
Dogtooth: 5 percent
Brandenburg: 4 percent
Chama: 3 percent
Lambert: 3 percent
Rock outcrop: 2 percent

Named Component Description

Badland, outcrop

Slope: 9 to 150 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 0 to 5 inches
Drainage Class: —-
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Saline within 30 inches
Sodium Affected: Sodic within 30 inches
Typical profile:
H1—0 to 60 inches; bedrock

Cabba

Slope: 9 to 70 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; silt loam
Bk—3 to 15 inches; silt loam
Cr—15 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

100—Pits, gravel and sand

Setting:

Pits, gravel and sand occur on terraces on uplands.

Map Unit Composition (percent)

Named Components

Pits and similar soils: 80 to 100 percent

Average Component Composition
Pits: 85 percent
Wabek: 10 percent
Lehr: 5 percent

Named Component Description

Pits
Slope: 0 to 60 percent
Depth to Restrictive Feature: None noted
Drainage Class: Excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
H1—0 to 6 inches; extremely gravelly sand
H2—6 to 60 inches; extremely gravelly sand

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

105—Dumps and Pits, mine

Setting:

Dumps and Pits, mine occurs as abandoned coal mines and municipal landfill areas.

Map Unit Composition (percent)

Named Components
Dumps and Pits and similar soils: 85 to 100 percent

Average Component Composition
Dumps and Pits: 90 percent
Cabba: 5 percent
Flasher: 5 percent

Named Component Description

Dumps and Pits
Slope: 0 to 60 percent
Depth to Restrictive Feature: None noted
Drainage Class: Excessively drained
Flooding: None

Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
H1—0 to 4 inches; clay loam
H2—4 to 60 inches; clay loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

Management

Major uses: Wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

110—Ustorthents, loamy, 0 to 6 percent slopes

Setting:

Ustorthents, loamy occur on rises on uplands.

Map Unit Composition (percent)

Named Components
Ustorthents and similar soils: 55 to 80 percent

Average Component Composition
Ustorthents: 65 percent
Ustipsamments: 35 percent

Named Component Description

Ustorthents
Slope: 0 to 6 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; silty clay loam
Cr—4 to 60 inches; bedrock

Detailed soil descriptions for all map unit components are in alphabetical order in the section "Soil Series and Their Morphology." Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the "Soil Properties" section.

Management

Major uses: Range

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

115—Riverwash

Setting:

Riverwash occurs on sand bars, point bars, and channels of flood plains in river valleys.

Map Unit Composition (percent)

Named Components
Riverwash and similar soils: 80 to 100 percent

Average Component Composition
Riverwash: 95 percent
Minnewaukan: 3 percent
Lallie: 1 percent
Mckeen, ponded: 1 percent

Named Component Description

Riverwash
Slope: 0 to 4 percent
Depth to Restrictive Feature: None noted
Drainage Class: Somewhat poorly drained
Flooding: Frequent
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
H1—0 to 6 inches; sand
H2—6 to 60 inches; stratified coarse sand to sandy loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

154F—Arikara-Shambo-Cabba loams, 9 to 70 percent slopes

Setting:

Arikara soils occur on linear backslopes and concave footslopes of ridges. Shambo soils occur on linear footslopes. Cabba soils occur on shoulders. This map unit occurs on wooded ridges on uplands.

Map Unit Composition (percent)

Named Components
Arikara and similar soils: 20 to 40 percent
Cabba and similar soils: 10 to 25 percent
Shambo and similar soils: 10 to 20 percent

Average Component Composition
Arikara: 33 percent
Cabba: 18 percent
Shambo: 13 percent
Lambert: 12 percent
Shambo, strongly sloping: 8 percent
Chama: 6 percent
Tally: 4 percent
Badland, outcrop: 2 percent
Daglum: 2 percent
Regent: 2 percent

Named Component Description

Arikara
Slope: 15 to 70 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 2 inches; loam
Bw—2 to 14 inches; loam
Bk—14 to 39 inches; loam
C—39 to 60 inches; loam

Cabba
Slope: 9 to 70 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 10 to 20 inches

Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 3 inches; loam
Bk—3 to 15 inches; loam
Cr—15 to 60 inches; bedrock

Shambo
Slope: 15 to 35 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 9 inches; loam
Bw1—9 to 13 inches; loam
Bw2—13 to 29 inches; loam
Bk—29 to 48 inches; loam
C—48 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

161F—Beisigl-Flasher-Arikara complex, 15 to 70 percent slopes

Setting:

Beisigl soils occur on convex backslopes and summits. Flasher soils occur on shoulders. Arikara soils occur on linear backslopes and footslopes. This map unit occurs on ridges and escarpments on uplands.

Map Unit Composition (percent)

Named Components
Beisigl and similar soils: 20 to 45 percent
Flasher and similar soils: 15 to 40 percent
Arikara and similar soils: 15 to 35 percent

Average Component Composition

Beisigl: 35 percent
Flasher: 30 percent
Arikara: 24 percent
Vebar: 6 percent
Cabba: 2 percent
Telfer: 2 percent
Regan: 1 percent

Named Component Description

Beisigl

Slope: 15 to 50 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 20 to 40 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 5 inches; loamy fine sand
Bk—5 to 27 inches; loamy fine sand
Cr—27 to 60 inches; bedrock

Flasher

Slope: 15 to 70 percent
Depth to Restrictive Feature: Bedrock (paralithic); top depth ranges from 7 to 20 inches
Drainage Class: Somewhat excessively drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 6 inches; loamy fine sand
AC—6 to 10 inches; loamy fine sand
Cr—10 to 60 inches; bedrock

Arikara

Slope: 15 to 70 percent
Depth to Restrictive Feature: None noted
Drainage Class: Well drained
Flooding: None
Water Table: None
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
Oi—0 to 1 inches; slightly decomposed plant material
A—1 to 2 inches; loam
Bw—2 to 14 inches; loam

Bk—14 to 39 inches; loam
C—39 to 60 inches; loam

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Range and wildlife habitat

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

185B—Banks loamy fine sand, slightly wet, 0 to 6 percent slopes

Setting:

Banks soils occur on flats and levees of flood plains in river valleys. This map unit is at a slightly lower elevation than the somewhat excessively-drained Banks map unit. The soils moisture state is effected by the fluctuating water levels of Lake Oahe.

Map Unit Composition (percent)

Named Components
Banks, slightly wet and similar soils: 60 to 85 percent

Average Component Composition
Banks, slightly wet: 70 percent
Banks, fine sandy loam: 14 percent
Banks, silty clay loam: 10 percent
Trembles: 4 percent
Havrelon: 2 percent

Named Component Description

Banks, slightly wet
Slope: 0 to 6 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: Occasional
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 4 inches; loamy fine sand
C1—4 to 30 inches; fine sand
C2—30 to 60 inches; loamy fine sand
Map Unit Notes: This map unit is rarely flooded as a result of protection by dam and dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Irrigated cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

186—Havrelon fine sandy loam, slightly wet, 0 to 2 percent slopes

Setting:

Havrelon soils occur on linear flood plains in river valleys. This map unit is at a slightly lower elevation than the well-drained Havrelon fine sandy loam map unit. The soils moisture state is affected by the fluctuating water levels of Lake Oahe.

Map Unit Composition (percent)

Named Components
Havrelon, slightly wet and similar soils: 75 to 95 percent

Average Component Composition
Havrelon, slightly wet: 85 percent
Havrelon, loamy fine sand: 8 percent
Banks: 5 percent
Banks, loamy fine sand: 2 percent

Named Component Description

Havrelon, slightly wet
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: Occasional
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 13 inches; fine sandy loam
C—13 to 60 inches; stratified very fine sandy loam to silty clay loam
Map Unit Notes: This map unit may rarely flood due to protection by dam or dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Irrigated cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland, Recreation, Wildlife Habitat, Engineering, and Soil Properties.

188—Havrelon silt loam, slightly wet, 0 to 2 percent slopes

Setting:

Haverlon soils occur on linear flood plains in river valleys. This map unit is at a slightly lower elevation than the well-drained Havrelon loam map unit. The soils moisture state is affected by the fluctuating water levels of Lake Oahe.

Map Unit Composition (percent)

Named Components
Havrelon and similar soils: 85 to 95 percent

Average Component Composition
Havrelon: 92 percent
Havrelon, silty clay loam: 5 percent
Lallie: 1 percent
Lohler: 1 percent
Trembles: 1 percent

Named Component Description

Havrelon
Slope: 0 to 2 percent
Depth to Restrictive Feature: None noted
Drainage Class: Moderately well drained
Flooding: Occasional
Water Table: Seasonal
Ponding: None
Salt Affected: Not affected
Sodium Affected: Not affected
Typical profile:
A—0 to 13 inches; silt loam
C—13 to 60 inches; stratified very fine sandy loam to silty clay loam
Map Unit Notes: This map unit may rarely flood due to protection from dam or dike structures.

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Irrigated cropland

For cropland limitations and hazards see Table 6. For information about managing this map unit, see the following sections: Agronomy, Rangeland,Recreation, Wildlife Habitat, Engineering, and Soil Properties.

M-W—Miscellaneous water

Setting:

These are generally small areas of waste water such as sewage lagoons.

Map Unit Composition (percent)

Named Components
Miscellaneous water and similar soils: 100 percent

Average Component Composition
Miscellaneous water: 100 percent

Named Component Description

Miscellaneous water
Slope: —
Depth to Restrictive Feature: None noted
Drainage Class: —
Flooding: None
Water Table: Seasonal
Ponding: Frequent
Salt Affected: Not affected
Sodium Affected: Not affected

Detailed soil descriptions for all map unit components are in alphabetical order in the section “Soil Series and Their Morphology.” Additional information specific to this map unit, such as USDA textures, permeability, and soil reaction, is available in the “Soil Properties” section.

Management

Major uses: Waste water storage

W—Water

Setting:

These are natural and manmade fresh water bodies, generally along streams and in depressions.

Map Unit Composition (percent)

Named Components
Water and similar soils:

Average Component Composition
Water: 95 percent
Dimmick: 5 percent

Named Component Description

Definition: Areas, including ponds, lakes, streams, and reservoirs, that are covered with water in most years during the period that is warm enough for plants to grow or longer.

Management

Major uses: Wetland wildlife habitat

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
1	Tonka silt loam, 0 to 1 percent slopes	183	*
3	Velva fine sandy loam, 0 to 2 percent slopes	6,320	0.5
4	Lallie silty clay loam, ponded, 0 to 1 percent slopes	992	*
5	Dimmick silty clay, 0 to 1 percent slopes	1,075	*
6	Heil silt loam, 0 to 1 percent slopes	1,063	*
7	Korell loam, 0 to 2 percent slopes	2,132	0.2
8	Straw loam, 0 to 2 percent slopes	7,343	0.6
9	Straw and Velva soils, channeled, 0 to 2 percent slopes	27,512	2.2
10	Arnegard loam, 0 to 2 percent slopes	7,125	0.6
10B	Arnegard loam, 2 to 6 percent slopes	3,578	0.3
11	Amor-Arnegard loams, 0 to 3 percent slopes	4,253	0.3
11B	Amor-Shambo loams, 3 to 6 percent slopes	19,272	1.5
12C	Amor-Cabba loams, 6 to 9 percent slopes	48,014	3.9
13D	Amor-Cabba loams, 9 to 15 percent slopes	46,572	3.7
15B	Chama-Cabba silt loams, 3 to 6 percent slopes	4,715	0.4
15C	Chama-Cabba-Sen silt loams, 6 to 9 percent slopes	43,763	3.5
15D	Cabba-Chama-Sen silt loams, 9 to 15 percent slopes	28,125	2.3
15F	Cabba-Chama-Arnegard silt loams, 15 to 70 percent slopes	74,170	6.0
16D	Ringling-Daglum loams, 6 to 15 percent slopes	5,099	0.4
16F	Brandenburg-Cabba-Savage complex, 6 to 70 percent slopes	9,641	0.8
17B	Sen-Chama silt loams, 3 to 6 percent slopes	9,310	0.7
18B	Reeder-Farnuf loams, 3 to 6 percent slopes	9,223	0.7
19	Farland silt loam, 0 to 2 percent slopes	10,524	0.8
19B	Farland silt loam, 2 to 6 percent slopes	23,078	1.9
19C	Farland silt loam, 6 to 9 percent slopes	8,353	0.7
19D	Farland silt loam, 9 to 15 percent slopes	1,993	0.2
20	Shambo loam, 0 to 2 percent slopes	7,161	0.6
20B	Shambo loam, 2 to 6 percent slopes	10,093	0.8
21B	Morton-Farland silt loams, 3 to 6 percent slopes	9,801	0.8
22F	Cabba-Rock Outcrop-Chama complex, 15 to 70 percent slopes	1,669	0.1
23C	Morton-Cabba silt loams, 3 to 9 percent slopes	14,375	1.2
26	Grail silty clay loam, 0 to 2 percent slopes	4,839	0.4
27	Belfield-Grail silty clay loams, 0 to 2 percent slopes	30,057	2.4
27B	Grail-Belfield silty clay loams, 2 to 6 percent slopes	21,067	1.7
28	Belfield-Daglum silt loams, 0 to 2 percent slopes	36,071	2.9
28B	Belfield-Daglum silt loams, 2 to 6 percent slopes	31,389	2.5
29	Savage silty clay loam, 0 to 2 percent slopes	5,270	0.4
29B	Savage silty clay loam, 2 to 6 percent slopes	17,873	1.4
29C	Savage silty clay loam, 6 to 9 percent slopes	2,802	0.2
30	Regent-Savage silty clay loams, 0 to 3 percent slopes	1,329	0.1
30B	Regent-Savage silty clay loams, 3 to 6 percent slopes	7,776	0.6
30C	Regent-Savage silty clay loams, 6 to 9 percent slopes	5,309	0.4
31B	Regent-Janesburg complex, 0 to 6 percent slopes	37,831	3.0
31C	Regent-Janesburg complex, 6 to 9 percent slopes	16,134	1.3
35B	Moreau silty clay, 0 to 6 percent slopes	9,639	0.8
35C	Moreau-Wayden silty clays, 6 to 9 percent slopes	2,280	0.2
35D	Moreau-Wayden silty clays, 9 to 15 percent slopes	5,945	0.5
36	Lawther silty clay, 0 to 2 percent slopes	809	*
38B	Searing-Ringling loams, 0 to 6 percent slopes	648	*
40C	Rhoades-Slickspots-Daglum complex, 0 to 9 percent slopes	13,844	1.1
41B	Daglum-Rhoades complex, 0 to 6 percent slopes	55,764	4.5
41C	Daglum-Rhoades complex, bedrock substratum, 6 to 9 percent slopes	28,456	2.3
42F	Dogtooth-Janesburg-Cabba complex, 6 to 30 percent slopes	39,352	3.2
43C	Rhoades-Daglum fine sandy loams, 0 to 9 percent slopes	4,419	0.4
44B	Ekalaka-Lakota fine sandy loams, 0 to 6 percent slopes	11,625	0.9
45	Harriet silt loam, 0 to 2 percent slopes	13,018	1.0
46C	Lakota-Ekalaka fine sandy loams, gullied, 0 to 9 percent slopes	6,348	0.5
47B	Dogtooth-Janesburg silt loams, 0 to 6 percent slopes	13,803	1.1
48B	Desart-Ekalaka-Telfer complex, 0 to 6 percent slopes	5,717	0.5
49B	Lefor fine sandy loam, 0 to 6 percent slopes	303	*
51D	Vebar-Flasher-Tally complex, 9 to 15 percent slopes	38,480	3.1
51F	Flasher-Vebar-Parshall complex, 9 to 35 percent slopes	65,586	5.3

* See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
52B	Vebar-Parshall fine sandy loams, 0 to 6 percent slopes	21,964	1.8
53B	Tally-Parshall fine sandy loams, 0 to 6 percent slopes	17,918	1.4
53C	Tally-Parshall fine sandy loams, 6 to 9 percent slopes	5,278	0.4
54C	Vebar-Flasher complex, 6 to 9 percent slopes	40,161	3.2
55B	Beisigl-Lihen loamy fine sands, 0 to 6 percent slopes	2,509	0.2
56	Parshall fine sandy loam, 0 to 2 percent slopes	3,412	0.3
57D	Beisigl-Flasher loamy fine sands, 6 to 15 percent slopes	15,038	1.2
58B	Lihen-Parshall complex, 0 to 6 percent slopes	6,576	0.5
59F	Flasher-Rock Outcrop-Vebar complex, 9 to 70 percent slopes	8,188	0.7
60D	Wabek-Manning complex, 6 to 15 percent slopes	3,327	0.3
62B	Manning fine sandy loam, 0 to 6 percent slopes	4,754	0.4
63B	Lehr-Stady loams, 0 to 6 percent slopes	5,072	0.4
64	Stady loam, 0 to 3 percent slopes	1,924	0.2
65	Wanagan loam, 0 to 3 percent slopes	1,360	0.1
66F	Wabek-Cabba-Shambo complex, 6 to 35 percent slopes	10,367	0.8
67B	Virgelle fine sandy loam, 0 to 6 percent slopes	2,047	0.2
68D	Telfer loamy fine sand, 6 to 15 percent slopes	3,468	0.3
68E	Telfer loamy fine sand, 15 to 25 percent slopes	1,959	0.2
70	Bowbells loam, 0 to 3 percent slopes	844	*
71	Williams-Bowbells loams, 0 to 3 percent slopes	2,326	0.2
71B	Williams-Bowbells loams, 3 to 6 percent slopes	12,603	1.0
73B	Williams-Reeder loams, 3 to 6 percent slopes	9,767	0.8
76C	Williams-Zahl loams, 6 to 9 percent slopes	13,193	1.1
76D	Zahl-Williams loams, 9 to 15 percent slopes	413	*
76F	Zahl-Williams loams, dissected, 15 to 45 percent slopes	7,620	0.6
77	Temvik-Wilton silt loams, 0 to 3 percent slopes	1,831	0.1
77B	Temvik-Williams silt loams, 3 to 6 percent slopes	2,401	0.2
80	Breien fine sandy loam, 0 to 2 percent slopes	3,294	0.3
82	Mckeen loam, 0 to 1 percent slopes	995	*
83	Mckeen loam, ponded, 0 to 1 percent slopes	722	*
85B	Banks loamy fine sand, 0 to 6 percent slopes	5,546	0.4
86	Havrelon fine sandy loam, 0 to 2 percent slopes	1,391	0.1
87	Minnewaukan fine sandy loam, 0 to 2 percent slopes	525	*
88	Havrelon silt loam, 0 to 2 percent slopes	4,853	0.4
91	Lohler silty clay, 0 to 2 percent slopes	1,416	0.1
98	Mandan-Linton silt loams, 0 to 3 percent slopes	2,393	0.2
98B	Linton-Mandan silt loams, 3 to 6 percent slopes	1,263	0.1
99F	Badland, Outcrop-Cabba complex, 9 to 70 percent slopes	4,309	0.3
100	Pits, gravel and sand	967	*
105	Dumps and Pits, mine	186	*
110	Ustorthents, loamy, 0 to 6 percent slopes	19	*
115	Riverwash	1,381	0.1
154F	Arikara-Shambo-Cabba loams, 9 to 70 percent slopes	8,044	0.6
161F	Beisigl-Flasher-Arikara complex, 15 to 70 percent slopes	2,380	0.2
185B	Banks loamy fine sand, slightly wet, 0 to 6 percent slopes	1,376	0.1
186	Havrelon fine sandy loam, slightly wet, 0 to 2 percent slopes	717	*
188	Havrelon silt loam, slightly wet, 0 to 2 percent slopes	2,882	0.2
M-W	Miscellaneous water	136	*
W	Water	13,075	1.1
	Total	1,244,500	100.0

* Less than 0.1 percent.

Formation and Classification of the Soils

This section relates the soils in the survey area to the major factors of soil formation and describes the system of soil classification.

Formation of the Soils

Soil forms through processes acting on deposited or accumulated geologic material. Characteristics of the soil at any given point are determined by (1) the physical, chemical, and mineralogical composition of the parent material; (2) the climate under which the soil material has accumulated and existed since accumulation; (3) the plant and animal life on and in the soil; (4) the relief, or lay of the land; and (5) the length of time that forces of soil formation have acted on the soil material (Buol et al. 1980).

Climate and plant and animal life, are active factors of soil formation. They act on the parent material that has accumulated through the weathering of geological deposits and slowly change it to a natural body that has genetically related horizons. The effects of climate and plant and animal life are conditioned by relief. Finally, time is needed for changing the parent material into soil. Some time is always required for the differentiation of soil horizons. Usually, a long time is required for the development of distinct horizons.

The factors of soil formation are so closely interrelated in their effects on the soil that few generalizations can be made regarding the effects of any one factor unless conditions are specified for the other four. Many of the processes of soil development are unknown.

Parent Material

Parent material is the unconsolidated mass in which a soil forms. It determines the limits of the chemical and mineralogy composition of the soil. The soils of Morton County formed in material of several origins.

Most of the soils in Morton County developed in bedrock. Flasher and Beisigl soils developed in sandstone. Amor and Reeder soils formed in soft mudstone and sandstone. Regent soils formed in soft siltstone and shale. Weathered soft sandstone is the source of some eolian material. Areas of Telfer and Lihen soils formed in these deposits. Other soils, such as Arnegard and Farland, formed in local alluvium that was transported from areas of soft bedrock. Some soils, such as Havrelon and Lohler, formed in alluvium deposited on flood plains. Soils such as Williams and Bowbells, formed in unsorted material or glacial till. This material was deposited in the eastern part of the county as the glacier receded.

Although some parent materials are of common origin, their properties vary greatly, sometimes within small areas, depending on how the materials were deposited.

Geologically, Morton County is located on the edge of the Williston Basin. Some 12,500 feet of sedimentary rock is present on the western end of the county (Bluemle, 1975 and Carlson, 1983). The Hell Creek, Fox Hills, Ludlow, Cannonball, Slope, Bullion Creek, Sentinel Butte, and Golden Valley formations are exposed in the county. Soils developed on poorly consolidated sand, silt, and clay of the upper Cretacious and Tertiary formations or on the glacial till Coleharbor Group (Bluemle, 1975), which is preserved on upland surfaces in the eastern portion of the county.

Other soils formed in recent alluvium (Carlson, 1983). These soils have depositional layers of varying texture and color which have been weathered and transported in the local area. The western end of Morton County also contains large deposits of “scoria” or porcelanite. These are clinkers which formed as the result of heat from burning lignite coal veins usually located in the Sentinel Butte Formation (Carlson, 1983, Bluemle, 1975, and Brandt, 1953). Additional information related to the surface geology of Morton County can be found in publications by Tisdale (1941), Laird and Mitchell (1958), Groenewold et al. (1979), Clausen (1980, 1981), and Tyschsen (1950).

Most of the water for domestic and livestock needs in Morton County is obtained from ground water sources. Areas adjacent to the Missouri River and its tributaries can obtain water from these origins. The most extensive aquifers are found in the Fox Hills formation, which can be up to 1,500 feet deep in the northwestern portion of the county. Water can usually be obtained from glacial drift materials. Other geological formations are considered to be of limited use as sources of ground water. Much of the ground water contains a high concentration of minerals and is of varying quality.

At present, irrigation is limited to areas around the Missouri and Heart Rivers. Caution must be used when applying ground water for irrigation due to the potential for decreased water quality because of salinity in the discharge waters (Ackerman, 1980).

Several processes have been involved in the formation of soils in Morton County. These processes are accumulation of organic matter; solution, transfer, and removal of calcium carbonates and bases; and liberation and translocation of silicate clay minerals. In most soils more than one of these processes have been active in horizon differentiation.

The parent materials in which most of the soils developed initially contained generous amounts of calcium and magnesium carbonate minerals. These minerals have been dissolved by water and removed from the upper horizons of the soil profile. Pure water is not an effective agent for dissolving calcium and magnesium carbonates. These minerals are only slightly soluble in pure water, but become moderately soluble and dissolve much more rapidly in a weak acid. The respiratory activity of plants is a significant factor in dissolving calcium and magnesium carbonates. As plants respire, they give off carbon dioxide. Carbon dioxide dissolves in water to form a weak carbonic acid solution. This facilitates dissolving calcium and magnesium carbonates in the soil.

In a dissolved state, calcium and magnesium are in the form of ions that have a positive net electrical charge. Calcium and magnesium ions are essential elements in plant nutrition, and can either be taken up by plant roots or carried away (leached) with moving soil water. Some of the calcium and magnesium ions are leached from the soil profiles. “Seep” sites along steep slopes that have deposits of recently precipitated calcium and magnesium carbonates provide evidence of leaching.

A large number of the calcium and magnesium ions that dissolved from carbonate mineral ions are translocated to upper soil horizons by a cyclical process of root uptake and ultimate release when plant material decomposes. As vegetation decays, positively charged calcium and magnesium ions move downward with water to the upper horizons of soil profiles. There they are held by the electrostatic forces of negatively charged clay particles and are again available for plant uptake.

Climate

Climate has direct and indirect effects on the formation of soils. Precipitation, temperature, and wind directly affect the weathering and reworking of soil material. The climate indirectly affects soil formation through its effects on the amount and kind of vegetation and animal life on or in the soil.

In addition to weathering soil material, precipitation and temperature affect the leaching and redistribution of carbonates and clay particles and the accumulation of organic matter in the soil. Freezing and thawing help break down soil particles in the parent material, thereby providing more surface area for chemical processes. Cool temperatures affect the content of organic matter by slowing the decay of plant material and animal remains.

Morton County has a continental, semi-arid climate characterized by long, cold winters and short, warm summers. The soil is generally frozen to a depth of 3 to 6 feet from November to April. During this time, except for some effects of frost action, the soil forming processes are mostly dormant. Most of the precipitation falls during the growing season and is distributed in an erratic pattern. It is during this part of the year that soil forming processes influenced by climate are most active. The climate is fairly uniform throughout the county.

Living Organisms

Soils in Morton County formed mainly under grassland vegetation. Grasses provide a plentiful supply of organic matter, which improves the chemical and physical properties of the soil. Fibrous roots of these grasses penetrate the soil to a depth of several feet, making it more porous and more granular. As a result of these changes in the soil, less water runs off the surface and more moisture is available for increased microbiological activity. Decay of plants improves the available water capacity, tilth, and fertility of the soil. Decayed organic matter, accumulating over long periods, gives the surface layer its dark color.

On moderately well drained, nearly level soils, such as Bowbells, the native vegetation is mainly tall and medium-sized grasses. Principal grasses are big bluestem, western wheatgrass, and green needlegrass.

On well drained and excessively drained, nearly level to steep soils, such as Farland, Wabek, and Williams short and medium-sized grasses are dominant. Among these grasses are needlegrass, western wheatgrass, little bluestem, needleandthread, and blue grama.

On the poorly drained and very poorly drained, depressional soils such as Tonka and Dimmick, the vegetation consists of tall grasses, rivergrass, slough sedge, American mannagrass, northern reedgrass, and prairie cordgrass.

Micro-organisms have important effects on soil formation because they feed on undecomposed organic matter and convert it into humus from which plants can obtain nutrients for growth. Bacteria and different kinds of fungi attack leaves and other forms of organic matter. Insects, earthworms, and small burrowing animals help mix the humus with the soil.

Human activities greatly affect soil formation. Management measures can alter soil drainage. They can help to control erosion, thus maintaining fertility. Poor management can increase the susceptibility to erosion and thus result in an unproductive soil.

Topography

Most of Morton County is level to rolling, but some areas are hilly to very steep. Many poorly drained and very poorly drained soils in depressions receive runoff from higher elevations. The steepest areas are breaks around rivers and drainageways. Local differences in relief within a square mile range from less than 10 feet to 400 feet. Relief influences the formation of soil through its effect on drainage, runoff, and erosion. Many differences in the soils of this county result from their topographic position. Among these differences are drainage, thickness of the A horizon, content of organic matter, color, features of the subsoil, thickness of the solum, and degree of horizon differentiation.

Runoff is rapid on steep slopes, and only a small percentage of the rainfall penetrates the soil. Under these conditions, there is little moisture for plant growth and soil development. The soils on steeper slopes are thin and low in organic matter content. They have weak horizonation. Examples are the Cabba and Zahl soils.

Soils on nearly level to rolling slopes are moderately well drained and well drained. Moisture is sufficient to support good stands of mixed native grasses, and the soils have well developed profiles characterized by a very dark grayish brown to very dark brown A horizon and a brown to dark brown B horizon. Examples are the Farnuf and Williams soils. Most of the moderately well drained soils occur on level or slightly concave areas. They generally have a thicker A horizon, a darker colored B horizon, and a greater depth to lime than those on convex, undulating, or rolling landscapes. An example is the Bowbells soils.

Depressional areas that receive large amounts of runoff from higher elevations have somewhat poor to very poor natural drainage. Soils formed in depressions vary widely in profile development, depending on the degree of wetness. Dimmick and Tonka soils exhibit an advanced degree of horizonation because of alternate wet and dry cycles that occur in these depressions. These soils have properties much like soils from areas of much higher precipitation. They are examples of soils in which translocated clays have accumulated in the Bt horizon. Gleying, or the reduction and transfer of iron, has occurred to some degree in all of the very poorly to somewhat poorly drained soils in the county. In these naturally wet soils, this process has had a significant influence on horizon differentiation. The gray color and redoximorphic features of the subsoil indicate the redistribution of reduced iron oxides.

The Missouri River and its tributaries, the Heart, Cannonball, and Knife Rivers are entrenched an average of 200 to 400 feet below the surrounding dissected plains (Ackerman, 1980). Areas near these rivers are influenced by water running over them that resulted in the deposition of sand and gravel. Soils in these areas include Lehr and Stady. Gravel pits may be established in these areas. The materials are used mainly for surfacing secondary roads and as a base for highways. The sand and gravel may be of low quality and onsite investigation is recommended to determine the suitability of the deposits. Excess silt or clay and a high shale content are common limitations for the use of these deposits. Areas alongside these rivers are influenced by flooding resulting in the deposition of sands, silts, and clays. Soils in these areas include Banks, Lohler, and Straw. Many of these areas are now protected by dams and dikes.

Time

The formation of soil is a very slow process. Much time is required for the processes of soil formation to act on the parent material and to form distinct horizons within the soil profile. In geological terms, the soils in the county are young. More time has been available for the formation of Savage soils on uplands than for the formation of Havrelon soils on flood plains. The forces of soil formation have been continually acting on the parent material of the Savage soils; however, Havrelon soils are continually gaining new parent material at the surface as a result of flooding. Savage soils have well-defined horizons whereas Havrelon soils have less distinct horizons.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999). Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or from laboratory measurements. Table 5, “Classification of the Soils,” shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Twelve soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Mollisol.

SUBORDER. Each order is divided into suborders primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Ustoll (*Ust*, meaning burnt, plus *oll*, from Mollisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; type of saturation; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Haplustoll (*Hapl*, meaning minimal horizonation, plus *ustoll*, the suborder of the Mollisols that has an ustic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Pachic* identifies the subgroup that thick epipedon. An example is Pachic Haplustolls.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is fine-loamy, mixed, superactive, frigid Pachic Haplustolls.

SERIES. The series consists of soils within a family that have horizons similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. The texture of the surface layer or of the substratum can differ within a series. An example is the Bowbells soil series.

Table 5.--Classification of the Soils

Soil name	Family or higher taxonomic class
Amor	Fine-loamy, mixed, superactive, frigid Typic Haplustolls
Arikara	Fine-loamy, mixed, superactive, frigid Typic Haplustepts
Arnegard	Fine-loamy, mixed, superactive, frigid Pachic Haplustolls
Banks	Sandy, mixed, frigid Typic Ustifluvents
Beisigl	Mixed, frigid Typic Ustipsamments
Belfield	Fine, smectitic, frigid Glossic Natrustolls
Bowbells	Fine-loamy, mixed, superactive, frigid Pachic Argiustolls
Bowdle	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Pachic Haplustolls
Brandenburg	Fragmental, mixed, frigid Typic Ustorthents
Breien	Sandy, mixed, frigid Mollic Ustifluvents
Bryant	Fine-silty, mixed, superactive, frigid Typic Haplustolls
Cabba	Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents
Cedarpan	Clayey, smectitic, frigid, shallow Natric Durustolls
Chama	Fine-silty, mixed, superactive, frigid Typic Calciustolls
Cohagen	Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents
Daglum	Fine, smectitic, frigid Vertic Natrustolls
Desart	Coarse-loamy, mixed, superactive, frigid Typic Natrustolls
Dimmick	Fine, smectitic, frigid Vertic Epiaquolls
Dogtooth	Fine, smectitic, frigid Leptic Natrustolls
Ekalaka	Coarse-loamy, mixed, superactive, frigid Typic Natrustolls
Farland	Fine-silty, mixed, superactive, frigid Typic Argiustolls
Farnuf	Fine-loamy, mixed, superactive, frigid Typic Argiustolls
Flasher	Mixed, frigid, shallow Typic Ustipsamments
Flaxton	Fine-loamy, mixed, superactive, frigid Pachic Argiustolls
Golva	Fine-silty, mixed, superactive, frigid Typic Haplustolls
Grail	Fine, smectitic, frigid Vertic Argiustolls
Grassna	Fine-silty, mixed, superactive, frigid Pachic Haplustolls
Hamerly	Fine-loamy, mixed, superactive, frigid Aeric Calciaquolls
Harriet	Fine, smectitic, frigid Typic Natraquolls
Havrelon	Fine-loamy, mixed, superactive, calcareous, frigid Typic Ustifluvents
Heil	Fine, smectitic, frigid Typic Natraquerts
Janesburg	Fine, smectitic, frigid Typic Natrustolls
Korchea	Fine-loamy, mixed, superactive, calcareous, frigid Mollic Ustifluvents
Korell	Fine-loamy, mixed, superactive, frigid Fluventic Haplustolls
Krem	Fine-loamy, mixed, superactive, frigid Typic Paleustolls
Lakota	Coarse-loamy, mixed, superactive, frigid Leptic Natrustolls
Lallie	Fine, smectitic, calcareous, frigid Vertic Fluvaquents
Lambert	Fine-silty, mixed, superactive, calcareous, frigid Typic Ustorthents
Lawther	Fine, smectitic, frigid Typic Haplusterts
Lefor	Fine-loamy, mixed, semiactive, frigid Typic Argiustolls
Lehr	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Haplustolls
Lihen	Sandy, mixed, frigid Entic Haplustolls
Linton	Coarse-silty, mixed, superactive, frigid Typic Haplustolls
Lohler	Fine, smectitic, calcareous, frigid Vertic Ustifluvents
Magnus	Fine, smectitic, frigid Vertic Haplustolls
Mandan	Coarse-silty, mixed, superactive, frigid Pachic Haplustolls
Manning	Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Haplustolls
Marysland	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Calciaquolls
Maschetah	Fine-silty, mixed, superactive, frigid Typic Calciustolls
Max	Fine-loamy, mixed, superactive, frigid Typic Haplustolls
Mckeen	Fine-loamy, mixed, superactive, calcareous, frigid Typic Fluvaquents
Minnewaukan	Mixed, frigid Typic Psammaquents
Moreau	Fine, smectitic, frigid Vertic Haplustolls
Morton	Fine-silty, mixed, superactive, frigid Typic Argiustolls
Noonan	Fine, smectitic, frigid Typic Natrustolls
Omio	Fine-silty, mixed, superactive, frigid Typic Haplustolls
Parnell	Fine, smectitic, frigid Vertic Argiaquolls
Parshall	Coarse-loamy, mixed, superactive, frigid Pachic Haplustolls

Table 5.--Classification of the Soils--Continued

Soil name	Family or higher taxonomic class
Peta	Fine-loamy, mixed, superactive, frigid Pachic Argiustolls
Reeder	Fine-loamy, mixed, superactive, frigid Typic Argiustolls
Regan	Fine-silty, mixed, superactive, frigid Typic Calciaquolls
Regent	Fine, smectitic, frigid Vertic Argiustolls
Rhoades	Fine, smectitic, frigid Leptic Vertic Natrustolls
Ridgelawn	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid Typic Ustifluvents
Ringling	Loamy-skeletal over fragmental, mixed, superactive, frigid Typic Haplustolls
Savage	Fine, smectitic, frigid Vertic Argiustolls
Schaller	Sandy, mixed, frigid Entic Haplustolls
Scorio	Clayey over loamy, smectitic over mixed, superactive, calcareous, frigid Vertic Ustifluvents
Searing	Fine-loamy over fragmental, mixed, superactive, frigid Typic Haplustolls
Sen	Fine-silty, mixed, superactive, frigid Typic Haplustolls
Seroco	Mixed, frigid Typic Ustipsamments
Shambo	Fine-loamy, mixed, superactive, frigid Typic Haplustolls
Stady	Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Haplustolls
Stirum	Coarse-loamy, mixed, superactive, frigid Typic Natraquolls
Straw	Fine-loamy, mixed, superactive, frigid Cumulic Haplustolls
Sutley	Coarse-silty, mixed, superactive, frigid Typic Calciustolls
Tally	Coarse-loamy, mixed, superactive, frigid Typic Haplustolls
Telfer	Sandy, mixed, frigid Entic Haplustolls
Temvik	Fine-silty, mixed, superactive, frigid Typic Haplustolls
Tonka	Fine, smectitic, frigid Argiaquic Argialbolls
Trembles	Coarse-loamy, mixed, superactive, calcareous, frigid Typic Ustifluvents
Ustipsamments	Ustipsamments
Ustorthents	Ustorthents
Vebar	Coarse-loamy, mixed, superactive, frigid Typic Haplustolls
Velva	Coarse-loamy, mixed, superactive, frigid Fluventic Haplustolls
Virgelle	Sandy over clayey, mixed over smectitic, frigid Entic Haplustolls
Wabek	Sandy-skeletal, mixed, frigid Entic Haplustolls
Wanagan	Loamy-skeletal, mixed, superactive, frigid Typic Haplustolls
Wayden	Clayey, smectitic, calcareous, frigid, shallow Typic Ustorthents
Werner	Loamy, mixed, superactive, frigid, shallow Entic Haplustolls
Whitebird	Coarse-loamy, mixed, superactive, frigid Leptic Natrustolls
Williams	Fine-loamy, mixed, superactive, frigid Typic Argiustolls
Wilton	Fine-silty, mixed, superactive, frigid Pachic Haplustolls
Zahl	Fine-loamy, mixed, superactive, frigid Typic Calciustolls

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetical order.

Characteristics of the soil and the material in which it formed are identified for each series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the Soil Survey Manual (Soil Survey Staff, 1993). Many of the technical terms used in the descriptions are defined in Soil Taxonomy (Soil Survey Staff, 1999). Effervescence refers to disseminated lime throughout the horizon. Following the pedon description is the range of important characteristics of the soil series.

Amor Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 1 to 25 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Amor loam, 2,300 feet east and 180 feet north of the southwest corner of sec. 2, T. 131 N., R. 103 W. (Colors are for dry soil unless otherwise stated.) (fig. 15)

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) dry; weak medium subangular blocky structure parting to weak medium and fine granular; slightly hard, friable, slightly sticky and nonplastic; many roots and pores; neutral; abrupt smooth boundary.

Bw1—8 to 13 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; a few stains of dark grayish brown (10YR 4/2) dry on faces of peds; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common roots; many fine pores; neutral; gradual wavy boundary.

Bw2—13 to 19 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine pores; slight effervescence; slightly alkaline; gradual wavy boundary.

Bk—19 to 31 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few fine roots; common fine pores; few masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

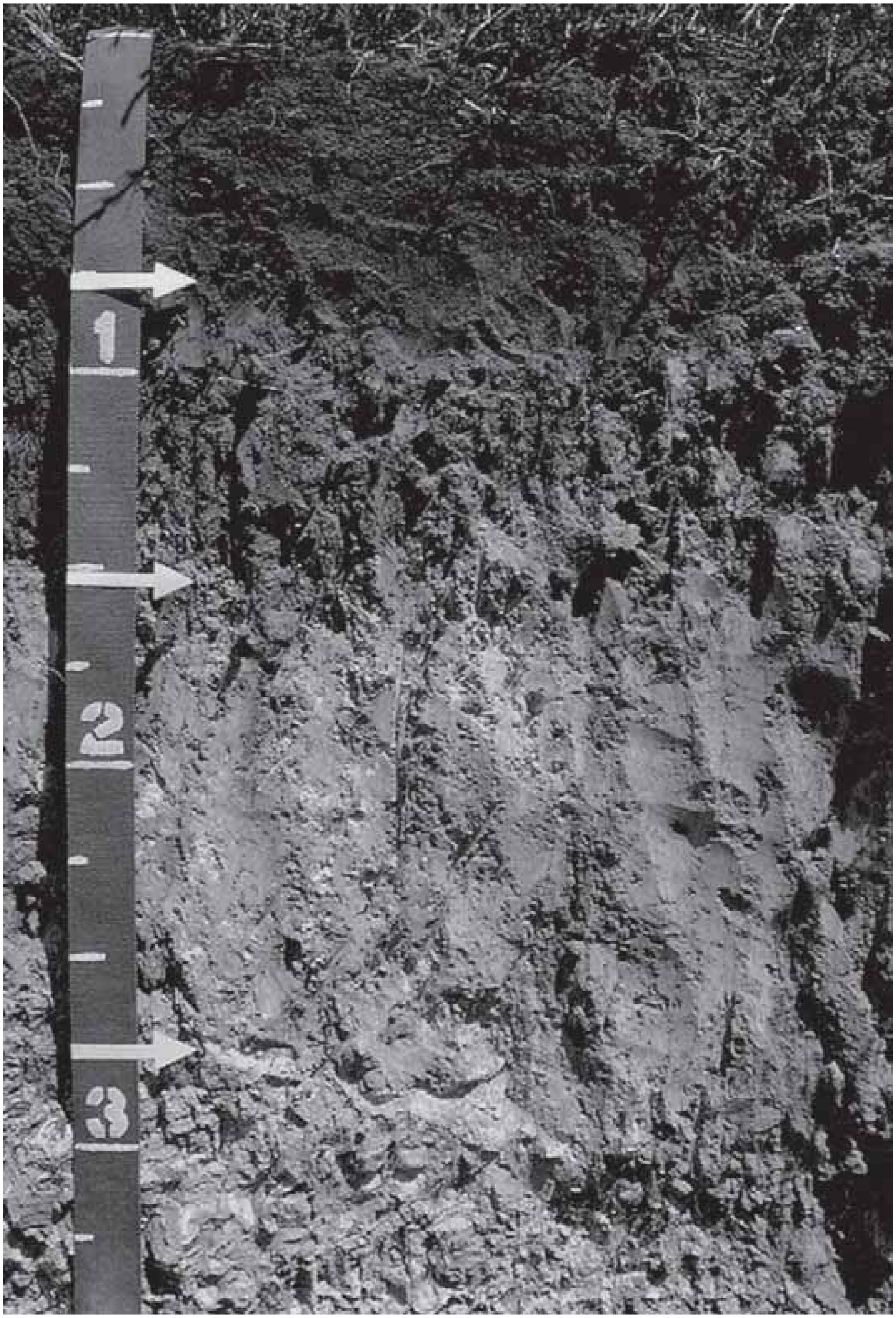

Figure 15. Typical profile of Amor loam.

Cr—31 to 60 inches; pale yellow and light gray (2.5Y 7/3 and 5Y 7/2) soft sandstone and siltstone, light olive gray and light olive brown (5Y 6/2 and 2.5Y 5/3) moist; slight effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 8 to 16 inches
Depth to lime: 14 to 40 inches
Depth to soft bedrock: 20 to 40 inches
Notes: Some pedons have a BCk horizon.

Ap horizon:
Value: 3 or 4, 2 or 3 moist

Bw horizon:
Value: 4 to 6, 3 to 5 moist

Bk horizon:
Value: 5 to 7, 4 to 6 moist

Cr horizon:
Hue: 10YR, 2.5Y or 5Y
Value: 3 to 7, 3 to 5 moist
Notes: It is soft mudstone, siltstone, or sandstone.

Arikara Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Alluvium
Slope: 15 to 70 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Haplustepts

Typical pedon:
Arikara loam, 2,000 feet north and 1,000 feet east of the southwest corner of sec. 11, T. 148 N., R. 96 W. (Colors are for dry soil unless otherwise stated.)

0i—0 to 1 inches; forest litter and partially decomposed forest litter; abrupt smooth boundary.

A—1 to 2 inches; dark gray (10YR 4/1) loam, black (10YR 2/1) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; few coarse, many fine and medium roots; slightly acid; abrupt wavy boundary.

Bw1—2 to 7 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common fine and medium roots; neutral; abrupt smooth boundary.

Bw2—7 to 14 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; hard, friable, sticky and plastic; common fine and medium roots; neutral; abrupt smooth boundary.

Bk—14 to 39 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 5/2) moist; moderate medium subangular blocky structure; hard, friable, sticky and plastic; few fine and medium roots; common masses of lime; strong effervescence; slightly alkaline; gradual wavy boundary.

C1—39 to 54 inches; light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/4) moist; massive; soft, very friable, slightly sticky and slightly plastic; slight effervescence; slightly alkaline; gradual wavy boundary.

C2—54 to 60 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, olive brown (2.5Y 4/4) moist; massive; loose, nonsticky and nonplastic; slight effervescence; slightly alkaline.

Range in Characteristics

Depth to lime: 11 to 28 inches

A horizon:
Value: 2 to 5, 2 or 3 moist
Chroma: 1 or 2
Texture: loam or clay loam

Bw horizon:
Hue: 2.5Y or 10YR
Value: 5 or 6, 4 or 5 moist
Chroma: 2 to 4
Texture: loam, clay loam, silt loam, or silty clay loam

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7, 4 or 5 moist
Chroma: 1 to 4
Texture: loam, fine sandy loam, clay loam, or silt loam

Arnegard Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 25 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Pachic Haplustolls

Typical pedon:
Arnegard loam, 1,575 feet north and 1,700 feet west of the southeast corner of sec. 35, T. 132 N., R. 93 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine and many very fine roots; neutral; clear smooth boundary.

A—6 to 13 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to weak fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine roots; neutral; gradual wavy boundary.

Bw1—13 to 27 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; many very fine roots; neutral; clear wavy boundary.

Bw2—27 to 36 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; slightly alkaline; clear wavy boundary.

Bk—36 to 60 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) dry; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; few fine irregular masses of lime; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to more than 30 inches
Notes: Some pedons have a BCk or C horizon.

A horizon:
Value: 3 or 4, 2 or 3 moist

Bw horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 to 4 moist

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7 dry
Chroma: 2 to 4

Banks Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 3 percent

Taxonomic class: Sandy, mixed, frigid Typic Ustifluvents

Typical pedon:
Banks very fine sandy loam, 2,165 feet east and 1,585 feet south of the northwest corner of sec. 5, T. 140 N., R. 81 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 4 inches; light brownish gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium granular structure; very friable; many roots; slight effervescence; slightly alkaline; abrupt wavy boundary.

C1—4 to 30 inches; light brownish gray (2.5Y 6/2) fine sand, grayish brown (2.5Y 5/2) moist; single grain; loose; few roots; slight effervescence; slightly alkaline; abrupt wavy boundary.

C2—30 to 60 inches; light brownish gray (2.5Y 6/2) loamy fine sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose; some very thin (1/8 to 1/2 inch) bands of silt and very fine sand; slight effervescence; slightly alkaline.

Range in Characteristics

A horizon:
Hue: 10YR or 2.5Y

Value: 5 or 6, 3 or 4 moist
Chroma: 2 or 3
Texture: very fine sandy loam or loamy fine sand

C horizon:
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Notes: It contains strata of very fine sand or finer materials in most pedons.

Beisigl Series

Depth class: Moderately deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landform: Uplands
Parent material: Residuum
Slope: 3 to 25 percent

Taxonomic class: Mixed, frigid Typic Ustipsamments

Typical pedon:
Beisigl loamy fine sand, 1,460 feet south and 100 feet west of the northeast corner of sec. 15, T. 129 N., R. 92 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 5 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; many very fine roots; many very fine pores; 1 percent sandstone channers; slight effervescence; slightly alkaline; clear smooth boundary.

Bk1—5 to 12 inches; light yellowish brown (2.5Y 6/4) loamy fine sand, light olive brown (2.5Y 5/4) moist; weak medium prismatic structure parting to weak fine granular; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine pores; 1 percent sandstone channers; disseminated lime; strong effervescence; moderately alkaline; clear smooth boundary.

Bk2—12 to 27 inches; pale yellow (2.5Y 7/4) loamy fine sand, light yellowish brown (2.5Y 6/4) moist; weak coarse and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots; common very fine pores; 1 percent coarse sandstone channers; disseminated lime; strong effervescence; moderately alkaline; gradual smooth boundary.

Cr—27 to 60 inches; pale yellow (2.5Y 7/4) soft calcareous sandstone, light yellowish brown (2.5Y 6/4) moist; hard and brittle when dry; fractures greater than 4 inches apart.

Range in Characteristics

Depth to soft bedrock: 20 to 40 inches

A horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 or 4 moist
Chroma: 2 or 3
Texture: loamy fine sand, fine sandy loam, or loamy sand

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist

Chroma: 2 to 4
Texture: loamy fine sand, fine sand, or loamy sand

Cr horizon:
Value: 6 or 7, 5 or 6 moist
Chroma: 2 to 6
Notes: The sandstone is slightly hard or hard, brittle when dry, and easily crushed when moist.

Belfield Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 3 percent
Notes: These soils are sodic.

Taxonomic class: Fine, smectitic, frigid Glossic Natrustolls

Typical pedon:
Belfield silty clay loam, 2,320 feet east and 235 feet north of the southwest corner of sec. 36, T. 137 N., R. 98 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 9 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate very fine subangular blocky; very hard, friable; many roots; many very fine pores; common uncoated sand grains on faces of peds; slightly acid; clear wavy boundary.

E/B—9 to 12 inches; light brownish gray (2.5Y 6/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to weak medium platy which parts to strong very fine subangular blocky; very hard, friable; many roots; many very fine pores; thin light gray (10YR 7/1) dry uncoated sand grains on top of plates and discontinuous on bottom of plates; slightly acid; clear smooth boundary.

Btn1—12 to 17 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; strong medium prismatic structure parting to strong medium and fine angular blocky; extremely hard, friable; common roots; many very fine pores; faint continuous clay films on faces of peds; common uncoated sand grains in the upper part and few in the lower part; neutral; clear wavy boundary.

Btn2—17 to 24 inches; light olive brown (2.5Y 5/4) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium and fine subangular blocky; very hard, friable; few roots; many fine pores; faint clay films of olive brown (2.5Y 4/3); slightly alkaline; clear wavy boundary.

Bk1—24 to 31 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; very hard, friable; few roots; many fine and very fine pores; common threads and masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Bk2—31 to 43 inches; light brownish gray (2.5Y 6/2) and white (2.5Y 8/2) silty clay loam, dark grayish brown (2.5Y 4/2) and light brownish gray (2.5Y 6/2) moist;

weak medium prismatic structure parting to moderate medium subangular blocky; very hard, friable; many fine pores; many threads and masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

C—43 to 60 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; massive; very hard, friable; many fine pores; violent effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 25 inches
Depth to lime: 22 to 55 inches
Notes: Some pedons have a Bky, BC, or BCky horizon.

A horizon:
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3

E/B horizon:
Notes: Some cultivated pedons do not have an E/B horizon.

Btn horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 2 to 5 moist
Texture: clay loam, silty clay, or silty clay loam

C horizon:
Value: 5 to 7, 4 or 5 moist
Texture: loam, clay loam, or silty clay loam

Bowbells Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 6 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Pachic Argiustolls

Typical pedon:
Bowbells loam, 2,040 feet south and 365 feet west of the northeast corner of sec. 32, T. 151 N., R. 85 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium prismatic and moderate medium subangular blocky structure parting to strong fine granular; slightly hard, friable; many roots; many fine pores; neutral; clear wavy boundary.

Bt1—6 to 14 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, friable; common fine roots; many fine pores; faint very dark brown (10YR 2/2) clay films on faces of peds; neutral; gradual wavy boundary.

Bt2—14 to 23 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, friable; common fine roots; common fine pores; faint clay films on faces of prisms and blocks; neutral; clear wavy boundary.

Bk—23 to 36 inches; pale yellow (2.5Y 7/4) loam, light olive brown (2.5Y 5/4) moist; weak medium and fine subangular blocky structure; hard, friable; few fine roots; common fine masses of lime; violent effervescence; moderately alkaline; clear wavy boundary.

C—36 to 60 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; massive but fractures into weak laminar and fine subangular blocks characteristic of till; hard, firm; few fine masses of lime; few stones; slight effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to more than 30 inches
Notes: Some pedons have a BCk horizon.

A horizon:
Value: 3 to 5, 2 or 3 moist

Bt horizon:
Hue: 10YR or 2.5Y
Value: 3 to 6, 2 to 4 moist
Chroma: 2 to 4

Bk horizon:
Hue: 10YR or 2.5Y
Value: 4 to 7, 3 to 6 moist
Chroma: 2 to 4
Texture: clay loam or loam

C horizon:
Value: 4 to 7, 3 to 5 moist
Chroma: 2 to 4
Texture: loam or clay loam

Bowdle Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part and rapid in the lower part
Landform: Terraces
Parent material: Alluvium
Slope: 0 to 6 percent

Taxonomic class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Pachic Haplustolls

Typical pedon:
Bowdle loam, 265 feet east and 230 feet south of northwest corner of sec. 7, T. 122 N., R. 73 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate fine and medium granular structure; soft, friable, slightly plastic; neutral; abrupt smooth boundary.

Bw1—8 to 16 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate medium prismatic structure parting to moderate medium angular and subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; neutral; clear smooth boundary.

Bw2—16 to 22 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) crushing to very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few pebbles coated with lime; neutral; abrupt wavy boundary.

Bk—22 to 25 inches; grayish brown (2.5Y 5/2) gravelly loam, very dark grayish brown (2.5Y 3/2) crushing to dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, very friable, slightly sticky and slightly plastic; common fine accumulations of lime; strong effervescence; slightly alkaline; abrupt wavy boundary.

2C1—25 to 30 inches; varicolored, very gravelly loamy sand; common fine fragments of shale; strong effervescence; slightly alkaline; clear smooth boundary.

2C2—30 to 60 inches; varicolored, very gravelly loamy sand; common fine fragments of shale; slight effervescence; slightly alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to more than 28 inches
Depth to sand and gravel: 20 to 40 inches
Notes: Some pedons do not have a Bk horizon.

Ap horizon:
Value: 3 or 4, 2 or 3 moist

2C horizon:
Hue: 10YR or 2.5Y
Notes: It has 5 to 40 percent gravel, but averages more than 15 percent above a depth of 40 inches.

Brandenburg Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderate in the upper part and very rapid in the lower part
Landform: Uplands
Parent material: Residuum
Slope: 3 to 70 percent

Taxonomic class: Fragmental, mixed, frigid Typic Ustorthents

Typical pedon:
Brandenburg channery loam, 1,485 feet north of the southwest corner of sec. 33, T. 132 N., R. 101 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 4 inches; pinkish gray (7.5YR 6/2) channery loam, brown (7.5YR 4/2) moist; moderate fine granular structure; slightly hard, very friable; many fine roots; 15 to 30 percent by volume small porcelanite chips; slight effervescence; slightly alkaline; clear wavy boundary.

C1—4 to 10 inches; reddish yellow (5YR 6/6) very channery loam, yellowish red (5YR 4/6) moist; weak medium and fine subangular blocky structure; soft, very friable; over 50 percent by volume porcelanite with thin carbonate crusts on undersides; strong effervescence; moderately alkaline; clear irregular boundary.

C2—10 to 60 inches; shattered porcelanite which is slightly weathered in upper 2 to 10 inches; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to lime: 0 to 3 inches
Depth to fragmental material: 10 to 20 inches

A horizon
Hue: 5YR or 7.5YR
Value: 4 to 6
Chroma: 2 to 4

C horizon
Hue: 5YR or 7.5YR
Value: 5 to 7, 3 to 5 moist
Chroma: 2 to 4

Breien Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid over rapid
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 3 percent

Taxonomic class: Sandy, mixed, frigid Mollic Ustifluvents

Typical pedon:
Breien fine sandy loam, 1,020 feet west and 380 feet south of the northeast corner of sec. 36, T. 132 N., R. 84 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; neutral; abrupt smooth boundary.

C1—6 to 10 inches; dark brown (10YR 3/3) stratified fine sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine roots; 1/2 inch to 1 1/4 inch thick strata of loam and loamy fine sand; neutral; clear smooth boundary.

C2—10 to 15 inches; dark grayish brown (10YR 4/2) stratified fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; few fine roots; 1/2 inch to 1 1/2 inch thick strata of loam, very fine sandy loam and sandy loam; slightly alkaline; clear irregular boundary.

C3—15 to 22 inches; light brownish gray (2.5Y 6/2) stratified loamy fine sand, grayish brown (2.5Y 5/2) moist; weak medium subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; few fine roots; thin strata of sand; strong effervescence; moderately alkaline; clear wavy boundary.

C4—22 to 60 inches; light brownish gray (2.5Y 6/2) stratified fine sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; slightly alkaline.

Range in Characteristics

Depth to lime: More than 10 inches
Depth to loamy fine sand and coarser material: 14 to 20 inches
Notes: Some pedons contain one or more layers of very fine sand, loam, or finer materials. Some pedons have thin layers of gravel.

A horizon:
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3

C horizon:
Texture: fine sandy loam, fine sand, loamy fine sand, loamy sand, or sand
Notes: Where fine sandy loam is present, it is in the upper 4 to 15 inches only.

Bryant Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Loess
Slope: 0 to 6 percent

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Bryant loam, 2,360 feet east and 215 feet north of the southwest corner of sec. 21, T. 123 N., R. 71 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak coarse subangular blocky and moderate fine and medium granular structure; slightly hard, very friable; neutral; abrupt smooth boundary.

Bw—8 to 15 inches; grayish brown (10YR 5/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few rock fragments; neutral; abrupt wavy boundary.

Bk1—15 to 19 inches; light brownish gray (2.5Y 6/2) loam, olive brown (2.5Y 4/4) moist; weak medium prismatic structure; soft, friable, slightly sticky and slightly plastic; few rock fragments; common medium accumulations of lime; strong effervescence (17 percent calcium carbonate); moderately alkaline; clear smooth boundary.

Bk2—19 to 32 inches; light brownish gray (2.5Y 6/2) loam, olive brown (2.5Y 4/4) moist; massive; soft, friable; few rock fragments; common coarse accumulations of lime; violent effervescence (24 percent calcium carbonate); moderately alkaline; clear smooth boundary.

C—32 to 60 inches; yellowish brown (10YR 5/4) loam, dark brown (10YR 4/3) moist; many medium prominent reddish yellow (7.5YR 7/8) dry redoximorphic concentrations and light gray (10YR 7/1) dry redoximorphic depletions; massive;

soft, friable; few rock fragments; strong effervescence (14 percent calcium carbonate); moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to lime: 11 to 27 inches

Ap horizon:
Value: 4 or 5, 2 or 3 moist

Bw horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 to 5 moist
Chroma: 2 to 4
Texture: loam, silt loam, silty clay loam, or clay loam

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 or 6, 4 or 5 moist
Chroma: 2 to 4
Texture: loam, silty clay loam, or silt loam

C horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: loam, silt loam, clay loam, or silty clay loam

Cabba Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 3 to 50 percent
Notes: These soils are calcareous.

Taxonomic class: Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents

Typical pedon:
Cabba loam, 2,100 feet north and 1,000 feet east of the southwest corner of sec. 15, T. 21 N., R. 9 E. (Colors are for dry soil unless otherwise stated.)

A—0 to 3 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; slight effervescence; slightly alkaline; clear smooth boundary.

Bk1—3 to 8 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine pores; common fine masses of lime; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—8 to 15 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; strong thin platy structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots; common very fine pores; common fine masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Cr—15 to 60 inches; pale brown (10YR 6/3) semiconsolidated sedimentary beds consisting of interbedded sandstone and shale, brown (10YR 5/3) moist; few very fine and fine roots in vertical cracks in upper part; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to soft bedrock: 10 to 20 inches

A horizon:
Hue: 10YR or 2.5Y
Value: 3 to 6, 3 or 4 moist
Chroma: 1 to 4

Bk horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 8, 4 to 7 moist
Chroma: 1 to 6
Texture: loam, silt loam, clay loam, or silty clay loam

Cr horizon:
Notes: It is interbedded layers of siltstone, sandstone or shale that crush to loam, silt loam, very fine sandy loam, clay loam, or silty clay loam

Cedarpan Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Very slow
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 35 percent
Notes: These soils are sodic.

Taxonomic class: Clayey, smectitic, frigid, shallow Natric Durustolls

Typical pedon:
Cedarpan loam, 1,500 feet east and 550 feet south of the northwest corner of sec. 27, T. 143 N., R. 99 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 4 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky and weak medium granular structure; soft, friable, slightly sticky and slightly plastic; many very fine roots throughout; 18 percent clay; neutral; clear smooth boundary.

BE—4 to 9 inches; brown (10YR 5/3) silt loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure parting to weak fine platy; soft, friable, slightly sticky and slightly plastic; common very fine roots throughout; 18 percent clay; neutral; clear smooth boundary.

Btn—9 to 15 inches; brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; strong medium columnar structure parting to strong fine angular blocky; hard, firm, sticky and plastic; common very fine roots throughout; common very fine low continuity tubular pores; 44 percent clay; many prominent continuous clay films throughout; slightly alkaline; abrupt wavy boundary.

2Bqm—15 to 26 inches; indurated silicrete; slightly alkaline; abrupt wavy boundary; fine-earth fraction is grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; this fraction makes up about 5 percent of the horizon; roots are in fissures.

3Btn—26 to 35 inches; gray (2.5Y 5/1) silty clay, dark gray (2.5Y 4/1) moist; strong fine angular blocky structure; hard, firm, sticky and plastic; many prominent continuous clay films throughout; common irregular medium masses of silica; moderately alkaline; gradual wavy boundary.

3Btny—35 to 45 inches; gray (2.5Y 6/1) silty clay, gray (2.5Y 5/1) moist; strong fine angular blocky structure; hard, firm, sticky and plastic; common continuous prominent clay films throughout; common medium irregular masses of silica pedogenic throughout; common coarse rounded nests of gypsum pedogenic throughout; moderately alkaline; gradual wavy boundary.

3BC—45 to 54 inches; gray (2.5Y 6/1) silty clay, gray (2.5Y 5/1) moist; massive; hard, friable, sticky and plastic; common medium irregular masses of silica pedogenic throughout; moderately alkaline; gradual wavy boundary.

3Cy—54 to 80 inches; gray (2.5Y 6/1) silty clay, gray (2.5Y 5/1) moist; massive; hard, friable, sticky and plastic; common fine rounded nests of gypsum pedogenic throughout; common medium irregular masses of silica pedogenic throughout; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to the Bqm horizon: 10 to 20 inches
Notes: Some pedons have an E horizon.

A horizon:
Hue: 7.5YR or 10YR
Value: 4 or 5
Chroma: 2 or 3

BE horizon:
Value: 5 or 6, 3 to 5 moist
Chroma: 2 or 3
Texture: silt loam or loam

Btn horizon:
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 to 7, 3 to 6 moist
Chroma: 2 to 4
Texture: silty clay, clay, clay loam, or silty clay loam
Notes: It has lime or gypsum in the lower part in some pedons.

2Bqm horizon:
Hue: 10YR or 2.5Y
Value: 4 or 5, 3 or 4 moist
Chroma: 2 to 4
Texture: silty clay or silty clay loam
Note: It is 1 to 10 percent fine earth material.

3Btn horizon:
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 5 to 8, 4 to 7 moist
Chroma: 0 to 3
Texture: silty clay, silty clay loam, or clay
Notes: It has lime or gypsum in the lower part of some pedons.

3BC horizon:
Hue: 2.5Y, 5Y, or neutral
Value: 6 to 8, 5 to 7 moist
Chroma: 0 to 2

3Cy horizon:
Hue: 2.5Y, 5Y, or neutral
Value: 6 to 8, 5 to 7 moist
Chroma: 0 to 3
Texture: silty clay or silty clay loam
Notes: It does not have gypsum in some pedons.

Chama Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 0 to 45 percent
Notes: These soils are highly calcareous.

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Calciustolls

Typical pedon:
Chama silt loam, 1,120 feet east and 1,180 feet north of the southwest corner of sec. 15, T. 136 N., R. 99 W. (Colors are for dry soil unless otherwise stated.) (fig. 16)

A—0 to 4 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; neutral; abrupt smooth boundary.

Bw—4 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and nonplastic; slight effervescence; slightly alkaline; clear smooth boundary.

Bk1—8 to 13 inches; light gray (2.5Y 7/2) silt loam, light olive brown (2.5Y 5/4) moist; weak medium prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, slightly sticky and nonplastic; many fine masses of lime; violent effervescence; slightly alkaline; clear smooth boundary.

Bk2—13 to 22 inches; light yellowish brown (2.5Y 6/4) silt loam, olive brown (2.5Y 4/4) dry; weak medium subangular blocky and weak thick platy structure; slightly hard, friable, slightly sticky and nonplastic; many medium masses of lime; violent effervescence; slightly alkaline; clear smooth boundary.

BCk—22 to 34 inches; light yellowish brown (2.5Y 6/4) silt loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic;

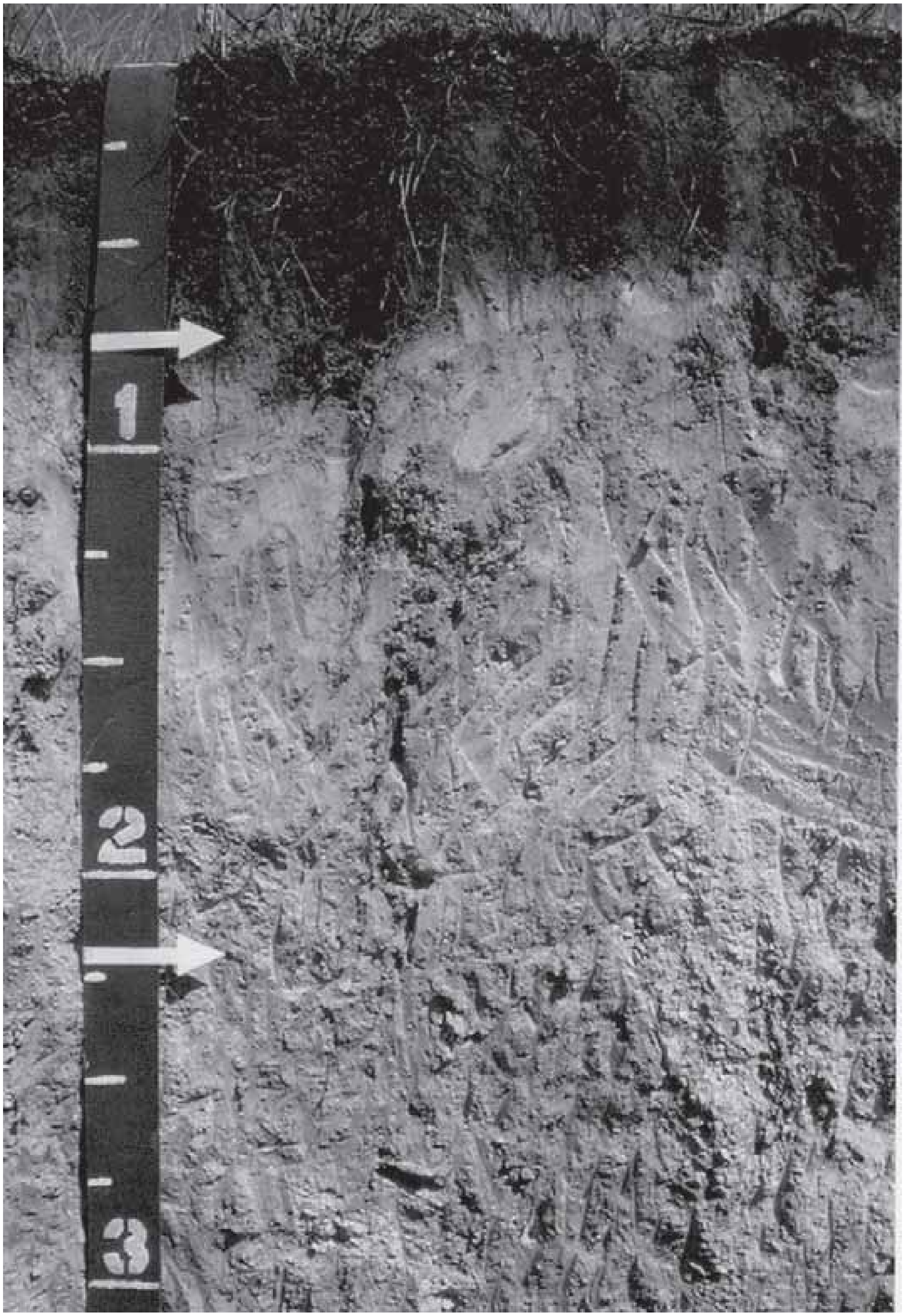

Figure 16. Typical profile of Chama silt loam.

many large lime concretions; slight effervescence; slightly alkaline; gradual wavy boundary.

Cr—34 to 60 inches; pale yellow (2.5Y 7/4) soft siltstone, light olive brown (2.5Y 5/4) moist; slight effervescence; slightly alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 10 inches
Depth to soft bedrock: 20 to 40 inches
Notes: Some pedons have a C horizon above the Cr horizon.

A horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 or 3 moist
Texture: silt loam, silty clay loam, clay loam, or loam

Bw horizon:
Hue: 2.5Y or 10YR
Value: 4 to 7, 3 to 6 moist
Chroma: 2 or 3
Texture: silt loam or silty clay loam

Bk horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 7, 3 to 6 moist
Texture: silt loam or silty clay loam

Cohagen Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Uplands
Parent material: Residuum
Slope: 6 to 50 percent
Notes: These soils are calcareous.

Taxonomic class: Loamy, mixed, superactive, calcareous, frigid, shallow Typic Ustorthents

Typical pedon:
Cohagen fine sandy loam, 2,360 feet east and 250 feet north of the southwest corner of sec. 29, T. 143 N., R. 85. W. (Colors are for dry soil unless otherwise stated.)

A—0 to 3 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak medium granular; slightly hard, very friable; many roots; slight effervescence; slightly alkaline; clear wavy boundary.

C1—3 to 8 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak medium and fine subangular blocky structure; slightly hard, very friable; common roots; slight effervescence; slightly alkaline; gradual boundary.

C2—8 to 17 inches; light yellowish brown (2.5Y 6/4) and light olive brown (2.5Y 5/5) fine sandy loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; hard, friable; common grading to few roots; 25 percent soft sandstone fragments; slight effervescence; moderately alkaline; clear wavy boundary.

Cr—17 to 40 inches; pale yellow (2.5Y 7/4) and light yellowish brown (2.5Y 6/4) soft calcareous sandstone, light olive brown (2.5Y 5/4) moist; massive; slightly hard and brittle; soft and easily crushed; few roots in cracks in upper part; few seams of lime.

Range in Characteristics

Notes: Depth to soft bedrock is 10 to 20 inches.

Ap horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 or 4 moist
Chroma: 2 or 3

C horizon:
Hue: 2.5Y or 10YR
Value: 5 to 7, 4 or 5 moist

Daglum Series

Depth class: Deep and very deep
Drainage class: Well drained
Permeability: Slow
Landform: Terraces and uplands
Parent material: Alluvium and residuum
Slope: 0 to 9 percent
Notes: These soils are sodic.

Taxonomic class: Fine, smectitic, frigid Vertic Natrustolls

Typical pedon:
Daglum silt loam, 1,950 feet east and 1,355 feet north of the southwest corner of sec. 26, T. 132 N., R. 98 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; slightly acid; abrupt smooth boundary.

E—7 to 8 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium and coarse subangular blocky structure parting to moderate fine subangular blocky and weak medium platy; slightly hard, friable, slightly sticky and slightly plastic; many very fine pores; light gray (10YR 7/2) dry coatings; slightly acid; clear smooth boundary.

Btn1—8 to 14 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong fine and medium columnar structure parting to strong fine and medium angular blocky; extremely hard, very firm, very sticky and plastic; common very fine roots along faces of peds; many very fine pores; light gray (10YR 7/2) dry silt coatings on tops of columns; many faint clay films on faces of peds; very dark brown (10YR 2/2) coatings on faces of peds; slightly alkaline; gradual smooth boundary.

Btn2—14 to 18 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; strong medium and coarse prismatic structure parting to strong fine and medium angular blocky; extremely hard, very firm, very sticky and very plastic; common very fine roots along faces of peds; many very fine pores; many faint clay films on faces of peds; very dark brown (10YR 2/2) coatings on faces of peds; moderately alkaline; clear smooth boundary.

Bky1—18 to 26 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; strong fine and medium angular and subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots; many very fine pores; few faint clay films on faces of peds; very dark grayish brown (10YR 3/2) coatings on faces of peds; few fine gypsum crystals; common fine and medium irregularly shaped masses of lime; strong effervescence; strongly alkaline; clear smooth boundary.

Bky2—26 to 32 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, sticky and plastic; common very fine roots; common very fine pores; common fine and medium gypsum crystals; common fine and medium irregularly shaped masses of lime; violent effervescence; strongly alkaline; clear smooth boundary.

BCk—32 to 47 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; many very fine pores; common fine threads of lime; violent effervescence; moderately alkaline; clear wavy boundary.

C—47 to 60 inches; light yellowish brown (2.5Y 6/4) clay, light olive brown (2.5Y 5/4) moist; common fine distinct brownish yellow (10YR 6/8) dry redoximorphic concentrations; weak medium and coarse subangular blocky structure; extremely hard, very firm, very sticky and very plastic; few very fine roots; common very fine pores; few fine gypsum crystals; common fine irregularly shaped masses of lime; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to gypsum or other salts: 16 to 36 inches
Depth to soft bedrock: 40 to 60 inches in map unit 41C and more than 60 inches in map units 16D, 28, 28B, 40C, 41B and 43C.
Notes: Pedons in map unit 41C have a Cr horizon between a depth of 40 and 60 inches.

A horizon:
Value: 4 or 5, 2 or 3 moist

E horizon:
Hue: 10YR or 2.5Y
Value: 4 to 7, 3 to 5 moist
Notes: Some cultivated pedons do not have an E horizon.

Btn horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 to 5 moist
Texture: clay loam, silty clay loam, clay, or silty clay

Desart Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow

Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 9 percent
Notes: These soils are sodic.

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Typic Natrustolls

Typical pedon:
Desart fine sandy loam, 1,300 feet west and 300 feet south of the northeast corner of sec. 28, T. 131 N., R. 81 W. (Colors are for dry soil unless otherwise stated.)

A1—0 to 11 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; slightly acid; clear smooth boundary.

A2—11 to 20 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; many very fine roots; neutral; clear smooth boundary.

E—20 to 24 inches; light brownish gray (2.5Y 6/2) loamy fine sand, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure parting to weak coarse platy; soft, very friable, nonsticky and nonplastic; common very fine roots; slightly alkaline; abrupt wavy boundary.

Btn—24 to 31 inches; light yellowish brown (2.5Y 6/3) fine sandy loam, olive brown (2.5Y 4/3) moist; strong coarse columnar structure parting to weak coarse platy; very hard, firm, slightly sticky and slightly plastic; few very fine roots; common faint dark grayish brown (2.5Y 4/2) moist clay films on faces of peds; strongly alkaline; clear wavy boundary.

C—31 to 60 inches; light brownish gray (2.5Y 6/2) loamy fine sand, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, very friable, nonsticky and nonplastic; strongly alkaline.

Range in Characteristics

Depth to the Btn horizon: 20 to 30 inches
Notes: Some pedons have E/B or B/E horizons. Some pedons have a Bk or Bky horizon. Some pedons have a Cr horizon at a depth of 40 to 60 inches.

A horizon:
Chroma: 2 or 3

E horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 3 to 5 moist
Chroma: 1 or 2
Texture: very fine sandy loam, loamy fine sand, fine sandy loam, sandy loam, loamy sand, or fine sand

Btn horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6, 3 to 5 moist
Chroma: 2 or 3
Texture: fine sandy loam, very fine sandy loam, sandy loam, or loam
Notes: Lime and salts are in the lower Btn horizon in some pedons.

C horizon:
Hue: 2.5Y or 5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 or 3
Texture: loam, sandy loam, or loamy fine sand

Dimmick Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 1 percent

Taxonomic class: Fine, smectitic, frigid Vertic Epiaquolls

Typical pedon:
Dimmick clay, 1,056 feet south and 180 feet east of the northwest corner of sec. 11, T. 144 N., R. 95 W. (Colors are for moist soil unless otherwise stated.)

Oe—0 to 3 inches; roots and partly decomposed stems and leaves of plants; loose; abrupt smooth boundary.

A—3 to 6 inches; very dark gray (10YR 3/1) clay, gray (10YR 5/1) dry; many very fine distinct dark yellowish brown (10YR 4/4) iron accumulations; strong fine and very fine angular blocky structure; hard, firm, very sticky and very plastic; many fine and medium roots; neutral; gradual wavy boundary.

Ag—6 to 23 inches; very dark gray (5Y 3/1) clay, gray (5Y 5/1) dry; many medium prominent dark yellowish brown (10YR 4/4) iron accumulations; weak fine angular blocky structure; hard, very firm, very sticky and very plastic; common fine and few medium roots; neutral; gradual smooth boundary.

BCg—23 to 43 inches; dark gray (5Y 4/1) clay, gray (5Y 6/1) dry; many medium prominent olive brown (2.5Y 4/4) iron accumulations; weak fine subangular blocky structure; hard, very firm, very sticky and very plastic; few roots; neutral; diffuse wavy boundary.

Cg—43 to 63 inches; dark gray (N 4/0) clay, gray (N 6/0) dry; many coarse prominent olive brown (2.5Y 4/4) iron accumulations; massive; hard, very firm, very sticky and very plastic; slightly alkaline.

Range in Characteristics

Mollic epipedon thickness: 20 to more than 40 inches
Depth to lime: 20 to more than 40 inches
Notes: Some pedons have Bk horizons. Some pedons have strata of silty clay loam or sandy clay loam below the A horizon. Some pedons are loam, silt loam, or silty clay loam below 40 inches.

A horizon:
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 2 or 3, 4 or 5 dry
Chroma: 0 to 2

Cg horizon:
Hue: 2.5Y, 5Y, or neutral
Value: 4 to 8

Chroma: 0 to 3
Texture: clay or silty clay

Dogtooth Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Very slow
Landform: Uplands
Parent material: Residuum
Slope: 9 to 15 percent
Notes: These soils are saline-sodic.

Taxonomic class: Fine, smectitic, frigid Leptic Natrustolls

Typical pedon:
Dogtooth silt loam, 2,100 feet east and 1,350 feet south of the northwest corner of sec. 4, T. 140 N., R. 89 W. (Colors are for dry soil unless otherwise stated.)

E—0 to 2 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak thin platy structure; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine roots; common fine pores; neutral; abrupt smooth boundary.

Btn—2 to 8 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; strong medium columnar structure parting to moderate fine angular blocky; very hard, very firm, very sticky and very plastic; common fine roots between peds; few medium and common fine pores; column tops coated with light brownish gray (2.5Y 6/2) dry E material; many distinct dark grayish brown (2.5Y 4/2) dry clay films on faces of peds; slight effervescence in lower part; moderately alkaline; clear smooth boundary.

Btkn—8 to 13 inches; light yellowish brown (2.5Y 6/4) silty clay, light olive brown (2.5Y 5/4) moist; moderate medium prismatic structure parting to strong fine angular blocky; very hard, very firm, very sticky and very plastic; few fine roots; common fine pores; many faint clay films on faces of peds; few fine irregular masses of lime; strong effervescence; moderately alkaline; clear smooth boundary.

Bky—13 to 21 inches; light yellowish brown (2.5Y 6/4) silty clay, light olive brown (2.5Y 5/4) moist; moderate medium prismatic structure parting to moderate fine angular blocky; very hard, very firm, very sticky and very plastic; few fine roots; few fine pores; common fine irregular masses of lime; few fine gypsum crystals; strong effervescence; strongly alkaline; abrupt wavy boundary.

Cr—21 to 60 inches; light gray (5Y 6/1) soft shale bedrock, dark gray (5Y 4/1) moist; slight effervescence.

Range in Characteristics

Depth to gypsum or other salts: 5 to 14 inches
Depth to soft bedrock: 20 to 40 inches

E horizon:
Hue: 10YR or 2.5Y
Value: 4 to 7, 3 or 4 moist
Chroma: 2 or 3
Texture: loam, silt loam, fine sandy loam, or silty clay loam

Btn horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 or 4 moist
Chroma: 1 to 3
Texture: silty clay, clay, silty clay loam, or clay loam

Btkn horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 4 or 5, 3 to 5 moist
Chroma: 1 to 4
Texture: clay, silty clay, silty clay loam, or clay loam

Bky horizon:
Hue: 10YR, 2.5Y or 5Y
Value: 5 to 6, 4 or 5 moist
Chroma: 1 to 4
Texture: silty clay, silty clay loam, clay loam, or loam

Cr horizon:
Notes: It is soft shale, siltstone, or mudstone bedrock.

Ekalaka Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 15 percent
Notes: These soils are sodic.

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Typic Natrustolls

Typical pedon:
Ekalaka fine sandy loam, 2,110 feet east and 1,300 feet north of the southwest corner of sec. 15, T. 133 N., R. 83 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 6 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky and nonplastic; few medium and common fine and very fine roots throughout; strongly acid; clear smooth boundary.

E—6 to 12 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak very thin platy structure; soft, very friable, nonsticky and nonplastic; many very fine roots; slightly acid; abrupt wavy boundary.

Btn—12 to 17 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; strong coarse columnar structure parting to strong medium angular blocky; extremely hard, firm, nonsticky and slightly plastic; common fine and many very fine roots between peds; clay bridging between sand grains and light gray (10YR 7/2) sand coats on faces of peds (10YR 4/2) moist; neutral; gradual wavy boundary.

Bz1—17 to 21 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium angular blocky; very hard, friable, nonsticky and slightly plastic; common very fine roots between peds; many threads and masses of salt; slight effervescence; slightly alkaline; gradual wavy boundary.

Bz2—21 to 25 inches; pale brown (10YR 6/3) loamy fine sand, dark grayish brown (10YR 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; very hard, friable, nonsticky and nonplastic; few very fine roots; few masses of salt; slight effervescence; slightly alkaline; clear wavy boundary.

BCz—25 to 33 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, nonsticky and nonplastic; few very fine roots throughout; few salt masses; many coarse yellowish brown (10YR 5/6) and dark yellowish brown (10YR 4/4) masses of manganese; slight effervescence; slightly alkaline; gradual wavy boundary.

C—33 to 60 inches; light gray (5Y 7/2) stratified fine sandy loam, loamy sand and sand, olive gray (5Y 4/2) moist; massive; hard, friable, nonsticky and nonplastic; few very fine roots throughout; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 25 inches
Depth to the Btn horizon: 7 to 20 inches
Notes: Some pedons have a Bk horizon. Some pedons have a Cr horizon at a depth of 40 to 60 inches.

A horizon:
Hue: 10YR or 2.5Y
Value: 4 or 5, 2 or 3 moist
Chroma: 2 or 3

E horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 3 to 5 moist
Chroma: 1 to 3
Texture: loamy fine sand, fine sandy loam, or very fine sandy loam
Notes: Some cultivated pedons do not have an E horizon.

Btn horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6, 3 to 5 moist
Chroma: 2 to 4
Texture: sandy loam, fine sandy loam, or loam
Notes: It has lime or salts in the lower part in some pedons.

Bz horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7, 3 to 6 moist
Chroma: 2 to 4
Texture: fine sandy loam, loamy fine sand, fine sand, or sandy loam

C horizon:
Hue: 2.5Y or 5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: stratified fine sandy loam, loamy fine sand, fine sand, or sandy loam

Farland Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 20 percent

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Argiustolls

Typical pedon:
Farland silt loam, 1,490 feet north and 1,200 feet west of southeast corner of sec. 1, T. 139 N., R. 91 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium and fine prismatic and fine subangular blocky structure parting to moderate fine granular; slightly hard, friable; many roots; many fine pores; neutral; gradual wavy boundary.

Bt1—4 to 11 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate medium and fine prismatic structure parting to strong medium and fine angular blocky; hard, friable; many roots; common fine pores; faint clay films on faces of peds; neutral; clear wavy boundary.

Bt2—11 to 18 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine prismatic structure parting to strong medium and fine subangular blocky; hard, friable; common roots; common fine pores; faint patchy clay films; neutral; gradual wavy boundary.

Bk1—18 to 25 inches; light yellowish brown (2.5Y 6/4) silt loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic and moderate coarse subangular blocky structure; hard, friable; few roots; common fine pores; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—25 to 34 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic and moderate coarse and medium subangular blocky structure; friable; few roots; few fine pores; violent effervescence; common coarse masses of lime; moderately alkaline; gradual boundary.

C—34 to 60 inches; light brownish gray (2.5Y 6/2) stratified silt loam, loam and silty clay loam, olive brown (2.5Y 4/4) moist; weak coarse to fine subangular blocky structure parting to weak thin platy; friable; few roots; few fine pores; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to lime: 8 to 30 inches
Notes: Some pedons have a Btk or BCk horizon.

A horizon:
Value: 4 or 5, 2 or 3 moist
Chroma: 2 or 3
Texture: loam, silt loam, or clay loam

Bt horizon:
Value: 4 to 6

Chroma: 2 to 4
Texture: silty clay loam or clay loam

Bk horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7, 3 to 5 moist
Chroma: 2 to 4
Texture: loam, silt loam, or silty clay loam

C horizon:
Hue: 2.5Y or 5Y
Value: 4 to 6 dry
Chroma: 2 to 4

Farnuf Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 3 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical pedon:
Farnuf loam, 1,600 feet west and 1,240 feet south of the northeast corner of sec. 36, T. 18 N., R. 6 E. (Colors are for dry soil unless otherwise stated.)

A—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; moderate very thin platy structure in the upper part and moderate medium prismatic structure in the lower part with plates and prisms that separate to moderate very fine granules; hard, very friable, slightly sticky and slightly plastic; many fine and medium roots; many very fine and fine pores; neutral (pH 7.4); clear smooth boundary.

Bt—7 to 15 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; strong medium prismatic structure parting to strong fine and medium subangular blocky; very hard, friable, sticky and plastic; many fine and very fine roots; many fine and very fine and few medium pores; continuous faint dark grayish brown (10YR 4/2) dry clay films on faces of peds; slightly alkaline (pH 7.6); clear wavy boundary.

Bk1—15 to 24 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; moderate medium prismatic structure that separates to weak medium and fine blocky; hard, friable, sticky and plastic; many fine and very fine roots; many fine and very fine and few medium pores; few masses of lime; strong effervescence; moderately alkaline (pH 8.3); diffuse wavy boundary.

Bk2—24 to 36 inches; light gray (10YR 7/2) loam, grayish brown (10YR 5/2) moist; weak coarse blocky structure; hard, friable, sticky and slightly plastic; common fine and very fine roots; common fine and very fine pores; 5 percent pebbles; common masses of lime; continuous faint coatings of lime on pebbles; strong effervescence; moderately alkaline (pH 8.4); diffuse wavy boundary.

BC—36 to 60 inches; very pale brown (10YR 7/3) loam consisting of layers of stratified sandy clay loam and fine sandy loam, brown (10YR 5/3) moist; massive; hard, very friable, sticky and slightly plastic; few fine and very fine roots; common fine and very fine pores; disseminated lime; strong effervescence; strongly alkaline (pH 8.5).

Range in Characteristics

Mollic epipedon thickness: 7 to 15 inches
Notes: Some pedons have a C horizon.

Ap horizon:
Value: 4 or 5, 2 or 3 moist

Bt horizon:
Chroma: 2 to 4
Texture: loam, clay loam, or silty clay loam

Bk horizon:
Value: 5 to 7, 4 to 6 moist

BC horizon:
Value: 5 to 7, 4 to 6 moist
Texture: loam or clay loam

Flasher Series

Depth class: Shallow
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landform: Uplands
Parent material: Residuum
Slope: 3 to 50 percent

Taxonomic class: Mixed, frigid, shallow Typic Ustipsamments

Typical pedon:
Flasher loamy fine sand, 1,110 feet north and 195 feet west of southeast corner of sec. 3, T. 134 N., R. 86 W. (Colors are for dry soil unless otherwise stated.) (fig. 17)

A—0 to 6 inches; dark grayish brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many roots; quartz grains stained; slight effervescence; slightly alkaline; gradual wavy boundary.

AC—6 to 10 inches; light olive brown (2.5Y 5/4) loamy fine sand, olive brown (2.5Y 4/4) moist; weak fine subangular blocky structure; loose, nonsticky and nonplastic; common roots; few small hard sandstone fragments; slight effervescence; slightly alkaline; gradual smooth boundary.

Cr—10 to 60 inches; light yellowish brown (2.5Y 6/4) soft sandstone that crushes to sand, olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/4) moist; slight effervescence; moderately alkaline.

Range in Characteristics

10 to 40 inch particle-size control section: loamy fine sand, fine sand, loamy sand, or sand
Depth to soft bedrock: 7 to 20 inches

A horizon:
Hue: 10YR or 2.5Y

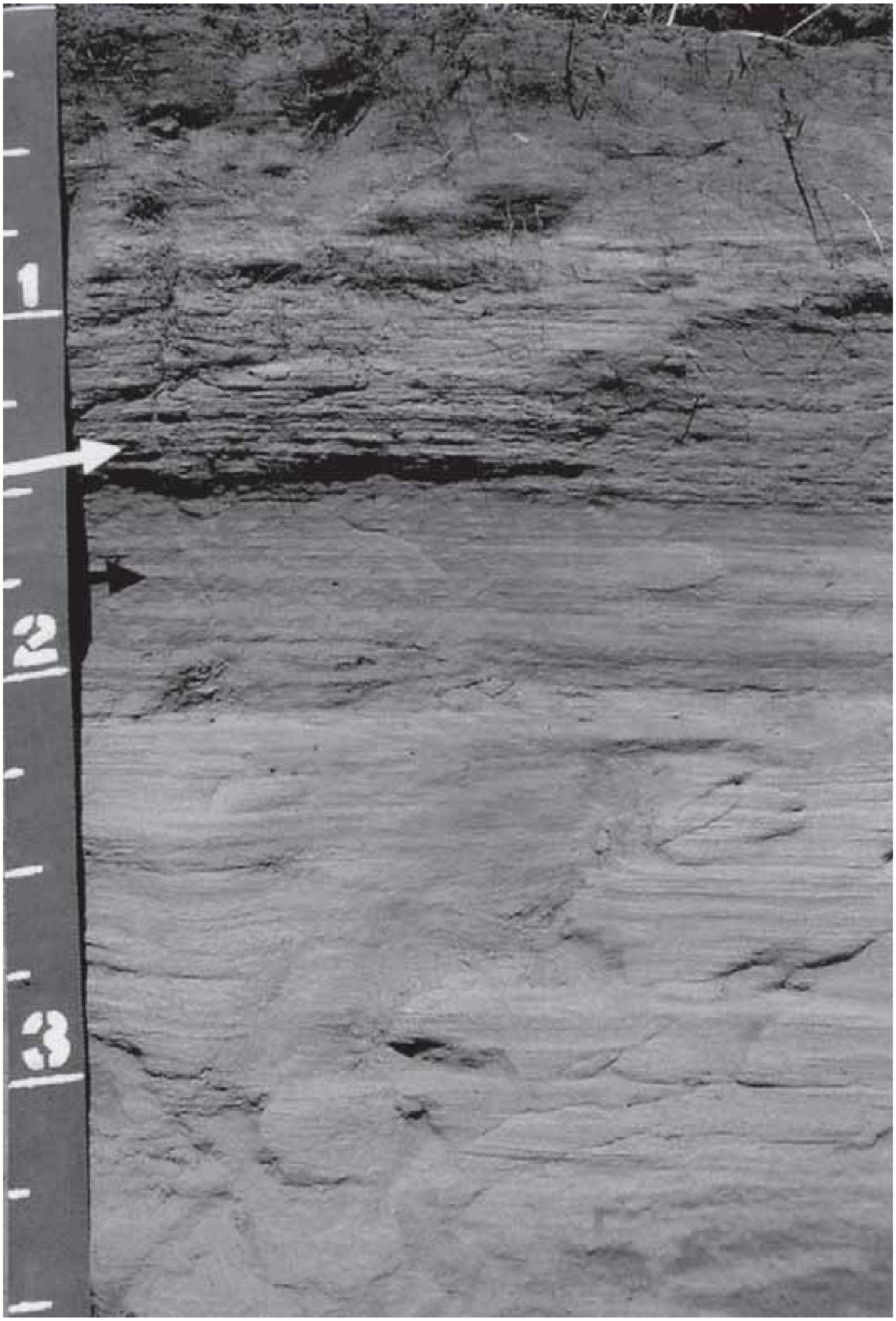

Figure 17. Typical profile of Flasher loamy fine sand.

Value: 4 to 6, 2 to 4 moist
Chroma: 2 or 3
Texture: loamy fine sand, loamy sand, fine sand, sandy loam or fine sandy loam

AC horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 8, 3 to 6 moist
Chroma: 2 to 4
Texture: loamy fine sand, fine sand, or loamy sand

Cr horizon:
Notes: It is soft sandstone bedrock that crushes to fine sand, sand, or loamy fine sand.

Flaxton Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid in the upper part and moderately slow in the lower part
Landform: Till plains
Parent material: Eolian and glacial till
Slope: 1 to 6 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Pachic Argiustolls

Typical pedon:
Flaxton fine sandy loam, 190 feet south of the northeast corner of sec. 24, T. 137 N., R. 79 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 15 inches; very dark grayish brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; dark grayish brown (10YR 4/2) in upper 2 inches; weak coarse and medium prismatic structure parting to weak fine subangular blocky and granular; friable; many roots; neutral; gradual smooth boundary.

Bw—15 to 22 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; friable; common roots; thin very dark brown (10YR 2/2) stains on faces of prisms; neutral; clear wavy boundary.

2Bt1—22 to 25 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure; firm, sticky; few fine and medium roots; many thin very dark grayish brown (2.5Y 3/2) clay films on faces of peds; few stones and pebbles; slightly alkaline; clear wavy boundary.

2Bt2—25 to 30 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse and medium prismatic structure; firm; few roots; many thin very dark grayish brown (2.5Y 3/2) clay films on faces of prisms; few tongues of fine sandy loam extend through the Bt horizons; strong effervescence; interior of prisms have a few masses of lime; slightly alkaline; clear wavy boundary.

2Bw—30 to 35 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse and medium prismatic structure; firm; strong effervescence; few masses of lime; moderately alkaline; gradual wavy boundary.

2Bk—35 to 42 inches; light brownish gray (2.5Y 6/2) clay loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure; firm; strong effervescence; many large masses of lime; moderately alkaline; gradual wavy boundary.

2BCk—42 to 60 inches; pale olive (5Y 6/3) clay loam, olive (5Y 4/3) moist; massive; firm; violent effervescence; many masses of lime; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to more than 30 inches
Depth to glacial till: 10 to 40 inches
Notes: Some pedons have loamy fine sand in the upper part. Some pedons do not have a Bw horizon. Some pedons have sandstone or shale below a depth of 40 inches.

A horizon:
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3

2Bt horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 to 5 moist
Chroma: 2 to 4
Texture: clay loam or loam

2Bk and 2BCk horizons:
Value: 5 or 6, 4 or 5 moist
Chroma: 2 to 4
Texture: clay loam or loam
Note: Some pedons do not have a 2BCk horizon.

Golva Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 15 percent

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Golva silt loam, 1,630 feet north and 2,000 feet west of the southeast corner of sec. 36, T. 133 N., R. 104 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 5 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate medium granular; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; neutral; gradual wavy boundary.

Bw1—5 to 15 inches; grayish brown (2.5Y 5/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; moderate coarse and medium prismatic structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; slightly alkaline; gradual wavy boundary.

Bw2—15 to 21 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; strong effervescence; moderately alkaline; clear wavy boundary.

Bk1—21 to 32 inches; pale yellow (2.5Y 7/4) silt loam, olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; discontinuous thin pebble line at bottom of horizon; common masses of lime; violent effervescence; moderately alkaline; clear smooth boundary.

Bk2—32 to 40 inches; pale yellow (5Y 8/3) silt loam, olive (5Y 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common masses of lime; violent effervescence; moderately alkaline; abrupt wavy boundary.

C—40 to 60 inches; pale yellow (5Y 8/3) silt loam, olive (5Y 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to lime: 10 to 22 inches
Notes: Some pedons have a Cr horizon below a depth of 40 inches.

A horizon:
Hue: 10YR or 2.5Y
Value: 4 or 5, 2 or 3 moist
Chroma: 2 or 3

Bw horizon
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 to 5 moist
Chroma: 2 or 3
Texture: silt loam or silty clay loam
Notes: In some pedons the upper part of the Bw horizon contains lime.

Bk horizon:
Value: 6 to 8, 4 to 6 moist
Chroma: 2 to 4
Texture: silt loam or silty clay loam

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 8, 4 to 6 moist
Chroma: 2 to 4
Texture: silt loam, silty clay loam, or loam
Notes: It is sandy loam or silty clay between a depth of 40 and 60 inches in some pedons.

Grail Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 1 to 6 percent

Taxonomic class: Fine, smectitic, frigid Vertic Argiustolls

Typical pedon:
Grail silt loam, 900 feet west and 900 feet south of the center of sec. 18, T. 139 N., R. 91 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak coarse and medium subangular blocky structure; soft, friable; many roots; many pores; neutral; abrupt smooth boundary.

A—5 to 10 inches; dark gray (10YR 4/1) silt loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to moderate coarse and medium subangular blocky; slightly hard, friable; many roots; many pores; neutral; gradual wavy boundary.

Bt1—10 to 13 inches; dark gray (10YR 4/1) silty clay loam, very dark brown (10YR 2/2) moist; weak medium prismatic structure parting to moderate coarse and medium subangular blocky and moderate fine granular; firm; common roots; few pores; faint clay films on faces of prisms and blocks; neutral; gradual smooth boundary.

Bt2—13 to 24 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to strong medium and fine angular blocky; very hard, firm; few roots; few pores; clay films on faces of peds; neutral; clear wavy boundary.

Bk—24 to 52 inches; light brownish gray (2.5Y 6/2) silty clay loam, grayish brown (2.5Y 5/2) moist; very weak medium prismatic structure parting to moderate coarse and medium subangular blocky; hard, firm; few pores; strong effervescence; few small masses of lime; moderately alkaline; clear wavy boundary.

C—52 to 60 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; hard, firm; strong effervescence; few small masses of lime; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to more than 40 inches
Notes: Some pedons have an AB, Btk, or BCk horizon.

Ap horizon:
Value: 3 or 4, 2 or 3 moist

Bt horizon:
Value: 3 to 5, 2 to 4 moist
Chroma: 1 to 3

Bk horizon:
Hue: 10YR or 2.5Y
Value: 4 to 7, 3 to 5 moist
Chroma: 3 to 4

Grassna Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 6 percent

Taxonomic class: Fine-silty, mixed, superactive, frigid Pachic Haplustolls

Typical pedon:
Grassna silt loam, 50 feet south and 45 feet west of the northeast corner of sec. 26, T. 129 N., R. 76 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium and fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; many roots; many fine pores; neutral; abrupt boundary.

A—7 to 17 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak coarse prismatic structure parting to moderate coarse and medium subangular blocky with some blocks separating to weak platy; hard, friable, slightly sticky and slightly plastic; common roots; many fine pores; neutral; gradual wavy boundary.

Bw1—17 to 30 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; common fine pores; few very dark brown (10YR 2/2) moist clay films on faces of peds; neutral; gradual wavy boundary.

Bw2—30 to 40 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate coarse and medium prismatic structure parting to moderate medium and fine angular blocky; very hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; neutral; clear wavy boundary.

Bk—40 to 50 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/4) moist; weak subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; common fine white masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

C—50 to 60 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/4) moist; common medium distinct gray (5Y 5/1) moist redoximorphic depletions and common fine prominent dark yellowish brown (10YR 4/4) moist redoximorphic concentrations; massive; hard, friable, slightly sticky and slightly plastic; few fine pores; few small masses of lime; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to 40 inches
Notes: Some pedons have Ab horizons below 50 inches. Some pedons have a 2Bk horizon.

A horizon:
Value: 3 to 5, 2 or 3 moist
Chroma: 1 or 2

Bw horizon:
Hue: 10YR or 2.5Y
Value: 4 or 5, 2 to 4 moist
Chroma: 2 or 3
Texture: silt loam, loam, clay loam, or silty clay loam

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 or 5 moist
Chroma: 2 to 5

C horizon:
Value: 6 or 7, 4 to 6 moist
Chroma: 2 to 4
Notes: Textures coarser or finer than silt loam are below a depth of 40 inches in some pedons. The horizon has gypsum in the lower part in some pedons.

Hamerly Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 3 percent
Notes: These soils are highly calcareous.

Taxonomic class: Fine-loamy, mixed, superactive, frigid Aeric Calciaquolls

Typical pedon:
Hamerly loam, 2,090 feet south and 95 feet west of the northeast corner of sec. 26, T. 132 N., R. 56 W. (Colors are for moist soil unless otherwise stated.)

Ap—0 to 8 inches; very dark gray (10YR 3/1) loam, gray (10YR 5/1) dry; weak medium subangular blocky structure parting to moderate medium granular; friable, slightly sticky; strong effervescence; abrupt smooth boundary.

Bk1—8 to 18 inches; light brownish gray (2.5Y 6/2) loam; weak medium and fine subangular blocky structure; friable; violent effervescence; gradual wavy boundary.

Bk2—18 to 25 inches; light brownish gray (2.5Y 6/2) and light olive brown (2.5Y 5/4) loam; weak medium subangular blocky structure; friable; few masses of lime; violent effervescence; gradual wavy boundary.

C—25 to 60 inches; light olive brown (2.5Y 5/4) and olive brown (2.5Y 4/4) loam; common medium distinct gray (2.5Y 5/1) redoximorphic depletions and yellowish brown (10YR 5/6) redoximorphic concentrations; weak medium blocky structure; firm; strong effervescence.

Range in Characteristics

Mollic epipedon thickness: 7 to 18 inches
Notes: Some pedons have a BCk horizon.

Ap horizon:
Hue: 10YR or 2.5Y
Value: 2 or 3, 3 to 5 dry
Chroma: 1 or 2

Bk horizon:
Hue: 10YR or 2.5Y
Value: 3 to 7, 4 to 8 dry
Chroma: 1 to 4
Texture: loam or clay loam

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6, 5 to 8 dry

Chroma: 1 to 4
Texture: loam or clay loam

Harriet Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 1 percent
Notes: These soils are saline-sodic.

Taxonomic class: Fine, smectitic, frigid Typic Natraquolls

Typical pedon:
Harriet loam, 1,650 feet east and 40 feet north of the southwest corner of sec. 34, T. 139 N., R. 79 W. (Colors are for moist soil unless otherwise stated.)

E—0 to 2 inches; very dark gray (N 3/0) loam, gray (N 5/0 and 6/0) dry; weak thick and medium platy structure; friable; many fine roots; common fine pores; few salt crystals visible when soil is dry; moderately alkaline; abrupt wavy boundary.

Btn—2 to 6 inches; black (N 2/0) clay loam, dark gray (N 4/0) dry; moderate medium columnar structure; extremely hard, firm; coatings of very dark gray (N 3/0) on faces of peds; gray (N 5/0) dry on tops and sides of columns; slight effervescence on inside of columns; strongly alkaline; clear wavy boundary.

Btnz—6 to 18 inches; very dark grayish brown (2.5Y 3/2) clay loam, grayish brown (2.5Y 5/2) dry; moderate coarse prismatic and weak medium subangular blocky structure; very hard, firm; few roots; common medium pores; common fine white salt crystals; strong effervescence; strongly alkaline; gradual wavy boundary.

Bz1—18 to 28 inches; dark grayish brown (2.5Y 4/2) loam, grayish brown and light brownish gray (2.5Y 5/2 and 6/2) dry; weak coarse prismatic structure; very hard, firm; few fine roots; few medium and fine pores; fine salt crystals visible when dry; violent effervescence; strongly alkaline; abrupt smooth boundary.

2Bz2—28 to 38 inches; light olive brown (2.5Y 5/3) very fine sandy loam, light yellowish brown (2.5Y 6/3) dry; weak coarse prismatic and weak coarse and medium subangular blocky structure; very hard, friable; few fine pores; common very fine salt crystals that are visible when dry; strong effervescence; strongly alkaline; abrupt smooth boundary.

3Ab—38 to 40 inches; very dark gray (N 3/0) clay loam, dark gray (N 4/0) dry; few medium distinct olive brown (2.5Y 4/3) redoximorphic concentrations; weak coarse prismatic structure; very hard, firm; few fine roots; strong effervescence; strongly alkaline; abrupt smooth boundary.

4C—40 to 60 inches; olive brown (2.5Y 4/3) stratified loam and clay loam, light yellowish brown (2.5Y 6/3) dry; weak coarse and medium subangular blocky structure; very hard, friable; strong effervescence; strongly alkaline.

Range in Characteristics

Notes: Some pedons have an A, Bk, BCk, or C horizon.

Btn horizon:
Hue: 10YR, 2.5Y, or neutral
Value: 2 to 4
Chroma: 0 to 2
Texture: clay loam, silty clay loam, or silty clay

Bz and 2Bz horizons:
Hue: 2.5Y or 5Y
Value: 3 to 5

3C horizon:
Hue: 2.5Y or 5Y
Value: 3 to 5
Notes: Some pedons do not have a 3C horizon.

Havrelon Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 1 percent
Notes: These soils are calcareous.

Taxonomic class: Fine-loamy, mixed, superactive, calcareous, frigid Typic Ustifluvents

Typical pedon:
Havrelon silt loam, 2,565 feet south and 75 feet east of the northwest corner of sec. 2, T. 139 N., R. 81 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 13 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate medium granular structure; very friable; common roots; common fine pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

C1—13 to 18 inches; grayish brown (2.5Y 5/2) silty clay loam, very dark grayish brown (2.5Y 3/2) moist; moderate medium granular structure; contains a thin stratification; friable; common fine and few large roots; common fine pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

C2—18 to 26 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate medium granular structure; very friable; few roots; slight effervescence; slightly alkaline; clear smooth boundary.

C3—26 to 40 inches; thinly stratified light gray (2.5Y 7/2) and light brownish gray (2.5Y 6/2) very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; very friable; thin strata of fine sandy loam and silty clay loam; slight effervescence; slightly alkaline; clear smooth boundary.

C4—40 to 46 inches; thinly stratified olive gray (5Y 5/2) silt loam and silty clay loam, olive gray (5Y 4/2) moist; common medium distinct reddish yellow (5YR 7/8) redoximorphic concentrations; massive; friable; slight effervescence; slightly alkaline; clear smooth boundary.

C5—46 to 60 inches; pale yellow (5Y 7/3) very fine sandy loam, olive (5Y 4/3) moist; massive; very friable; slight effervescence; slightly alkaline.

Range in Characteristics

Notes: Some pedons have an Ab horizon.

Ap horizon:
Hue: 10YR or 2.5Y
Value: 3 or 4 moist
Texture: loam or silt loam

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 5 moist

Heil Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Very slow
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 1 percent
Notes: These soils are saline-sodic.

Taxonomic class: Fine, smectitic, frigid Typic Natraquerts

Typical pedon:
Heil silty clay, 650 feet west and 20 feet south of the northeast corner of sec. 14, T. 135 N., R. 100 W. (Colors are for moist soil unless otherwise stated.)

E—0 to 3 inches; dark gray (10YR 4/1) silty clay, light gray (10YR 6/1) dry; common fine distinct brown (10YR 5/3) and dark brown (10YR 4/3) redoximorphic concentrations; moderate fine subangular blocky and weak thin platy structure; firm; many roots and fine pores; neutral; abrupt wavy boundary.

Btn—3 to 7 inches; very dark gray (2.5Y 3/1) silty clay, gray (2.5Y 5/1) dry; strong coarse and medium columnar structure parting to strong coarse medium and fine angular blocky; extremely hard, very firm; roots in cracks; few pores; slightly alkaline; gradual smooth boundary.

Btng—7 to 24 inches; very dark gray (5Y 3/1) silty clay, gray (5Y 5/1) dry; strong very coarse prismatic structure parting to strong coarse and medium angular blocky; extremely hard, very firm; few roots; surface of peds has a glossy appearance when moist; few tongues of E (5Y 6/1) dry; moderately alkaline; gradual wavy boundary.

Bg—24 to 38 inches; dark gray (5Y 4/1) silty clay, light gray (5Y 6/1) dry; moderate coarse angular blocky structure; extremely hard, very firm; strong effervescence; moderately alkaline; gradual wavy boundary.

Byg1—38 to 44 inches; dark gray (5Y 4/1) silty clay, light gray (5Y 6/1) dry; weak coarse and fine angular blocky structure; very firm; few fine gypsum crystals; strong effervescence; moderately alkaline; diffuse wavy boundary.

Byg2—44 to 52 inches; olive (5Y 4/3) silty clay, pale olive (5Y 6/3) dry; weak coarse subangular blocky structure; very firm; common gypsum crystals; strong effervescence; strongly alkaline; gradual wavy boundary.

Cg—52 to 60 inches; olive (5Y 5/4) silty clay, pale olive (5Y 6/3) dry; many strong brown (7.5YR 5/6) and yellowish brown (10YR 5/6) redoximorphic concentrations and gray (5Y 5/1) redoximorphic depletions; massive; few large white masses of lime; strong effervescence; strongly alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 45 inches
Depth to lime: 12 to 40 inches
Depth to the Btn horizon: 1 to 4 inches
Notes: Some pedons have an A horizon up to 3 inches thick. Some pedons have a Btkn or Bk horizon.

E horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 5, 4 to 8 dry
Chroma: 1 or 2
Texture: silt loam, silty clay loam, or silty clay

Btn horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4, 4 to 6 dry
Chroma: 1 or 2
Texture: silty clay or clay

Bg and Byg horizons:
Hue: 2.5Y or 5Y
Value: 3 to 5, 4 to 7 dry
Texture: silty clay, clay, silty clay loam, or clay loam

Cg horizon:
Hue: 2.5Y or 5Y
Value: 3 to 5, 5 to 7 dry
Chroma: 1 to 4
Texture: silty clay, clay, silty clay loam, or clay loam

Janesburg Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Very slow
Landform: Uplands
Parent material: Residuum
Slope: 0 to 6 percent
Notes: These soils are sodic.

Taxonomic class: Fine, smectitic, frigid Typic Natrustrolls

Typical pedon:
Janesburg silty clay loam, 2,050 feet south and 50 feet east of the northwest corner of sec. 36, T. 137 N., R. 87 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 8 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate fine and medium subangular blocky structure; hard, firm, sticky and plastic; many fine and very fine roots; common fine pores; slightly acid; clear wavy boundary.

E—8 to 10 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate medium subangular blocky structure parting to weak medium platy; slightly hard, friable, sticky and plastic; many fine and very fine roots; many fine pores; slightly acid; abrupt wavy boundary.

Btn1—10 to 16 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; strong medium columnar structure parting to strong fine angular blocky; very hard, very firm, very sticky and very plastic; common fine and very fine roots between peds; common fine pores; many faint dark grayish brown (10YR 4/2) dry clay films on faces of peds; column tops coated with light brownish gray (10YR 6/2) dry E material; slightly alkaline; clear wavy boundary.

Btn2—16 to 21 inches; light brownish gray (10YR 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate medium angular blocky; very hard, very firm, very sticky and very plastic; few fine roots; common fine pores; few faint grayish brown (2.5Y 5/2) dry clay films on faces of peds; slightly alkaline; abrupt wavy boundary.

BCk—21 to 26 inches; light yellowish brown (2.5Y 6/4) silt loam, olive brown (2.5Y 4/4) moist; moderate medium prismatic structure parting to weak medium subangular blocky; hard, firm, slightly sticky and slightly plastic; few fine roots; few fine pores; few medium irregular masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Cr—26 to 60 inches; light yellowish brown (2.5Y 6/4) and olive yellow (2.5Y 6/6) soft siltstone bedrock, olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/6) dry; common irregular masses of lime between siltstone stratifications; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to gypsum or other salts: More than 16 inches
Depth to soft bedrock: 20 to 40 inches

A horizon:
Value: 4 or 5, 2 or 3 moist
Chroma: 2 or 3
Texture: silty clay loam, clay loam, silt loam, loam, or fine sandy loam

E horizon:
Value: 5 or 6, 3 or 4 moist
Chroma: 1 to 3
Texture: silt loam, loam, or fine sandy loam

Btn horizon:
Value: 4 to 6, 3 to 5 moist
Chroma: 2 to 4
Texture: silty clay, clay, silty clay loam, or clay loam

BCk horizon:
Hue: 2.5Y or 5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: loam, silt loam, clay loam, silty clay loam, or silty clay

Cr horizon:
Notes: It is soft shale, siltstone, or mudstone.

Korchea Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 3 percent
Notes: These soils are calcareous.

Taxonomic class: Fine-loamy, mixed, superactive, calcareous, frigid Mollic Ustifluvents

Typical pedon:
Korchea loam, 790 feet south and 110 feet west of the northeast corner of sec. 36, T. 129 N., R. 102 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 6 inches; grayish brown (10YR 5/2) stratified loam, very dark grayish brown (10YR 3/2) moist; weak coarse and medium subangular blocky structure parting to moderate fine granular; hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine pores; slight effervescence; moderately alkaline; clear smooth boundary.

C1—6 to 15 inches; grayish brown (10YR 5/2) stratified loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; many fine pores; slight effervescence; moderately alkaline; abrupt smooth boundary.

C2—15 to 18 inches; grayish brown (2.5Y 5/2) stratified fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine pores; slight effervescence; moderately alkaline; abrupt smooth boundary.

C3—18 to 36 inches; grayish brown (2.5Y 5/2) stratified loam, silt loam, and very fine sandy loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, slightly sticky and slightly plastic; common fine roots in upper part, few fine roots in lower part; very few fine masses of lime; strong effervescence; moderately alkaline; gradual smooth boundary.

C4—36 to 60 inches; grayish brown (2.5Y 5/2) stratified fine sandy loam and loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard and hard, friable, slightly sticky and slightly plastic; few fine roots; slight effervescence; moderately alkaline.

Range in Characteristics

Depth to lime: 0 to 5 inches

A horizon
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3

C horizon
Value: 4 to 7, 3 to 6 moist
Chroma: 2 to 4
Texture: sandy loam to silty clay loam

Notes: It is stratified. It has sand or fine sand below a depth of 40 inches in some pedons.

Korell Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 3 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Fluventic Haplustolls

Typical pedon:
Korell silt loam, 2,200 feet east and 50 feet south of the northwest corner of sec. 36, T. 138 N., R. 86 W. (Colors are for dry soil unless otherwise stated.) (fig. 18)

Ap—0 to 8 inches: dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine roots; many very fine pores; slightly alkaline; abrupt smooth boundary.

Bw—8 to 15 inches; light olive brown (2.5Y 5/3) loam, olive brown (2.5Y 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine pores; strong effervescence; moderately alkaline; clear wavy boundary.

Bk—15 to 27 inches; light yellowish brown (2.5Y 6/3) loam, olive brown (2.5Y 4/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; common fine irregularly shaped masses of lime; violent effervescence; moderately alkaline; abrupt smooth boundary.

Ab—27 to 32 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; common very fine pores; many fine irregularly shaped masses of lime; violent effervescence; moderately alkaline; clear smooth boundary.

Bk'—32 to 48 inches; light yellowish brown (2.5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine pores; many fine irregularly shaped masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

C—48 to 60 inches; light yellowish brown (2.5Y 6/3) stratified silt loam, olive brown (2.5Y 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; common very fine pores; common fine irregularly shaped masses of lime; violent effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 15 inches
Notes: Some pedons have an Ab horizon up to 6 inches thick.

Figure 18. Typical profile of Korell silt loam.

A horizon:
Value: 4 or 5, 2 or 3 moist
Chroma: 1 or 2

Bw horizon:
Hue: 10YR or 2.5Y
Value: 5 or 6
Chroma: 2 or 3
Texture: loam or silt loam

Bk and C horizons:
Hue: 10YR or 2.5Y
Value: 5 or 6, 4 or 5 moist
Chroma: 2 or 3

Krem Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Rapid over moderate
Landform: Uplands
Parent material: Eolian over glacial till
Slope: 0 to 15 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Paleustolls

Typical pedon:
Krem loamy fine sand, 1,850 feet east and 135 feet south of the northwest corner of sec. 17, T. 144 N., R. 85 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loamy fine sand, very dark brown (10YR 2/2) moist; weak fine and medium granular structure; very friable, nonsticky and nonplastic; common very fine, medium and coarse roots; very few pebbles; neutral; clear smooth boundary.

A1—7 to 15 inches; dark grayish brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and few fine roots; very few pebbles; neutral; clear wavy boundary.

A2—15 to 25 inches; dark grayish brown (10YR 4/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak coarse subangular blocky structure; very friable, nonsticky and nonplastic; common very fine and few medium roots; many very fine tubular pores; very few pebbles; krotovina 3 inches in diameter; neutral; abrupt wavy boundary.

BA—25 to 30 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; loose, nonsticky and nonplastic; few very fine roots; common very fine and medium tubular pores; about 5 percent rock fragments; slightly alkaline; abrupt irregular boundary.

2Bt—30 to 38 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct strong brown (7.5YR 5/6) dry redoximorphic concentrations; strong coarse prismatic structure parting to strong angular blocky; sticky and plastic; few very fine and fine roots; many very fine tubular pores; many moderately thick clay films on faces of peds and surface of pores; sandy coatings up to 1/4 inch thick between prisms; about 3 percent rock fragments; some are coated with lime; slightly alkaline; clear irregular boundary.

2Btk—38 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; common fine distinct strong brown (7.5YR 5/6) dry redoximorphic concentrations; strong very coarse prismatic structure parting to moderate medium and coarse angular blocky; sticky and plastic; few very fine and fine roots along faces of prisms; many very fine tubular pores; many moderately thick dark grayish brown (2.5Y 4/2) clay films on faces of peds and surfaces of pores; sandy coatings up to 1/4 inch thick between prisms; about 3 percent rock fragments and few large weathered sandstone fragments; many irregular shaped masses of lime; violent effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: More than 20 inches
Depth to glacial till: 20 to 40 inches
Notes: Some pedons have 2Bk, 2BC, or 2C horizons.

A horizon:
Value: 3 to 5
Chroma: 2 or 3
Texture: loamy fine sand, fine sand, or loamy sand

BA horizon:
Value: 4 or 5, 3 or 4 moist
Chroma: 2 or 3
Texture: loamy sand or loamy fine sand
Notes: It does not have rock fragments in some pedons.

2Bt horizon:
Hue: 2.5Y or 10YR
Value: 4 to 6, 3 or 4 moist
Chroma: 2 or 3
Texture: clay loam, sandy clay loam, or loam
Notes: It has 1 to 10 percent rock fragments.

Lakota Series

Depth class: Deep
Drainage class: Well drained
Permeability: Slow
Landform: Terraces and uplands
Parent material: Alluvium and residuum
Slope: 0 to 9 percent
Notes: These soils are saline-sodic.

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Leptic Natrustolls

Typical pedon:
Lakota fine sandy loam, 2,500 feet north and 1,000 feet east of the southwest corner of sec. 7, T. 133 N., R. 81 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 4 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; slightly acid; clear smooth boundary.

E—4 to 8 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; moderate medium platy structure; soft, very friable, slightly sticky and nonplastic; common very fine and fine roots; neutral; abrupt wavy boundary.

Btn—8 to 14 inches; grayish brown (2.5Y 5/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; strong medium columnar structure parting to strong medium and fine angular blocky; extremely hard, extremely firm, slightly sticky and slightly plastic; common very fine and few fine roots along faces of peds; column tops coated with light brownish gray (10YR 6/2) E material; common distinct clay bridges between mineral grains; slightly alkaline; clear wavy boundary.

Bkz—14 to 25 inches; light olive brown (2.5Y 5/3) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; common fine nests and threads of salts; few medium irregularly shaped masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

BCz—25 to 34 inches; light olive gray (5Y 6/2) loamy fine sand, olive gray (5Y 4/2) moist; massive; soft, very friable, nonsticky and nonplastic; few fine threads of salts; slight effervescence; slightly alkaline; gradual wavy boundary.

C—34 to 50 inches; light olive gray (5Y 6/2) loamy fine sand, olive gray (5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; moderately alkaline; clear wavy boundary.

Cr—50 to 60 inches; light olive gray (5Y 6/2) and pale olive (5Y 6/3) soft sandstone bedrock; olive gray (5Y 5/2) and olive (5Y 5/3) moist; massive; slightly alkaline.

Range in Characteristics

Depth to gypsum or other salts: 10 to 16 inches
Depth to soft bedrock: 40 to 60 inches
Notes: Some pedons have By horizons.

A horizon:
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3

E horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 or 4 moist
Chroma: 1 to 3
Texture: loamy fine sand, fine sand, sandy loam, fine sandy loam, or loamy sand

Btn horizon:
Hue: 10YR or 2.5Y
Value: 3 to 6, 2 to 4 moist
Chroma: 2 or 3
Texture: fine sandy loam, loam, or sandy loam

Bkz and BCz horizons:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7, 4 or 5 moist
Chroma: 2 to 4
Texture: fine sandy loam, sandy loam, loamy fine sand, or loamy sand

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 6 or 7, 3 to 5 moist
Chroma: 2 to 4
Texture: loamy fine sand, loamy sand, fine sandy loam, or fine sand

Cr horizon:
Notes: Some pedons do not have a Cr horizon within a depth of 60 inches.

Lallie Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 2 percent
Notes: These soils are calcareous.

Taxonomic class: Fine, smectitic, calcareous, frigid Vertic Fluvaquents

Typical pedon:
Lallie silty clay loam, 2,630 feet east and 1,300 feet south of the northwest corner of sec. 21, T. 151 N., R. 61 W. (Colors are for moist soil unless otherwise stated.)

A—0 to 2 inches; black (10YR 2/1) silty clay loam, dark gray (10YR 4/1) dry; moderate medium and fine granular structure; slightly hard, friable, sticky and plastic; many roots; common fine flecks of salt; strong effervescence; slightly alkaline; abrupt smooth boundary.

Cg—2 to 24 inches; dark gray (5Y 4/1) silty clay loam, light gray and gray (5Y 6/1) dry; common medium prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; weak coarse prismatic structure parting to moderate fine subangular blocky; slightly hard, friable, sticky and plastic; common fine roots; few fine flecks of salt; violent effervescence; slightly alkaline; abrupt wavy boundary.

Ab—24 to 32 inches; black (N 2/0) silty clay, very dark gray (5Y 3/1) dry; weak coarse prismatic structure parting to moderate medium and fine subangular blocky; hard, firm, very sticky and very plastic; few fine roots; common fine flecks of salt; few snail shell fragments; strong effervescence; moderately alkaline; gradual wavy boundary.

C’g—32 to 60 inches; olive gray (5Y 4/2) silty clay, light gray and gray (5Y 6/1) dry; common fine prominent yellowish brown (10YR 5/4) redoximorphic concentrations; massive; very hard, very firm, very sticky and very plastic; few flecks of salt; common snail fragments; strong effervescence; slightly alkaline.

Range in Characteristics

10 to 40 inch particle-size control section: 35 to 60 percent clay
Salinity: The soil is saline in some map units.
Notes: Some pedons have an O horizon.

A horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4, 3 to 6 dry
Chroma: 1 or 2
Texture: silty clay loam, silty clay, loam, silt loam, clay loam, or clay

Cg horizon:
Hue: 2.5Y, 5Y, or neutral
Value: 3 to 6, 4 to 8 dry
Chroma: 0 to 2
Texture: silty clay loam, silty clay, or clay

Lambert Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 15 percent
Notes: These soils are calcareous.

Taxonomic class: Fine-silty, mixed, superactive, calcareous, frigid Typic Ustorthents

Typical pedon:
Lambert silt loam, 550 feet west and 600 feet north of the south 1/4 corner of sec. 7, T. 1 S., R. 27 E. (Colors are for dry soil unless otherwise stated.)

A1—0 to 5 inches; grayish brown (2.5Y 5/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots and interstitial pores; slight effervescence; moderately alkaline; gradual boundary.

C1—5 to 22 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure grading with increased depth to massive; many grading to few very fine roots; common very fine and fine tubular pores; strong effervescence; moderately alkaline; gradual boundary.

C2—22 to 36 inches; light olive gray (5Y 6/2) silt loam, olive gray (5Y 4/2) moist; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots; common very fine and fine tubular pores; strong effervescence; moderately alkaline; gradual boundary.

C3—36 to 60 inches; light olive gray (5Y 6/2) very fine sandy loam, olive gray (5Y 4/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few very fine roots; strong effervescence; moderately alkaline.

Range in Characteristics

A horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6
Chroma: 2 or 3

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 6 or 7
Chroma: 2 or 3

Lawther Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 1 percent
Notes: These soils are calcareous.

Taxonomic class: Fine, smectitic, frigid Typic Haplusterts

Typical pedon:
Lawther silty clay, 2,195 feet south and 1,440 feet east of the northwest corner of sec. 25, T. 131 N., R. 98 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 4 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak medium and coarse subangular blocky structure parting to moderate medium granular; very hard, firm, sticky and very plastic; common very fine pores; slightly alkaline; abrupt smooth boundary.

A—4 to 10 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate coarse subangular blocky structure; very hard, very firm, sticky and very plastic; common very fine roots; common very fine pores; slightly alkaline; clear wavy boundary.

Bss1—10 to 21 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, very sticky and very plastic; common very fine roots; common very fine pores; very dark grayish brown (2.5Y 3/2) coatings on faces of peds; 1 inch wide cracks filled with A horizon material; common slickensides; very slight effervescence; slightly alkaline; gradual wavy boundary.

Bss2—21 to 33 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse and medium subangular blocky structure parting to moderate fine subangular blocky; very hard, firm, very sticky and very plastic; few very fine roots; common very fine pores; 1/2 inch wide cracks filled with A horizon material; common slickensides; few medium irregularly shaped masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Bk—33 to 47 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots; common very fine pores; 1/2 inch wide cracks filled with A horizon material; common slickensides; common fine irregularly shaped masses of lime; strong effervescence; moderately alkaline; abrupt wavy boundary.

C—47 to 60 inches; grayish brown (2.5Y 5/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; very hard, firm, very sticky and very plastic; few very fine roots; many very fine pores; common fine irregularly shaped masses of lime; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 45 inches
Depth to lime: 0 to 30 inches
Notes: When the soil is dry, cracks 1/2 to 2 inches wide and several feet long extend downward through the Bss horizon. Some pedons have a By horizon up to 15 inches thick.

A horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 or 3 moist
Texture: silty clay, clay, or silty clay loam

Bss horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 6, 2 to 4 moist
Chroma: 1 to 3
Texture: clay, silty clay, or silty clay loam

Bk horizon:
Hue: 2.5Y or 5Y
Value: 4 to 6, 2 to 5 moist
Chroma: 1 or 2
Texture: silty clay, clay, or silty clay loam
Notes: Some pedons do not have a Bk horizon.

C horizon:
Hue: 2.5Y or 5Y
Value: 4 to 7, 3 to 6 moist
Chroma: 1 to 3
Texture: clay loam, silty clay, clay, or silty clay loam

Lefor Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 0 to 15 percent

Taxonomic class: Fine-loamy, mixed, semiactive, frigid Typic Argiustolls

Typical pedon:
Lefor fine sandy loam, 2,555 feet south and 290 feet east of the northwest corner of sec. 13, T. 137 N., R. 94 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure parting to moderate medium and fine granular; hard, friable, slightly sticky; many roots; many fine pores; medium acid (pH 5.6); abrupt smooth boundary.

B/E—7 to 15 inches; brown (10YR 5/3) (B) and dark grayish brown (10YR 4/2) (E) fine sandy loam, dark brown (10YR 3/3) moist; strong coarse prismatic structure parting to weak coarse to fine subangular blocky; hard, friable, slightly sticky; many roots; many fine pores; slightly acid; clear wavy boundary.

Bt1—15 to 24 inches; light yellowish brown (2.5Y 6/3) sandy clay loam, olive brown (2.5Y 4/4) moist; brown (10YR 5/3) coatings on faces of prisms; strong very coarse prismatic structure parting to moderate medium angular blocky; very hard, friable, slightly sticky and slightly plastic; common roots; many fine pores; neutral; gradual wavy boundary.

Bt2—24 to 30 inches; light yellowish brown (2.5Y 6/4) sandy clay loam, olive brown (2.5Y 4/4) moist; thin grayish brown (2.5Y 5/2) coatings on faces of prisms; strong very coarse prismatic structure parting to moderate medium angular blocky; very hard, friable, slightly sticky and slightly plastic; few fine roots; common fine pores; slightly alkaline; clear wavy boundary.

Bk—30 to 36 inches; pale yellow (2.5Y 7/4) fine sandy loam, light olive brown (2.5Y 5/4) moist; strong very coarse prismatic structure parting to moderate medium angular blocky; hard, friable, slightly sticky and slightly plastic; few roots; common fine and medium pores; few fine masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Cr—36 to 60 inches; pale yellow and white (2.5Y 7/4 and 8/4 and 5Y 8/2) soft sandstone, light yellowish brown and light gray (2.5Y 6/4 and 5Y 7/2) moist;

gypsum crystals in some layers; slight effervescence in some layers and no effervescence in others; moderately alkaline.

Range in Characteristics

Depth to soft bedrock: 20 to 40 inches.
Notes: Some pedons have a Bw horizon below the Bt horizon. Some pedons have a C horizon above the Cr horizon.

A horizon:
Hue: 10YR or 2.5Y
Value: 4 or 5, 2 or 3 moist
Chroma: 2 or 3

B/E horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 2 to 5 moist
Chroma: 2 to 4
Texture: fine sandy loam, loam, or sandy loam

Bt horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 6
Texture: sandy clay loam or loam

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 8, 4 to 6 moist
Chroma: 2 to 8
Texture: fine sandy loam, sandy loam, loam, or sandy clay loam

Lehr Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid in the upper part and very rapid in the lower part
Landform: Terraces
Parent material: Alluvium
Slope: 0 to 6 percent

Taxonomic class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Lehr loam, 1,490 feet north and 625 feet west of the southeast corner of sec. 12, T. 156 N., R. 93 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; common very fine roots; about 2 percent gravel; slightly alkaline; abrupt smooth boundary.

Bw—6 to 11 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; about 5 percent gravel; slightly alkaline; gradual wavy boundary.

Bk1—11 to 15 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; few distinct very dark grayish brown (10YR 3/2) coatings on faces of peds; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; about 10 percent gravel; common medium irregular masses and filaments of lime; thin crusts of lime on undersides of pebbles; violent effervescence; moderately alkaline; clear smooth boundary.

2Bk2—15 to 22 inches; light yellowish brown (10YR 6/4) and white (10YR 8/1) gravelly loamy coarse sand, yellowish brown (10YR 5/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; about 30 percent gravel; many medium irregular masses and filaments of lime; thin crusts of lime on undersides of pebbles; violent effervescence; moderately alkaline; clear smooth boundary.

2C—22 to 60 inches; light brownish gray (2.5Y 6/2) and pale yellow (2.5Y 7/4) very gravelly coarse sand, grayish brown (2.5Y 5/2) and light yellowish brown (2.5Y 6/4) moist; single grain; loose, nonsticky and nonplastic; about 40 percent gravel; thin crusts of lime on undersides of pebbles; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 8 to 16 inches
Depth to sand and gravel: 14 to 20 inches
Notes: Some pedons have a 2BCk horizon.

Ap horizon:
Value: 3 or 4, 2 or 3 moist

Bw horizon:
Hue: 10YR or 2.5Y
Value: 4 or 5, 3 or 4 moist
Chroma: 2 to 4

2C horizon:
Hue: 10YR or 2.5Y
Value: 5 to 8, 4 or 5 moist

Lihen Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 25 percent

Taxonomic class: Sandy, mixed, frigid Entic Haplustolls

Typical pedon:
Lihen sandy loam, 2,680 feet south and 2,600 feet west of the northeast corner of sec. 14, T. 29 N., R. 53 E. (Colors are for dry soil unless otherwise stated.)

A1—0 to 4 inches; dark grayish brown (10YR 4/2) sandy loam, very dark brown (10YR 2/2) moist; weak fine platy structure; soft, very friable, nonsticky and nonplastic; many fine roots; many fine and medium tubular pores; 2 percent pebbles; slightly alkaline; clear smooth boundary.

A2—4 to 9 inches; grayish brown (10YR 5/2) sandy loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, nonsticky and nonplastic; many fine roots; common fine and few medium pores; 10 percent pebbles; slightly alkaline; clear smooth boundary.

A3—9 to 24 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; single grain; loose, very friable, nonsticky and nonplastic; common fine roots; few pores; 10 percent pebbles; few lime cutans on lower surfaces of pebbles; slight effervescence; moderately alkaline; clear smooth boundary.

Bk—24 to 32 inches; light brownish gray (2.5Y 6/2) sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; few roots; 10 percent pebbles; common lime cutans on lower surfaces of pebbles; strong effervescence; moderately alkaline; clear smooth boundary.

C—32 to 60 inches; light brownish gray (2.5Y 6/2) sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; few roots; disseminated lime; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 12 to 30 inches
Depth to the Bk horizon: 10 to 36 inches

A horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5
Chroma: 2 or 3
Texture: fine sandy loam, sandy loam, or loamy fine sand

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 3 to 6 moist
Chroma: 2 to 4
Texture: loamy fine sand, loamy sand, fine sand, or sand

C horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 or 3
Texture: loamy fine sand, loamy sand, fine sand, or sand

Linton Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Terraces
Parent material: Loess
Slope: 0 to 6 percent

Taxonomic class: Coarse-silty, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Linton silt loam, 1,250 feet east and 350 feet south of the northwest corner of sec. 26, T. 147 N., R. 84 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; neutral; abrupt smooth boundary.

Bw1—7 to 14 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; common fine pores; slight effervescence; neutral; clear smooth boundary.

Bw2—14 to 17 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine pores; slight effervescence; slightly alkaline; clear boundary.

Bk—17 to 29 inches; light gray (2.5Y 7/2) silt loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; common masses of lime; strong effervescence; slightly alkaline; clear boundary.

C—29 to 60 inches; light yellowish brown (2.5Y 6/4) silt loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; strong effervescence; slightly alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to lime: 10 to 30 inches

A horizon:
Value: 4 or 5, 2 or 3 moist
Chroma: 1 to 3, 2 or 3 moist

Bw horizon:
Value: 4 to 6
Chroma: 2 or 3

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 7 moist
Chroma: 2 to 4

C horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Notes: Some pedons have textures coarser or finer than silt loam below a depth of 40 inches.

Lohler Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 1 percent
Notes: These soils are calcareous.

Taxonomic class: Fine, smectitic, calcareous, frigid Vertic Ustifluvents

Typical pedon:
Lohler silty clay, 53 feet east and 53 feet south of the northwest corner of sec. 35, T. 140 N., R. 81 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 8 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse and medium subangular blocky structure parting to moderate fine granular; hard, firm, sticky and plastic; many fine roots; common fine pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

C—8 to 60 inches; light brownish gray (2.5Y 6/2) stratified silty clay, dark grayish brown (2.5Y 4/2) moist; massive; very hard, firm, sticky and plastic; common fine roots 8 to 30 inches, few fine 30 to 60 inches; common fine pores; some layers appear platy, but strong very fine angular blocky in other layers; 1/8 to 1/2 inch thick layers of light gray (2.5Y 7/2) silt below a depth of 40 inches; slight effervescence; slightly alkaline.

Range in Characteristics

Ap horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 to 5 moist
Chroma: 1 or 2

C horizon
Hue: 2.5Y or 5Y
Value: 4 to 7, 3 to 6 moist
Chroma: 1 to 4
Texture: silty clay, clay, or silty clay loam

Magnus Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Terraces
Parent material: Alluvium
Slope: 0 to 6 percent

Taxonomic class: Fine, smectitic, frigid Vertic Haplustolls

Typical pedon:
Magnus silty clay, 2,360 feet east and 2,060 feet north of southwest corner of sec. 26, T. 138 N., R. 80 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; strong fine granular structure; hard, friable; few large and common fine roots; many fine pores; slight effervescence; moderately alkaline; abrupt smooth boundary.

A1—7 to 15 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak coarse prismatic and moderate and strong medium and very fine angular blocky structure; very hard, firm; common roots; many fine pores; black (10YR 2/1) moist thin layers; slight effervescence; moderately alkaline; clear smooth boundary.

A2—15 to 26 inches; dark gray (10YR 4/1) silty clay, very dark gray (10YR 3/1) crushed, black (10YR 2/1) moist; moderate coarse prismatic and strong medium and fine angular blocky structure; very hard, firm; common fine pores; shiny pressure faces on surface of peds; few small carbonate nodules; slight effervescence; moderately alkaline; gradual wavy boundary.

Bw—26 to 36 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak coarse prismatic and strong medium angular blocky structure; very hard, firm; shiny pressure faces on vertical faces of prisms; common fine carbonate nodules; slight effervescence; moderately alkaline; gradual wavy boundary.

BC—36 to 54 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium and fine angular blocky structure; very hard, firm; a few vertical cracks with pressure faces; common fine carbonate nodules, slight effervescence; moderately alkaline; gradual boundary.

C—54 to 60 inches; light brownish gray (2.5Y 6/2) and light yellowish brown (2.5Y 6/4) stratified silty clay, silt loam, and silty clay loam, olive brown (2.5Y 4/4) and dark grayish brown (2.5Y 4/2) moist; massive; firm; few medium carbonate nodules; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to 40 inches
Notes: Some pedons have Bk horizons.

A horizon:
Value: 3 to 5
Notes: It does not have lime in the lower part in some pedons.

Bw horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 or 3 moist
Chroma: 1 or 2
Texture: silty clay or clay

C horizon:
Notes: It has thin strata of loam or sandy loam in some pedons. It has gypsum segregations in some pedons.

Mandan Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Terraces
Parent material: Loess
Slope: 0 to 25 percent

Taxonomic class: Coarse-silty, mixed, superactive, frigid Pachic Haplustolls

Typical pedon:
Mandan silt loam, approximately 2,240 feet north and 90 feet east of the southwest corner of sec. 15, T. 138 N., R. 80 W. (Colors are for dry soil unless otherwise stated.)

A1—0 to 13 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak coarse prismatic structure parting to weak coarse and fine subangular blocky; hard, very friable, slightly sticky and slightly plastic; many roots; many fine pores; slightly alkaline; gradual wavy boundary.

A2—13 to 20 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; hard, very friable, slightly sticky and slightly plastic; common roots; many fine pores; slight effervescence; moderately alkaline; gradual wavy boundary.

Bw—20 to 29 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak subangular blocky; hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine pores; few masses of lime; strong effervescence; moderately alkaline; gradual wavy boundary.

Bk—29 to 38 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic and subangular blocky structure; hard, very friable, slightly sticky and slightly plastic; few fine roots; common very fine pores; common masses of lime; violent effervescence; moderately alkaline; gradual smooth boundary.

BCk—38 to 47 inches; light brownish gray (2.5Y 6/2) silt loam, grayish brown (2.5Y 5/2) moist; massive; hard, very friable, slightly sticky and slightly plastic; few fine roots; few small pebbles with carbonate crusts on undersides are near base of horizon; common fine masses of lime; violent effervescence; strongly alkaline; clear smooth boundary.

2C1—47 to 56 inches; light brownish gray (10YR 6/2) loam, dark grayish brown (10YR 4/2) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few small pebbles; few masses of lime; strongly alkaline; clear wavy boundary.

3C2—56 to 60 inches; dark brown (10YR 3/3) fine sandy loam; violent effervescence; strongly alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to over 35 inches
Depth to lime: 0 to 40 inches
Depth to glacial till: 40 to more than 60 inches
Notes: Some pedons have an Ab horizon. Some pedons have a silt loam C horizon to a depth of 60 inches.

A horizon:
Value: 2 or 3 moist

Bw horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 2 to 4 moist
Chroma: 2 or 3
Texture: silt loam or very fine sandy loam

Bk and BCk horizons:
Value: 5 to 7
Chroma: 2 or 3
Notes: Some pedons have a 2Bk horizon.

2C and 3C horizons:
Hue: 10YR or 2.5Y
Value: 4 or 5 moist
Chroma: 2 to 4
Texture: loam, fine sandy loam, sand, or gravelly sand

Notes: These horizons are below a depth of 40 inches. Some pedons do not have 2C or 3C horizons within a depth of 60 inches.

Manning Series

Depth class: Very deep
Drainage class: Somewhat excessively drained
Permeability: Moderately rapid in the upper part and very rapid in the lower part
Landform: Terraces
Parent material: Alluvium
Slope: 3 to 6 percent

Taxonomic class: Coarse-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Manning fine sandy loam, 2,040 feet west and 100 feet south of the northeast corner of sec. 15, T. 139 N., R. 97 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate medium granular; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; many fine pores; few pebbles; neutral; abrupt smooth boundary.

Bw1—5 to 12 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate coarse and medium prismatic structure parting to moderate medium subangular blocky; hard, very friable, slightly sticky and slightly plastic; common fine roots; many fine pores; few faint clay films on faces of peds; few pebbles; neutral; gradual wavy boundary.

Bw2—12 to 18 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; moderate coarse and medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; few faint clay films on faces of prisms; few pebbles and cobbles; neutral; clear wavy boundary.

Bk—18 to 25 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; few roots; common fine pores; about 10 percent gravel; violent effervescence; common fine masses of lime; moderately alkaline; clear wavy boundary.

2C1—25 to 40 inches; light yellowish brown (2.5Y 6/4) sand and gravel, olive brown (2.5Y 4/3) dry; single grain; loose; few fine roots; about 25 percent gravel coarser than 3/4 inch; few cobbles; thin coating of lime on undersides of some pebbles and cobbles; strong effervescence in upper part and slight effervescence in lower part; moderately alkaline; clear wavy boundary.

2C2—40 to 60 inches; light brownish gray (2.5Y 6/2) sand and strata of fine gravel, dark grayish brown (2.5Y 4/2) moist; single grain; loose; about 10 percent gravel; slight effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to lime: 13 to 28 inches
Depth to sand and gravel: 24 to 40 inches

A horizon:
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3
Texture: fine sandy loam or loam
Notes: It has up to 3 percent rock fragments.

Bw horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 2 to 4
Texture: fine sandy loam or loam
Notes: It has 1 to 10 percent rock fragments.

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 8, 3 to 6 moist
Chroma: 2 or 3
Texture: fine sandy loam or loam
Notes: It has 2 to 15 percent rock fragments.

2C horizon:
Hue: 2.5Y or 5Y
Value: 4 to 7, 3 to 6 moist
Chroma: 2 to 4
Texture: fine sand, loamy sand, coarse sand, sand, or loamy coarse sand
Notes: It has up to 75 percent rock fragments.

Marysland Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderate in the upper part and rapid in the lower part
Landform: Terraces
Parent material: Alluvium
Slope: 0 to 1 percent
Notes: These soils are highly calcareous.

Taxonomic class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Calciaquolls

Typical pedon:
Marysland loam, 900 feet east and 200 feet north of the southwest corner of sec. 4, T. 121 N., R. 40 W. (Colors are for moist soil unless otherwise stated.)

A—0 to 9 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; very friable; many roots; slight effervescence; moderately alkaline; abrupt wavy boundary.

Ak—9 to 12 inches; black (10YR 2/1) loam, dark gray (10YR 4/1) dry; weak fine granular structure; very friable; many roots; disseminated lime; strong effervescence; moderately alkaline; abrupt wavy boundary.

Bkg1—12 to 15 inches; olive gray (5Y 4/2) loam; many fine faint olive gray (5Y 5/2) and dark gray (5Y 4/1) redoximorphic depletions; weak fine subangular blocky structure; very friable; few roots; disseminated lime; strong effervescence; moderately alkaline; clear irregular boundary.

Bkg2—15 to 20 inches; olive gray (5Y 4/2) loam; few fine prominent olive yellow (2.5Y 6/6) redoximorphic concentrations; weak fine and medium subangular blocky structure; very friable; few dark brown (10YR 4/3) coatings in root channels; few small lime masses; strong effervescence; moderately alkaline; clear wavy boundary.

Bkg3—20 to 27 inches; light olive gray (5Y 6/2) loam; few fine prominent olive yellow (2.5Y 6/6) redoximorphic concentrations; weak medium and fine subangular blocky structure; friable; few grayish brown (2.5Y 5/2) root channel fillings; few small lime and dark-colored masses; strong effervescence; moderately alkaline; clear wavy boundary.

2Cg1—27 to 40 inches; grayish brown (2.5Y 5/2) sand; many fine and medium faint light brownish gray (2.5Y 6/2) and common medium prominent yellowish brown (10YR 5/8) redoximorphic concentrations; single grain; loose; slight effervescence; moderately alkaline; gradual wavy boundary.

2Cg2—40 to 60 inches; grayish brown (2.5Y 5/2) sand; many medium faint light brownish gray (2.5Y 6/2) redoximorphic depletions and few medium prominent red (2.5YR 4/8) redoximorphic concentrations; single grain; loose; slight effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 24 inches
Depth to the calcic horizon: 0 to 12 inches
Depth to sand and gravel: 20 to 40 inches

A horizon:
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 2 or 3
Chroma: 0 or 1

Bkg horizon:
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 3 to 6, 4 to 7 dry
Chroma: 0 to 2

2Cg horizon:
Hue: 2.5Y or 5Y
Value: 3 to 6, 4 to 8 dry
Notes: It has 1 to 35 percent gravel.

Maschetah Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 45 percent
Notes: These soils are highly calcareous.

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Calciustolls

Typical pedon:
Maschetah silt loam, 1,800 feet east and 1,125 feet south of the northwest corner of sec. 7, T. 146 N., R. 104 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 7 inches; grayish brown (2.5Y 5/2) silt loam, very dark grayish brown (2.5Y 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; strong effervescence; slightly alkaline; clear smooth boundary.

Bk1—7 to 19 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many very fine tubular pores; common fine masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

Bk2—19 to 34 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; many very fine tubular pores; common fine masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

Bk3—34 to 48 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; few very fine roots; many very fine tubular pores; common fine masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

C—48 to 90 inches; pale yellow (2.5Y 7/4) silty clay loam, light olive brown (2.5Y 5/4) moist; massive; very hard, very firm, sticky and plastic; common very fine tubular pores; few fine masses of lime; violent effervescence; moderately alkaline.

Range in Characteristics

Notes: Some pedons have a calcareous Bw horizon up to 10 inches thick.

A horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 4 or 5, 3 or 4 moist
Chroma: 2 or 3

Bk horizon:
Hue: 10YR, 2.5Y, or 5Y
Chroma: 2 to 4
Texture: silt loam or silty clay loam
Notes: Rock fragments range from 0 to 5 percent.

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 6 or 7, 4 or 5 moist
Chroma: 2 to 4
Texture: silt loam or silty clay loam
Notes: Rock fragments range from 0 to 5 percent.

Max Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope: 9 to 45 percent slopes

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Max loam, 2,350 feet north and 1,440 feet east of the southwest corner of sec. 29, T. 153 N., R. 80 W. (Colors are for moist soil unless otherwise stated.)

A—0 to 6 inches; very dark brown (10YR 2/2) loam, dark grayish brown (10YR 4/2) dry; moderate medium and fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and common fine roots; about 2 percent gravel; neutral; clear wavy boundary.

Bw1—6 to 11 inches; dark brown (10YR 3/3) loam, brown (10YR 5/3) dry; moderate coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, sticky and plastic; many very fine and common fine roots; about 2 percent gravel; slightly alkaline; gradual wavy boundary.

Bw2—11 to 16 inches; dark brown (10YR 4/3) loam, brown (10YR 5/3) dry; moderate medium and coarse prismatic structure parting to moderate medium and fine subangular blocky; slightly hard, friable, sticky and plastic; common very fine roots; about 2 percent gravel; slightly alkaline; clear smooth boundary.

Bk1—16 to 26 inches; olive brown (2.5Y 4/4) loam, light yellowish brown (2.5Y 6/4) dry; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, firm, sticky and plastic; few very fine roots; about 5 percent gravel; disseminated lime throughout; strong effervescence; moderately alkaline; gradual smooth boundary.

Bk2—26 to 37 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/4) dry; weak coarse subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; about 5 percent gravel; few fine irregularly shaped masses of lime; strong effervescence; moderately alkaline; gradual smooth boundary.

C—37 to 60 inches; light olive brown (2.5Y 5/4) loam, light yellowish brown (2.5Y 6/4) dry; massive; hard, firm, sticky and plastic; few very fine roots; about 5 percent gravel; few fine irregularly shaped masses of lime; slight effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to lime: 10 to 25 inches
Percent rock fragments: 1 to 10 percent
Notes: Some pedons have a BCk horizon.

A horizon:
Value: 2 or 3, 3 to 5 dry
Chroma: 2 or 3

Bw horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6 dry
Chroma: 2 to 4
Texture: loam or clay loam

Bk horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

C horizon:
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4
Texture: loam or clay loam

Mckeen Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 1 percent
Notes: These soils are calcareous.

Taxonomic class: Fine-loamy, mixed, superactive, calcareous, frigid Typic Fluvaquents

Typical pedon:
Mckeen loam, 80 feet south and 230 feet east of the northwest corner of sec. 32, T. 137 N, R. 79 W. (Colors are for moist soil unless otherwise stated.)

A—0 to 2 inches; very dark grayish brown (10YR 3/2) loam, grayish brown (10YR 5/2) dry; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; common very fine pores; very slight effervescence; slightly alkaline; clear smooth boundary.

C—2 to 12 inches; stratified dark grayish brown (2.5Y 4/2) loam, light brownish gray (2.5Y 6/2) dry; many fine faint grayish brown (2.5Y 5/2) redoximorphic depletions and many fine prominent yellowish brown (10YR 5/8) redoximorphic concentrations; moderate medium and fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine pores; slight effervescence; slightly alkaline; abrupt smooth boundary.

Ab—12 to 15 inches; very dark grayish brown (2.5Y 3/2) silty clay, grayish brown (2.5Y 5/2) dry; few fine prominent yellowish brown (10YR 5/8) redoximorphic concentrations; strong fine subangular blocky structure; hard, firm, very sticky and very plastic; few very fine and fine roots; few very fine pores; slight effervescence; slightly alkaline; clear smooth boundary.

Cg1—15 to 23 inches; stratified olive gray (5Y 4/2) silty clay loam, olive gray (5Y 5/2) dry; few fine prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; massive; hard, firm, sticky and plastic; few very fine and fine roots; few very fine pores; slight effervescence; slightly alkaline; clear smooth boundary.

Cg2—23 to 45 inches; stratified dark olive gray (5Y 3/2) and olive gray (5Y 4/2) loam, olive gray (5Y 5/2) and light olive gray (5Y 6/2) dry; common fine distinct gray (5Y 5/1) redoximorphic depletions and common fine prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine pores; slight effervescence; slightly alkaline; clear smooth boundary.

Cg3—45 to 54 inches; stratified olive gray (5Y 4/2) loam, olive gray (5Y 5/2) dry; many fine faint gray (5Y 5/1) redoximorphic depletions and many fine prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine pores; slight effervescence; slightly alkaline; clear smooth boundary.

Cg4—54 to 60 inches; stratified olive gray (5Y 4/2) loamy fine sand, light olive gray (5Y 6/2) dry; common fine faint gray (5Y 5/1) redoximorphic depletions and common fine prominent dark yellowish brown (10YR 4/4) redoximorphic concentrations; massive; soft, very friable, nonsticky and nonplastic; few very fine roots; few very fine pores; very slight effervescence; slightly alkaline.

Range in Characteristics

Depth to lime: 0 to 6 inches
10 to 40 inch particle-size control section: Stratified with loam, silt loam, silty clay loam, or clay loam textures averaging between 18 to 30 percent clay and more than 15 percent fine and coarser sand. Thin strata of coarser or finer textures may occur throughout the profile.
Notes: Some pedons have an O horizon.

A horizon:
Hue: 10YR or 2.5Y
Value: 2 to 4, 3 to 6 dry
Chroma: 1 or 2

C horizon:
Value: 3 to 6, 4 to 7 dry
Chroma: 1 or 2
Texture: loam, silt loam, silty clay loam, or clay loam
Notes: Coarser or finer textures occur as thin strata or are below a depth of 40 inches.

Minnewaukan Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Rapid
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 3 percent

Taxonomic class: Mixed, frigid Typic Psammaquents

Typical pedon:
Minnewaukan loamy fine sand, 1,055 feet south and 150 feet west of the northeast corner of sec. 17, T. 151 N., R. 63 W. (Colors are for moist soil unless otherwise stated.)

A—0 to 3 inches; black (10YR 2/1) loamy fine sand, dark gray (10YR 4/1) dry; weak fine subangular blocky and granular structure; soft, very friable, slightly sticky and nonplastic; many roots; about 1 percent gravel; slight effervescence; slightly alkaline; abrupt smooth boundary.

AC—3 to 5 inches; dark grayish brown and very dark grayish brown (2.5Y 4/2 and 2.5Y 3/2) loamy coarse sand, grayish brown (2.5Y 5/2) dry; single grain;

nonsticky and nonplastic; many roots; about 15 percent gravel; slight effervescence; slightly alkaline; clear smooth boundary.

C—5 to 16 inches; dark grayish brown with olive brown (2.5Y 4/2 with 2.5Y 4/4) loamy sand, light brownish gray (2.5Y 6/2) dry; many fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable, slightly sticky and nonplastic; few roots; about 1 percent gravel; slight effervescence; slightly alkaline; clear wavy boundary.

Cg1—16 to 28 inches; olive gray and olive (5Y 4/2 and 5Y 4/3) loamy sand, light gray and light olive gray (5Y 6/1 and 5Y 6/2) dry; very weak coarse prismatic structure; slightly sticky and nonplastic; few fine roots; about 10 percent pebbles; about 30 percent of sand and pebbles are shale fragments; few fine masses of lime; slight effervescence; slightly alkaline; clear wavy boundary.

Cg2—28 to 36 inches; olive gray and gray (5Y 5/2 and 5Y 5/1) fine sand, light gray (5Y 7/2) dry; single grain; nonsticky and nonplastic; about 1 percent gravel; slight effervescence; slightly alkaline; clear smooth boundary.

Cg3—36 to 50 inches; dark brown (10YR 3/3) fine sand, brown (10YR 4/3 and 10YR 5/3) dry; single grain; nonsticky and nonplastic; few small iron and manganese concretions; slight effervescence; moderately alkaline; clear smooth boundary.

Cg4—50 to 60 inches; olive (5Y 4/3) fine sand, pale olive (5Y 6/3) dry; single grain; nonsticky and nonplastic; slight effervescence; moderately alkaline.

Range in Characteristics

10 to 40 inch particle-size control section: Loamy fine sand, loamy sand, fine sand, or sand
Notes: Some pedons have horizons that contain 1 to 20 percent gravel.

A and AC horizons:
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 6
Texture: ranges from fine sandy loam to sand

C horizon:
Hue: 10YR, 2.5Y, 5Y, or 5GY

Moreau Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Slow
Landform: Uplands
Parent material: Residuum
Slope: 0 to 40 percent
Notes: These soils are calcareous.

Taxonomic class: Fine, smectitic, frigid Vertic Haplustolls

Typical pedon:
Moreau silty clay, 350 feet north and 200 feet east of the southwest corner of sec. 22, T. 129 N., R. 90 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; weak fine granular structure; slightly hard, friable, very sticky and very plastic; few very fine roots; slight effervescence; slightly alkaline; abrupt wavy boundary.

Bw—6 to 13 inches; light olive brown (2.5Y 5/3) silty clay, olive brown (2.5Y 4/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky and very plastic; few very fine roots; 1 to 2 inch wide cracks filled with A material throughout; strong effervescence; slightly alkaline; clear wavy boundary.

Bk—13 to 27 inches; light yellowish brown (2.5Y 6/3) silty clay, light olive brown (2.5Y 5/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, firm, very sticky and very plastic; 1 to 2 inch wide cracks filled with A material in upper 10 inches; common medium irregularly shaped masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

BCk—27 to 35 inches; light brownish gray (2.5Y 6/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak medium subangular blocky structure; slightly hard, firm, very sticky and very plastic; common olive yellow (2.5Y 6/6) iron stains; about 50 percent fine fragments of unweathered shale; few medium irregularly shaped masses of lime; strong effervescence; moderately alkaline; gradual wavy boundary.

Cr—35 to 60 inches; light olive gray (5Y 6/2) soft shale, olive gray (5Y 4/2) moist; common yellow (2.5Y 6/6) iron stains between bedrock laminations; slight effervescence; moderately alkaline.

Range in Characteristics

Depth to lime: 0 to 10 inches
Depth to soft bedrock: 20 to 40 inches
Notes: Some pedons have a By or C horizon

A horizon:
Hue: 10YR or 2.5Y
Value: 4 or 5, 2 or 3 moist

Bw horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6, 3 to 5 moist
Chroma: 2 to 4
Texture: silty clay, clay, or silty clay loam

Bk and BCk horizons:
Hue: 2.5Y or 5Y
Value: 5 or 6
Chroma: 1 to 3
Texture: silty clay, clay, or silty clay loam
Notes: The horizon contains nests of gypsum in some pedons.

Cr horizon
Hue: 2.5Y or 5Y
Value: 5 to 7, 3 to 6 moist
Chroma: 2 to 4

Morton Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 0 to 15 percent

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Argiustolls

Typical pedon:
Morton silt loam, 300 feet east and 60 feet south of the northwest corner of sec. 35, T. 141 N., R. 85 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 5 inches; very dark grayish brown (10YR 3/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure in the upper part and weak medium prismatic structure parting to moderate medium granular in the lower part; slightly hard, friable; many roots; few fine pores; neutral; clear wavy boundary.

Bt1—5 to 10 inches; dark brown (10YR 4/3) silty clay loam, very dark grayish brown (10YR 3/2) moist; very dark brown (10YR 2/2) moist coatings on faces of peds; moderate medium prismatic structure parting to moderate medium and fine angular blocky; hard, friable; many roots; common fine pores; faint continuous clay films on faces of peds; neutral; gradual smooth boundary.

Bt2—10 to 15 inches; brown (10YR 5/3) silty clay loam, dark brown (10YR 4/3) moist; very dark grayish brown (10YR 3/2) moist coatings on faces of peds; moderate medium prismatic structure parting to moderate coarse to fine subangular blocky; hard, friable; common roots; many fine pores; faint patchy clay films on faces of peds; neutral; gradual smooth boundary.

Bk1—15 to 18 inches; light olive brown (2.5Y 5/4) silty clay loam, dark grayish brown (2.5Y 4/2) moist; few very dark grayish brown (10YR 3/2) moist coatings on faces of peds; moderate medium subangular blocky structure; hard, friable; common roots; many fine pores; few faint clay films on faces of peds; few masses of lime; slight effervescence; moderately alkaline; gradual smooth boundary.

Bk2—18 to 33 inches; light gray (2.5Y 7/2) loam, grayish brown (2.5Y 5/2) moist; weak coarse prismatic structure parting to weak coarse subangular blocky; hard, friable; few fine roots; common fine pores; many large masses of lime; violent effervescence; moderately alkaline; clear smooth boundary.

Cr—33 to 60 inches; soft consolidated siltstone and mudstone.

Range in Characteristics

Depth to lime: 11 to 30 inches
Depth to soft bedrock: 20 to 40 inches
Notes: It has glacial stones in the surface layer in some pedons. Some pedons have a C horizon above the Cr horizon.

A horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3

Bt horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 2 to 4
Texture: loam, silt loam, or silty clay loam

Bk horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 6 moist

Noonan Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow
Landform: Till plains
Parent material: Glacial till
Slope: 0 to 6 percent
Notes: These soils are sodic.

Taxonomic class: Fine, smectitic, frigid Typic Natrustolls

Typical pedon:
Noonan loam, 1,850 feet south and 110 feet west of the northeast corner of sec. 35, T. 163 N., R. 97 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to moderate fine granular; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; many fine pores; about 2 percent gravel; neutral; abrupt smooth boundary.

Btn1—6 to 9 inches; dark grayish brown (10YR 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; strong coarse and medium columnar structure parting to moderate medium angular blocky; tops of columns capped with gray (10YR 6/1) dry loam; very hard, firm, sticky and plastic; few very fine roots; many distinct very dark brown (10YR 2/2) clay films on faces of peds and lining pores; about 2 percent gravel; strongly alkaline; clear wavy boundary.

Btn2—9 to 12 inches; dark grayish brown (2.5Y 4/2) clay loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to strong medium angular blocky; very hard, firm, sticky and plastic; few very fine roots; few pores; faces of peds coated with brown (10YR 4/3) clay films; about 2 percent gravel; strongly alkaline; clear wavy boundary.

Bk—12 to 20 inches; light olive brown (2.5Y 5/3) clay loam, olive brown (2.5Y 4/3) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and slightly plastic; few very fine roots; about 2 percent gravel; few medium masses of lime; few fine nests of gypsum in the lower part; strong effervescence; strongly alkaline; gradual wavy boundary.

Bky—20 to 28 inches; light yellowish brown (2.5Y 6/3) loam, olive brown (2.5Y 4/3) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, friable, sticky and slightly plastic; few fine and medium roots; about 2 percent gravel; few fine nests of gypsum; common fine masses of lime; strong effervescence; strongly alkaline; gradual wavy boundary.

BCy—28 to 60 inches; light yellowish brown (2.5Y 6/3) and light olive brown (2.5Y 5/3) loam, olive brown (2.5Y 4/3) moist; weak coarse and medium subangular blocky structure; very hard, firm, sticky and slightly plastic; about 2 percent gravel; common medium nests of gypsum; slight effervescence; strongly alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 22 inches
Depth to lime: 8 to 30 inches
Depth to gypsum or other salts: More than 16 inches
Percent rock fragments: 1 to 8 percent
Notes: Some pedons have an E or C horizon. Some pedons have a Btnz horizon below a depth of 16 inches. Some pedons have a Bw or Btkn horizon below the Btn horizon.

Ap horizon:
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3

Btn horizon:
Hue: 10YR or 2.5Y
Value: 3 to 6, 2 to 4 moist
Chroma: 2 to 4
Texture: clay loam, silty clay, or clay

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4

BCy horizon:
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: loam or clay loam

Omio Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate over moderately slow
Landform: Uplands
Parent material: Loess over residuum
Slope: 0 to 9 percent

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Omio silt loam, 1,550 feet south and 900 feet west of the northeast corner of sec. 32, T. 133 N., R. 78 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots; neutral; abrupt smooth boundary.

Bw—5 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium and coarse subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; few very fine continuous random pores; slightly alkaline; clear smooth boundary.

BCk—12 to 22 inches; brown (10YR 5/3) silt loam, olive brown (2.5Y 4/4) moist; weak coarse prismatic structure parting to moderate coarse subangular blocky; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine continuous random pores; strong effervescence; slightly alkaline; clear smooth boundary.

C1—22 to 31 inches; light yellowish brown (2.5Y 6/4) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots; few very fine continuous random pores; strong effervescence; slightly alkaline; abrupt wavy boundary.

2C2—31 to 38 inches; olive (5Y 5/3) silt loam, olive (5Y 4/3) moist; strong medium and coarse angular blocky structure; very hard, firm, slightly sticky and slightly plastic; few very fine roots follow interfaces between adjacent peds; few very fine discontinuous pores; strong effervescence; slightly alkaline; abrupt wavy boundary.

2Cr—38 to 60 inches; light olive gray (5Y 6/2) stratified soft siltstone; slight effervescence.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches thick
Depth to lime: 12 to 26 inches
Depth to soft bedrock: 20 to 40 inches

A horizon:
Value: 3 or 4, 2 or 3 moist

Bw horizon:
Value: 3 to 5, 3 or 4 moist
Chroma: 2 to 4, 2 or 3 moist

C and 2C horizons:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7, 4 or 5 moist
Texture: silt loam, loam, or fine sandy loam

Cr horizon:
Notes: It is soft or slightly hard siltstone, sandstone, or shale

Parnell Series

Depth class: Very deep
Drainage class: Very poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Alluvium
Slope: 0 to 1 percent

Taxonomic class: Fine, smectitic, frigid Vertic Argiaquolls

Typical pedon:
Parnell silty clay loam, 1,320 feet north and 35 feet west of the southeast corner of sec. 10, T. 125 N., R. 40 W. (Colors are for moist soil unless otherwise stated.)

A1—0 to 15 inches; black (10YR 2/1) silty clay loam, black (10YR 2/1) dry; moderate very fine and fine subangular blocky structure; friable; common roots; few fine distinct dark brown (7.5YR 3/2) and few fine prominent reddish brown (5YR 4/4) redoximorphic concentrations; neutral; clear smooth boundary.

A2—15 to 22 inches; very dark gray (10YR 3/1) silt loam, dark gray (10YR 4/1) dry; moderate fine and medium platy structure parting to weak very fine subangular blocky; friable; few roots; few patchy gray (10YR 6/1) coatings on faces of peds when dry; slightly acid; clear smooth boundary.

Btg1—22 to 32 inches; black (10YR 2/1) silty clay loam, very dark gray (10YR 3/1) dry; weak medium prismatic structure parting to moderate medium subangular blocky; firm; few roots; many thin coatings of clean sand and silt particles on faces of peds; few faint black (10YR 2/1) clay films on faces of peds; slightly acid; gradual smooth boundary.

Btg2—32 to 55 inches; black (10YR 2/1) grading to very dark gray (10YR 3/1) silty clay, very dark gray (10YR 3/1) dry; weak medium prismatic structure parting to strong angular blocky; firm; many faint black (10YR 2/1) clay films on faces of peds; slightly acid in upper part grading to neutral in lower part; diffuse wavy boundary

BCg—55 to 80 inches; grayish brown (2.5Y 5/2) grading to olive gray (5Y 5/2) in the lower part, silty clay loam; weak very fine angular blocky structure; firm in upper part and friable in lower part; few strata of loam and silty clay; few distinct black (10YR 2/1) and very dark gray (10YR 3/1) clay films in upper part; common fine prominent reddish brown (5YR 4/4) redoximorphic concentrations and common fine faint dark grayish brown (2.5Y 4/2) redoximorphic depletions; neutral in upper part becoming slightly alkaline; slight effervescence in lower part.

Range in Characteristics

Mollic epipedon thickness: 24 to 80 inches
Depth to lime: 35 to more than 80 inches
Notes: Some pedons have an 0a horizon up to 6 inches thick. Some pedons have an E horizon up to 4 inches thick. Some pedons have a Bk or C horizon. Some pedons have a 2C horizon of glacial till that has up to 8 percent rock fragments.

A horizon:
Hue: 10YR, 2.5Y, 5Y, or neutral
Chroma: 0 or 1

Btg horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4
Chroma: 1 or 2
Texture: silty clay, silty clay loam, clay loam, or clay

BCg horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 3 to 6
Chroma: 1 to 4
Texture: loam, clay loam, silty clay loam, silty clay, or clay

Parshall Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 25 percent

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Pachic Haplustolls

Typical pedon:
Parshall fine sandy loam, 1,550 feet north and 950 feet east of southwest corner of sec. 33, T. 139 N., R. 81 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; common very fine and few fine pores; neutral; abrupt smooth boundary.

A—7 to 12 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many fine and very fine and few medium roots; many fine and very fine and few medium pores; neutral; clear wavy boundary.

Bw1—12 to 20 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine and fine and few medium roots; many very fine and fine and few medium pores; slightly alkaline; clear wavy boundary.

Bw2—20 to 29 inches; light olive brown (2.5Y 5/3) fine sandy loam, dark olive brown (2.5Y 3/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and few fine pores; neutral; abrupt smooth boundary.

Bk1—29 to 42 inches; grayish brown (2.5Y 5/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure parting to weak medium subangular blocky; soft, very friable, slightly sticky and slightly plastic; common very fine and few fine roots; many very fine and few fine pores; few fine filaments of lime; strong effervescence; moderately alkaline; clear smooth boundary.

Bk2—42 to 48 inches; light brownish gray (2.5Y 6/2) fine sandy loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; soft, very friable, slightly sticky and nonplastic; few fine and very fine roots; common very fine pores; common fine filaments of lime; strong effervescence; moderately alkaline; abrupt wavy boundary.

BCk—48 to 60 inches; light yellowish brown (2.5Y 6/3) loamy fine sand, olive brown (2.5Y 4/3) moist; weak coarse subangular blocky structure; soft, very friable, slightly sticky and nonplastic; few fine and very fine roots; few very fine pores; few fine irregularly shaped masses and common fine filaments of lime; violent effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to 40 inches
Notes: Some pedons have an Ab horizon below a depth of 50 inches. Some pedons have a C horizon.

A horizon:
Value: 3 or 4

Bw horizon:
Chroma: 2 to 4

Bk horizon:
Hue: 10YR or 2.5Y
Texture: fine sandy loam or loamy fine sand

Peta Series

Depth class: Very deep
Drainage class: Somewhat poorly drained
Permeability: Moderate
Landform: Uplands
Parent material: Alluvium
Slope: 0 to 3 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Pachic Argiustolls

Typical pedon:
Peta loam, 2,150 feet east and 1,900 feet south of the northwest corner of sec. 23, T. 142 N., R. 99 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; 18 percent clay; neutral; clear smooth boundary.

A—5 to 10 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots throughout; common very fine tubular pores; 18 percent clay; neutral; clear smooth boundary.

Bt1—10 to 20 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; moderately hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; common very fine tubular pores; 25 percent clay; few distinct discontinuous very dark grayish brown (10YR 3/2) clay films throughout; common fine rounded distinct dark yellowish brown (10YR 4/6) dry redoximorphic concentrations from 16 to 20 inches; neutral; clear wavy boundary.

Bt2—20 to 26 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; weak medium prismatic structure parting to moderate medium subangular blocky; moderately hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; common very fine tubular pores; 23 percent clay; few distinct discontinuous dark brown (10YR 3/3) clay films throughout; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations throughout; neutral; clear wavy boundary.

BC—26 to 36 inches; light olive brown (2.5Y 5/4) fine sandy loam, olive brown (2.5Y 4/4) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots throughout; common very fine tubular pores; 15 percent clay; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations throughout; neutral; gradual wavy boundary.

C1—36 to 48 inches; light olive brown (2.5Y 5/4) fine sandy loam, olive brown (2.5Y 4/4) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots throughout; common very fine tubular pores; 11 percent clay; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations and common fine rounded prominent light olive gray (5Y 6/2) dry redoximorphic depletions throughout; slightly alkaline; gradual wavy boundary.

C2—48 to 53 inches; light yellowish brown (2.5Y 6/3) loam, light olive brown (2.5Y 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 18 percent clay; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations and common fine rounded distinct light olive gray (5Y 6/2) dry redoximorphic depletions throughout; common fine rounded masses of lime pedogenic throughout; strong effervescence (HCL, 1 normal); moderately alkaline; gradual wavy boundary.

C3—53 to 80 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, slightly sticky and nonplastic; 9 percent clay; common fine rounded prominent strong brown (7.5YR 4/6) dry redoximorphic concentrations throughout; slight effervescence (HCL, 1 normal); moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 to 40 inches
Percent rock fragments: less than 1 percent
Depth to redoximorphic features: 7 to 32 inches

A horizon:
Value: 2 or 3, 3 or 4 dry
Chroma: 1 to 3

Bt horizon:
Chroma: 2 to 4
Texture: loam, clay loam, or sandy clay loam

BC horizon:
Hue: 10YR or 2.5Y
Value: 4 or 5, 5 or 6 dry
Chroma: 2 to 4
Texture: fine sandy loam, sandy loam, or sandy clay loam

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7 dry
Texture: fine sandy loam, loam, sandy loam, or loamy sand

Reeder Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 0 to 6 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Argiustolls

Typical pedon:
Reeder loam, 1,575 feet south and 475 feet west of the northeast corner of sec. 14, T. 129 N., R. 100 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse and fine subangular blocky structure parting to weak fine granular; friable; many roots; many fine pores; neutral; abrupt smooth boundary.

Bt1—8 to 12 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate coarse and medium prismatic and moderate medium angular blocky structure; friable; common roots; many fine pores; many faint clay films on vertical and many clay films on horizontal faces of peds; neutral; clear smooth boundary.

Bt2—12 to 17 inches; brown (10YR 5/3) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic and moderate medium angular blocky structure; friable; many clay films on faces of peds; neutral; gradual wavy boundary.

Bk1—17 to 32 inches; light brownish gray (2.5Y 6/3) loam, dark grayish brown (2.5Y 4/3) moist; weak coarse and medium prismatic and moderate medium subangular blocky structure; friable; few roots; many fine pores; common masses of lime; strong effervescence; moderately alkaline; gradual wavy boundary.

Bk2—32 to 36 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; weak medium subangular blocky structure; friable; few fine roots; many fine threads of lime, strong effervescence; moderately alkaline; gradual wavy boundary.

Cr—36 to 60 inches; pale yellow (5Y 7/3) soft sandstone and siltstone, olive (5Y 5/3) moist; few masses of lime; slight effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to soft bedrock: 20 to 40 inches
Notes: Some pedons have a stratified loam, clay loam, or silty clay loam C horizon.

Ap horizon:
Value: 3 to 5, 2 or 3 moist

Bt horizon:
Hue: 7.5YR, 10YR, or 2.5Y
Value: 4 to 6, 3 to 5 moist
Chroma: 2 to 4

Bk horizon:
Notes: Some pedons do not have a Bk horizon.

Regan Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 3 percent
Notes: These soils are highly calcareous.

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Calciaquolls

Typical pedon:
Regan silty clay loam, 1,650 feet south and 1,000 feet east of the northwest corner of sec. 34, T. 144 N., R. 78 W. (Colors are for moist soil unless otherwise stated.)

A1—0 to 4 inches; very dark gray (2.5Y 3/1) silty clay loam, dark gray (2.5Y 4/1) dry; moderate fine granular structure; hard, friable, slightly sticky and slightly plastic; many roots; slight effervescence; moderately alkaline; clear wavy boundary.

A2—4 to 9 inches; very dark gray (5Y 3/1) silty clay loam, gray (5Y 5/1) dry; strong fine and very fine subangular blocky structure parting to strong fine granular; hard, friable, sticky and slightly plastic; common roots; strong effervescence; moderately alkaline; clear very wavy boundary.

Bkg1—9 to 16 inches; gray (5Y 5/1) silty clay loam, light gray (5Y 6/1) dry; moderate medium granular structure; very hard, friable, sticky and slightly plastic; common roots; violent effervescence; moderately alkaline; gradual wavy boundary.

Bkg2—16 to 28 inches; dark gray (5Y 4/1) silty clay loam, gray (5Y 5/1) dry; massive; extremely hard, firm; few roots; violent effervescence; moderately alkaline; gradual wavy boundary.

2Cg1—28 to 54 inches; olive gray (5Y 4/2) clay loam, gray (5Y 5/1) dry; massive; extremely hard, friable; few roots; few pores; few salt crystals; strong effervescence; moderately alkaline; clear smooth boundary.

2Cg2—54 to 60 inches; olive gray (5Y 4/2) sandy clay loam, gray (5Y 5/1) dry; few fine distinct dark yellowish brown (10YR 4/4) redoximorphic concentrations; massive; stratified with clay loam and sandy loam layers; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Salinity: The soil is saline in some map units.

A horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 2 or 3
Chroma: 1 or 2
Texture: silt loam or silty clay loam

Bkg horizon:
Hue: 10YR, 2.5Y, or 5Y

Value: 3 to 6, 4 to 7 dry
Chroma: 1 or 2
Texture: silt loam or silty clay loam

2Cg horizon:
Value: 3 to 5, 5 to 7 dry
Chroma: 1 to 4

Regent Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Slow
Landform: Uplands
Parent material: Residuum
Slope: 1 to 6 percent

Taxonomic class: Fine, smectitic, frigid Vertic Argiustolls

Typical pedon:
Regent silty clay loam, northwest corner of sec. 3, T. 139 N., R. 97 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 10 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky and moderate fine granular structure; firm, plastic; common fine roots; common fine pores; neutral; clear smooth boundary.

Bt1—10 to 18 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure separating to strong fine angular blocky; firm, plastic; few roots; common fine pores; dark grayish brown (10YR 4/2) dry clay films on faces of peds; slightly alkaline; clear wavy boundary.

Bt2—18 to 26 inches; light brownish gray (2.5Y 6/2) silty clay, olive brown (2.5Y 4/3) moist; weak coarse prismatic structure separating to moderate medium subangular blocky; firm, plastic; few roots; common very fine pores; faint clay films on faces of peds; few faint white masses of lime; slightly alkaline; gradual wavy boundary.

Bk—26 to 39 inches; pale olive (5Y 6/3) silty clay loam, olive (5Y 5/3) moist; weak coarse prismatic structure separating to moderate medium subangular blocky; firm, plastic; few fine pores; common fine threads and few masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Cr—39 to 62 inches; pale olive (5Y 6/3) dry soft shale; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to soft bedrock: 24 to 40 inches

Ap horizon:
Value: 4 or 5, 2 or 3 moist

Bt horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 2 to 4 moist
Chroma: 2 to 4

Bk horizon:
Notes: Some pedons do not have a Bk horizon.

Cr horizon:
Notes: It is soft siltstone or shale.

Rhoades Series

Depth class: Deep and very deep
Drainage class: Well drained
Permeability: Very slow
Landform: Terraces and uplands
Parent Material: Alluvium and residuum
Slope: 0 to 25 percent
Notes: These soils are saline-sodic.

Taxonomic class: Fine, smectitic, frigid Leptic Vertic Natrustolls

Typical pedon: Rhoades silt loam, 350 feet south and 125 feet east of the northwest corner of sec. 16, T. 131 N., R. 96 W. (Colors are for dry soil unless otherwise stated.)

E—0 to 3 inches; light brownish gray (10YR 6/2) silt loam, dark grayish brown (10YR 4/2) moist; moderate thin and medium platy structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and very fine and few coarse roots; common fine and few coarse pores; slightly acid; abrupt smooth boundary.

Btn—3 to 8 inches; dark grayish brown (2.5Y 4/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; strong medium columnar structure parting to strong fine and very fine angular blocky; extremely hard, very firm, very sticky and very plastic; common fine roots on faces of peds; common fine pores; light brownish gray (10YR 6/2) coatings on tops of columns; many faint clay films on faces of peds; moderately alkaline; clear wavy boundary.

Btknyz—8 to 14 inches; grayish brown (2.5Y 5/2) silty clay, very dark grayish brown (2.5Y 3/2) moist; moderate coarse prismatic structure parting to moderate fine angular blocky; very hard, very firm, very sticky and very plastic; common fine roots on faces of peds; common fine pores; common faint clay films on faces of peds; common fine flecks of gypsum and other salt crystals; few fine masses of lime; strong effervescence; strongly alkaline; gradual wavy boundary.

Bkyz—14 to 24 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; common fine roots; common fine pores; few faint clay films on faces of peds; common fine flecks of gypsum and other salt crystals; few fine masses of lime; strong effervescence; strongly alkaline; gradual wavy boundary.

Bky1—24 to 40 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; very hard, very firm, very sticky and very plastic; few fine roots; common fine pores; common fine gypsum accumulations; common fine masses of lime; strong effervescence, strongly alkaline; gradual wavy boundary.

Bky2—40 to 46 inches; light yellowish brown (2.5Y 6/4) silty clay, light olive brown (2.5Y 5/4) moist; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; weak coarse subangular structure; hard, firm, very sticky and very plastic; few fine pores; few fine gypsum accumulations; common fine masses of lime; strong effervescence, strongly alkaline; clear wavy boundary.

C—46 to 60 inches; pale yellow (2.5Y 7/4) stratified silt loam and silty clay loam, light yellowish brown (2.5Y 6/4) moist; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; massive; hard, firm, sticky and plastic; few fine masses of lime; violent effervescence; strongly alkaline.

Range in Characteristics

Depth to soft bedrock: 40 to 60 inches in map unit 41C and more than 60 inches in map units 40C, 41B, and 43C
Notes: Some pedons have a thin A horizon. Some pedons have a By horizon. Pedons in map unit 41C have a Cr horizon between a depth of 40 and 60 inches.

E horizon:
Value: 4 to 6, 2 to 5 moist
Chroma: 2 or 3

Bt horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 to 4 moist
Chroma: 2 or 3
Texture: silty clay loam, clay loam, clay, or silty clay

Bky horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 7, 3 to 5 moist
Chroma: 2 to 4
Texture: clay loam, loam, silty clay loam, silty clay, or clay
Notes: It does not have gypsum in the some pedons.

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 4 to 7, 3 to 6 moist
Chroma: 1 to 4
Texture: silt loam, loam, clay loam, silty clay loam, silty clay, or clay
Notes: It has salt or gypsum in some horizons. Some pedons do not have a C horizon within a depth of 60 inches.

Ridgelawn Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate over rapid
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 2 percent
Notes: These soils are calcareous.

Taxonomic class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, calcareous, frigid Typic Ustifluvents

Typical pedon:
Ridgelawn silt loam, 2,500 feet north and 140 feet east of the southwest corner of sec. 6, T. 21 N., R. 59 E. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 9 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse subangular blocky structure parting to moderate medium granular; hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; slight effervescence throughout (HCL, 1 normal); moderately alkaline (pH 8.0); abrupt boundary.

C1—9 to 20 inches; light brownish gray (2.5Y 6/2) stratified silt loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, moderately sticky and moderately plastic; stratifications 1 to 2 mm thick; common very fine roots throughout; common fine irregular yellowish brown (10YR 5/6) iron concretions pedogenic throughout; slight effervescence throughout (HCL, 1 normal); moderately alkaline; clear smooth boundary.

C2—20 to 25 inches; light brownish gray (2.5Y 6/2) stratified silty clay loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, moderately sticky and moderately plastic; stratifications 1 to 2 mm thick; few very fine roots throughout; few irregular yellowish brown (10YR 5/6) iron concretions pedogenic throughout; strong effervescence throughout (HCL, 1 normal); moderately alkaline; clear smooth boundary.

C3—25 to 29 inches; light brownish gray (2.5Y 6/2) stratified loam and silt loam, dark grayish brown (2.5Y 4/2) moist; massive; hard, friable, moderately sticky and moderately plastic; stratifications 1 to 2 mm thick; few very fine roots throughout; strong effervescence throughout (HCL, 1 normal); moderately alkaline; abrupt smooth boundary.

2C4—29 to 49 inches; light brownish gray (2.5Y 6/2) fine sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose, nonsticky and nonplastic; stratifications 1 to 2 mm thick; organic matter or coal strata 1 mm thick throughout; slight effervescence throughout (HCL, 1 normal); moderately alkaline; abrupt smooth boundary.

2C5—49 to 57 inches; light brownish gray (2.5Y 6/2) stratified loamy fine sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; stratifications 1 to 2 mm thick; slight effervescence throughout (HCL, 1 normal); moderately alkaline; clear smooth boundary.

2C6—57 to 70 inches; light brownish gray (2.5Y 6/2) stratified loamy sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; stratifications 1 to 2 mm thick; slight effervescence throughout (HCL, 1 normal); moderately alkaline; clear smooth boundary.

2C7—70 to 80 inches; light brownish gray (2.5Y 6/2) sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; strata of coal 1 to 5 mm thick throughout; very slight effervescence throughout (HCL, 1 normal); moderately alkaline.

Range in Characteristics

Depth to the sand and gravel: 20 to 40 inches.

A horizon:
Hue: 10YR, 2.5, or 5Y
Value: 5 or 6, 4 or 5 moist
Chroma: 1 to 3

C horizon:
Hue: 10YR, 2.5Y, or 5Y

Value: 5 or 6, 4 or 5 moist
Chroma: 1 to 3

2C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 or 6
Chroma: 1 to 3
Notes: The horizon has up to 35 percent rock fragments.

Ringling Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Moderately rapid in the upper part and rapid in the lower part
Landform: Uplands
Parent material: Residuum
Slope: 2 to 15 percent

Taxonomic class: Loamy-skeletal over fragmental, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Ringling channery loam, 2,600 feet west and 700 feet south of the northeast corner of sec. 22, T. 3 S., R. 42 E. (Colors are for dry soil unless otherwise stated.)

A—0 to 5 inches; reddish brown (5YR 4/3) channery loam, dark reddish brown (5YR 3/3) moist; weak fine granular structure; soft, friable, nonsticky and nonplastic; common medium fine and very fine roots; 30 percent channers; slightly alkaline (pH 7.4); clear smooth boundary.

Bw—5 to 17 inches; reddish brown (5YR 4/4) very channery loam, dark reddish brown (2.5YR 3/4) moist; weak very fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common medium, fine, and very fine roots; 50 percent channers and 5 percent flagstones; slightly alkaline (pH 7.4); clear smooth boundary.

2Ck—17 to 42 inches; pale red (10R 6/3) highly fractured baked sandstone and shale with less than 5 percent fine material in the voids; few medium, fine, and very fine roots along faces of fragments mainly in the upper part; lime casts on rock fragments mainly in the upper part; gradual wavy boundary.

2C—42 to 60 inches; pale red (10R 6/3) highly fractured baked sandstone; less than 3 percent fine material in the voids.

Range in Characteristics

Mollic epipedon thickness: 7 to 14 inches thick
Depth to fragmental material: 12 to 20 inches

A horizon:
Hue: 7.5YR, 5YR, 2.5YR, or 10R
Value: 4 or 5, 2 or 3 moist
Chroma: 2 or 3
Notes: It has 10 to 80 percent rock fragments made up of 0 to 15 percent flagstones and 10 to 65 percent channers.

Bw horizon:
Hue: 7.5YR, 5YR, 2.5YR, or 10R
Value: 4 or 5, 3 or 4 moist
Chroma: 2 to 4
Notes: It has 35 to 80 percent rock fragments made up of 5 to 25 percent flagstones and 30 to 55 percent channers.

2Ck and 3C horizons:
Notes: It has 95 to 100 percent rock fragments made up of 90 to 95 percent flagstones and 5 to 10 percent channers.

Savage Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Slow
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 15 percent

Taxonomic class: Fine, smectitic, frigid Vertic Argiustolls

Typical pedon:
Savage silty clay loam, 280 feet south and 395 feet east of the northwest corner of sec. 13, T. 132 N., R. 92 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate very fine and fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; neutral; abrupt smooth boundary.

A—5 to 7 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure parting to moderate very fine and fine granular; hard, firm, slightly sticky and slightly plastic; many very fine roots; neutral; clear wavy boundary.

Bt1—7 to 11 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate very fine subangular blocky; slightly hard, friable, very sticky and very plastic; many very fine roots; many faint clay films on faces of peds; neutral; clear wavy boundary.

Bt2—11 to 18 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate very fine subangular blocky; hard, firm, very sticky and very plastic; common very fine roots; common distinct clay films on faces of peds; slightly alkaline; gradual wavy boundary.

Bt3—18 to 25 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak medium prismatic structure parting to weak very fine and fine subangular blocky; hard, firm, very sticky and very plastic; common very fine roots; common distinct clay films on faces of peds; slightly alkaline; abrupt smooth boundary.

Bk1—25 to 36 inches; grayish brown (2.5Y 5/2) silty clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure; hard, firm, sticky and plastic; common very fine roots; very few distinct clay films on faces of peds; common medium irregularly shaped masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

Bk2—36 to 51 inches; pale olive (5Y 6/3) silty clay loam, olive (5Y 5/3) moist; weak very coarse prismatic structure; very hard, very firm, very sticky and very plastic; few very fine roots; very few lignite channers; few fine irregularly shaped masses of lime; violent effervescence; moderately alkaline; clear wavy boundary.

C—51 to 80 inches; light yellowish brown (2.5Y 6/4) silty clay loam, olive brown (2.5Y 6/4) moist; massive; very hard, very firm, sticky and plastic; about 1 percent shale channers; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to the Bk horizon: 12 to 30 inches

A horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3
Notes: It has 0 to 5 percent rock fragments.

Bt horizon:
Value: 3 to 6, 2 to 4 moist
Chroma: 2 to 4
Texture: silty clay, silty clay loam, or clay
Notes: It has 0 to 5 percent rock fragments. It has lime in the lower part in some pedons.

Bk and C horizons:
Hue: 10YR, 2.5Y, or 5Y
Chroma: 2 to 4
Texture: silty clay loam, silty clay, or clay
Notes: The horizons have 0 to 10 percent rock fragments.

Schaller Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Rapid
Landform: Terraces
Parent material: Alluvium
Slope: 0 to 25 percent

Taxonomic class: Sandy, mixed, frigid Entic Haplustolls

Typical pedon:
Schaller fine sandy loam, 700 feet east and 90 feet south of the northwest corner of sec. 18, T. 131 N., R. 84 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 9 inches; dark brown (10YR 3/3) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; common fine roots; 5 percent gravel; neutral; clear wavy boundary.

Bk—9 to 15 inches; grayish brown (10YR 5/2) fine sandy loam, dark grayish brown (10YR 4/2) moist; single grain; loose, nonsticky and nonplastic; few fine roots; 5

percent gravel; fine masses of lime; strong effervescence; slightly alkaline; abrupt wavy boundary.

C—15 to 60 inches; light yellowish brown (2.5Y 6/4) gravelly loamy coarse sand, light olive brown (2.5Y 5/4) moist; single grain; loose, nonsticky and nonplastic; few very fine roots; 20 percent gravel; slightly alkaline.

Range in Characteristics

Mollic epipedon thickness: 10 to 16 inches
Depth to lime: 5 to 15 inches

A horizon:
Value: 2 or 3

Bk horizon:
Notes: Some pedons do not have a Bk horizon.

C horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: sand, loamy coarse sand, loamy sand, or coarse sand
Notes: It has 2 to 35 percent gravel.

Scorio Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Slow in the upper part and moderately rapid in the lower part
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 1 percent
Notes: These soils are calcareous.

Taxonomic class: Clayey over loamy, smectitic over mixed, superactive, calcareous, frigid Vertic Ustifluvents

Typical pedon:
Scorio silty clay, 695 feet north and 940 feet east of the southwest corner of sec. 18, T. 152 N., R. 103 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 8 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; strong coarse subangular blocky structure; very hard, very firm, very sticky and very plastic; many very fine and few fine and medium roots; strong effervescence; slightly alkaline; abrupt smooth boundary.

C1—8 to 32 inches; grayish brown (2.5Y 5/2) silty clay with few 1 to 3 inch strata of silt, dark grayish brown (2.5Y 4/2) moist; massive; very hard, very firm, very sticky and very plastic; common very fine roots; strong effervescence; slightly alkaline; gradual wavy boundary.

2C2—32 to 60 inches; stratified light yellowish brown (2.5Y 6/4) loam, olive brown (2.5Y 4/3) moist and pale yellow (2.5Y 7/4) very fine sandy loam, light olive brown (2.5Y 5/4) moist; many fine prominent dark yellowish brown (10YR 4/6) moist redoximorphic concentrations; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; strong effervescence; moderately alkaline.

Range in Characteristics

Salinity: The soil is saline in some map units.
Depth to loamy material: 20 to 40 inches

Ap horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 or 4 moist
Chroma: 2 or 3

C horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: silty clay or silty clay loam
Notes: It is stratified in most pedons.

2C horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: loamy very fine sand, fine sandy loam, very fine sandy loam, very fine sand, silt loam, or loam
Notes: It is stratified fine sand in some pedons.

Searing Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 1 to 15 percent

Taxonomic class: Fine-loamy over fragmental, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Searing loam, 1,960 feet east and 970 feet north of the southwest corner, sec. 20, T. 145 N., R. 94 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 8 inches; dark brown (7.5YR 4/2) loam, dark brown (7.5YR 3/2) moist; weak medium subangular blocky structure parting to fine granular; slightly hard, friable, slightly sticky and slightly plastic; many fine and medium roots; neutral; abrupt smooth boundary.

Bw—8 to 23 inches; reddish brown (5YR 4/4) loam, dark reddish brown (5YR 3/4) moist; strong coarse prismatic structure parting to moderate medium and coarse subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots; slightly alkaline; clear smooth boundary.

C1—23 to 33 inches; reddish yellow (5YR 6/6) channery loam, yellowish red (5YR 4/6) moist; massive; soft, friable, slightly sticky and slightly plastic; common fine roots; 15 percent porcelanite channers; slight effervescence; slightly alkaline; abrupt smooth boundary.

2C2—33 to 60 inches; reddish yellow (5YR 7/6) shattered porcelanite, yellowish red (5YR 5/6) moist; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to lime: 10 to 24 inches
Depth to fragmental material: 20 to 40 inches
Notes: Some pedons have a Bk horizon.

Ap horizon:
Hue: 5YR, 7.5YR, or 10YR
Value: 4 or 5, 2 or 3 moist
Chroma: 2 or 3
Texture: loam, silt loam, or clay loam

Bw horizon:
Hue: 5YR, 7.5YR, or 10YR
Value: 4 to 6, 3 or 4 moist
Chroma: 2 to 4
Texture: loam, silt loam, or clay loam

C horizon:
Texture: loam or clay loam
Notes: It has 5 to 30 percent porcelanite channers.

2C horizon:
Notes: It is shattered porcelanite.

Sen Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 0 to 25 percent

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Sen silt loam, 180 feet west and 1,990 feet north of the southeast corner of sec. 36, T. 139 N., R. 99 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and nonplastic; common roots; neutral; abrupt smooth boundary.

Bw1—6 to 10 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate coarse and medium subangular blocky; slightly hard, friable, slightly sticky and nonplastic; common roots; neutral; clear wavy boundary.

Bw2—10 to 17 inches; light yellowish brown (2.5Y 6/3) silt loam, olive brown (2.5Y 4/3) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and slightly plastic; common roots; slightly alkaline; clear wavy boundary.

Bk1—17 to 23 inches; pale yellow (2.5Y 7/3) silt loam, light olive brown (2.5Y 5/4) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, sticky and slightly plastic; common roots; medium generally rounded masses of lime; violent effervescence; slightly alkaline; clear wavy boundary.

Bk2—23 to 34 inches; white (2.5Y 8/2) silt loam, light yellowish brown (2.5Y 6/4) moist; weak medium subangular blocky structure; slightly hard, friable, sticky and slightly plastic; common roots; many small iron concretions; strong effervescence; moderately alkaline; clear wavy boundary.

Cr—34 to 60 inches; pale yellow (5Y 7/3) and pale olive (5Y 6/3) soft stratified siltstone, pale olive (5Y 6/3) moist; slight effervescence.

Range in Characteristics

Depth to lime: 10 to 30 inches
Depth to soft bedrock: 20 to 40 inches

A horizon:
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3

Bw horizon:
Value: 3 to 6, 3 to 5 moist
Chroma: 2 to 4
Texture: silt loam, loam, or silty clay loam

Bk horizon:
Hue: 2.5Y or 5Y
Value: 5 to 8, 4 to 6 moist
Texture: silt loam, loam, or silty clay loam

Seroco Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Rapid
Landform: Terraces and uplands
Parent material: Eolian
Slope: 0 to 35 percent

Taxonomic class: Mixed, frigid Typic Ustipsamments

Typical pedon:
Seroco loamy fine sand, 1,056 feet south and 60 feet east of the northwest corner of sec. 13, T. 144 N., R. 86 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 3 inches; dark grayish brown (10YR 4/2) loamy fine sand, very dark brown (10YR 3/2) moist; weak medium subangular blocky structure; loose; many fine roots; slightly acid; gradual wavy boundary.

C1—3 to 20 inches; brown (10YR 5/3) fine sand, brown (10YR 4/3) moist; single grain; common fine roots; neutral; gradual wavy boundary.

C2—20 to 60 inches; brown (10YR 5/3) fine sand, brown (10YR 4/3) moist; single grain; few roots; neutral.

Range in Characteristics

Depth to lime: 30 to more than 60 inches
10 to 40 inch particle-size control section: loamy fine sand, loamy sand, or fine sand
Percent rock fragments: 0 to 10 percent
Notes: Some pedons have AC horizons.

A horizon:
Value: 4 to 6, 3 or 4 moist
Chroma: 2 or 3

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4

Shambo Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 35 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Shambo loam, about 1,800 feet south and 1,150 feet east of the northwest corner of sec. 27, T. 131 N., R. 90 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 9 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many fine roots; neutral; abrupt smooth boundary.

Bw1—9 to 13 inches; dark brown (10YR 4/3) loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; neutral; clear wavy boundary.

Bw2—13 to 20 inches; brown (10YR 5/3) loam, dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; slightly alkaline; gradual wavy boundary.

Bw3—20 to 29 inches; light olive brown (2.5Y 5/4) loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common fine roots; slightly alkaline; clear wavy boundary.

Bk—29 to 42 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine roots; strong effervescence; moderately alkaline; gradual smooth boundary.

BCk—42 to 48 inches; light gray (2.5Y 7/2) loam, light brownish gray (2.5Y 6/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; strong effervescence; moderately alkaline; gradual smooth boundary.

C—48 to 60 inches; light gray (2.5Y 7/2) loam, light yellowish brown (2.5Y 6/4) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to lime: 10 to 35 inches
Notes: Some pedons have an Ab horizon. Some pedons have a loamy fine sand, gravelly loam, or gravelly loamy sand 2C horizon at a depth of more than 40 inches. Some pedons have a Cr horizon below a depth of 40 inches.

A horizon:
Value: 3 to 5, 2 or 3 moist
Chroma: 2 or 3

Bw horizon:
Value: 4 to 6, 3 to 5 moist
Texture: loam, silt loam, or clay loam

Bk and BCk horizons:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: loam, silt loam, silty clay loam, or clay loam
Notes: Some pedons do not have a BCk horizon.

C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: loam, or is stratified with sandy loam, fine sandy loam, very fine sandy loam, silty clay loam, sandy clay loam, or clay loam

Stady Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate in the upper part and very rapid in the lower part
Landform: Terraces
Parent material: Alluvium
Slope: 0 to 9 percent

Taxonomic class: Fine-loamy over sandy or sandy-skeletal, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Stady loam, 220 feet north and 115 feet east of the southwest corner of sec. 35, T. 133 N., R. 100 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; moderate fine granular structure; friable; many roots and very fine pores; neutral; abrupt smooth boundary.

Bw1—6 to 12 inches; brown (10YR 5/3) loam, dark brown (10YR 3/3) moist; strong coarse prismatic and moderate medium subangular blocky structure; friable; common roots; common very fine pores; faint clay films on prism faces; neutral; gradual smooth boundary.

Bw2—12 to 15 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; moderate coarse prismatic structure; friable; few roots; common very fine pores; neutral; clear wavy boundary.

Bk1—15 to 18 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) dry; weak coarse prismatic and moderate coarse and medium subangular blocky structure; friable; few roots; disseminated lime throughout; strong effervescence; slightly alkaline; clear wavy boundary.

Bk2—18 to 29 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic and weak coarse subangular blocky structure; friable; few roots; few stones; common masses of lime; violent effervescence; moderately alkaline; clear wavy boundary.

2Bk3—29 to 42 inches; light brownish gray (2.5Y 6/2) sand and gravel, grayish brown (2.5Y 5/2) moist; single grain; loose; thin lime crusts coat bottom of all pebbles; violent effervescence; moderately alkaline; gradual boundary.

2C—42 to 60 inches; light yellowish brown (10YR 6/4) sand and gravel, dark yellowish brown (10YR 4/4) moist; single grain; loose; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to lime: 15 to 25 inches
Depth to sand and gravel: 20 to 40 inches

Ap horizon:
Value: 3 to 5, 2 or 3 moist
Texture: loam or silt loam

Bw horizon:
Value: 4 to 6, 2 to 4 moist
Chroma: 2 to 4

Bk horizon:
Hue: 10YR or 2.5Y
Value: 6 or 7, 4 or 5 moist
Chroma: 2 to 4

2Bk and 2C horizons:
Value: 4 or 5

Stirum Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Moderately slow over moderate to rapid
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 3 percent
Notes: These soils are saline-sodic.

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Typic Natraquolls

Typical pedon:
Stirum fine sandy loam, 2,290 feet south and 240 feet east of the northwest corner of sec. 24, T. 138 N., R. 54 W. (Colors are for moist soil unless otherwise stated.)

Ap—0 to 7 inches; black (10YR 2/1) fine sandy loam, dark gray (10YR 4/1) dry; weak fine and medium subangular blocky structure; very friable; slight effervescence; moderately alkaline; abrupt smooth boundary.

Btn—7 to 15 inches; dark grayish brown (10YR 4/2) fine sandy loam, gray (10YR 5/1) dry; strong coarse columnar structure parting to moderate fine and medium angular blocky; very hard, firm, slightly sticky and plastic; very dark grayish brown (10YR 3/2) clay films on faces of peds; slight effervescence; strongly alkaline; gradual wavy boundary.

Bk—15 to 26 inches; light brownish gray (2.5Y 6/2) loam, light gray (2.5Y 7/2) dry; common fine prominent yellowish brown (10YR 5/4) redoximorphic concentrations; strong very coarse prismatic structure parting to weak fine and medium angular blocky; very hard, firm, plastic; strong effervescence; very strongly alkaline; gradual wavy boundary.

Bg—26 to 34 inches; olive gray (5Y 5/2) very fine sandy loam, light gray (5Y 7/2) dry; common medium prominent yellowish brown (10YR 5/4) and many medium very dark grayish brown (10YR 3/2) redoximorphic concentrations; weak subangular blocky structure; very friable, slightly sticky; slight effervescence; strongly alkaline; clear wavy boundary.

Bkg—34 to 44 inches; light olive gray (5Y 6/2) silt loam, light gray (5Y 7/2) dry; many medium prominent dark brown (7.5YR 4/4) and many coarse very dark grayish brown (10YR 3/2) redoximorphic concentrations; weak fine angular blocky structure; slightly plastic; strong effervescence; strongly alkaline; clear wavy boundary.

2Cg—44 to 60 inches; gray (5Y 5/1) loamy fine sand, light gray (5Y 7/1) dry; many medium prominent dark yellowish brown (10YR 4/4) and few very dark grayish brown (10YR 3/2) redoximorphic concentrations; single grain; strongly alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 24 inches
Depth to lime: 0 to 10 inches
Notes: Some pedons have an E or Bw horizon.

A horizon:
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 2 or 3, 3 to 5 dry
Chroma: 0 to 2
Texture: loam to loamy sand

Btn horizon:
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 3 to 6, 4 to 8 dry
Chroma: 0 to 2
Texture: fine sandy loam, sandy loam, or loam
Notes: It has salts or gypsum in some pedons.

Bk horizon:
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 4 to 7, 5 to 8 dry
Chroma: 0 to 4
Texture: sandy clay loam to loamy fine sand
Notes: It has salts or gypsum in some pedons.

Cg or 2Cg horizons:
Hue: 10YR, 2.5Y, 5Y, or neutral
Value: 3 to 7, 5 to 8 dry
Chroma: 0 to 6
Texture: silt loam to fine sand
Notes: It has textures of sand below a depth of 30 inches in some pedons. It has strata of textures finer than silt loam in some pedons.

Straw Series

Depth class: Very deep
Drainage class: Well
Permeability: Moderate
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 6 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Cumulic Haplustolls

Typical pedon:
Straw loam, 30 feet south and 1,800 feet west of the northeast corner of sec. 10, T. 136 N., R. 94 W. (Colors are for dry soil unless otherwise stated.) (fig. 19)

Ap—0 to 5 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; neutral; clear wavy boundary.

A1—5 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots; neutral; clear wavy boundary.

A2—10 to 23 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine and common fine roots; mildly alkaline; clear wavy boundary.

A3—23 to 30 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots; slight effervescence; moderately alkaline; gradual wavy boundary.

C—30 to 36 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; massive; very hard, firm, sticky and plastic; common very fine roots; few pebbles; few fine and medium rounded masses of lime; strong effervescence; moderately alkaline; gradual wavy boundary.

Ab—36 to 40 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; weak medium subangular blocky structure; hard, firm, sticky and plastic; few very fine roots; common fine and medium irregularly shaped masses of lime; strong effervescence; moderately alkaline; gradual wavy boundary.

C’—40 to 60 inches; pale brown (10YR 6/3) clay loam, brown (10YR 4/3) moist; massive; very hard, firm, sticky and plastic; few very fine roots; few fine and medium irregularly shaped masses of lime; strong effervescence; moderately alkaline.

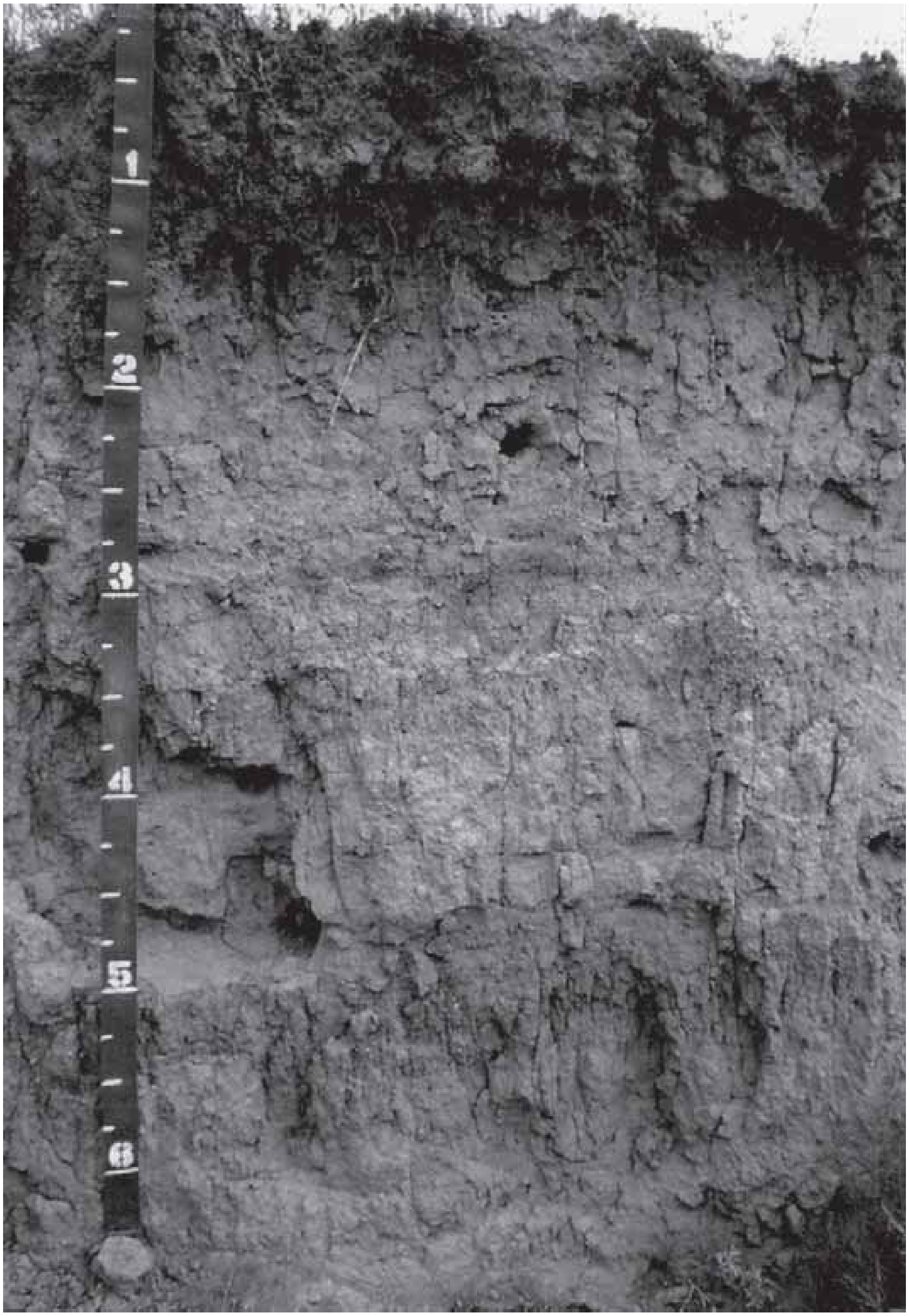

Figure 19. Typical profile of Straw loam.

Range in Characteristics

Mollic epipedon thickness: 16 to 40 inches
Depth to lime: 0 to 25 inches

Percent rock fragments: 0 to 10 percent
Notes: Some pedons have a Bw, Bk, or 2C horizon.

A horizon:
Hue: 10YR or 2.5Y
Chroma: 2 or 3

C horizon:
Hue: 10YR or 2.5Y
Value: 5 or 6, 4 or 5 moist
Chroma: 2 to 4
Texture: loam, silt loam, or clay loam
Notes: It is stratified with sandy loam or fine sandy loam in some pedons.

Sutley Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Loess
Slope: 0 to 25 percent
Notes: These soils are highly calcareous.

Taxonomic class: Coarse-silty, mixed, superactive, frigid Typic Calciustolls

Typical pedon: Sutley silt loam, 1,100 feet south and 160 feet west of the northeast corner of sec. 19, T. 127 N., R. 77 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; dark brown (10YR 4/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable; many very fine roots and pores; strong effervescence; slightly alkaline; abrupt smooth boundary.

Bk—6 to 24 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; moderate medium and coarse subangular blocky structure; slightly hard, very friable; common fine roots and tubular pores; many fine accumulations of lime; violent effervescence; moderately alkaline; clear wavy boundary.

C—24 to 60 inches; light brownish gray (2.5Y 6/2) silt loam, dark grayish brown (2.5Y 4/2) moist; massive; slightly hard, very friable; few fine accumulations of lime; violent effervescence; moderately alkaline.

Range in Characteristics

Depth to lime: 0 to 10 inches
Notes: Some uncultivated pedons do not have lime in the upper few inches. Some pedons have an AC horizon 2 to 5 inches thick. Some pedons have sandstone, shale, or glacial till at a depth of 40 to 60 inches.

A horizon:
Hue: 10YR or 2.5Y
Value: 4 or 5, 2 or 3 moist

Bk and C horizons:
Hue: 10YR or 2.5Y

Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: silt loam or very fine sandy loam

Tally Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 25 percent

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Tally sandy loam, 1,200 feet east and 2,000 feet south of the northwest corner of sec. 7, T. 20 N., R. 56 E. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; dark brown (10YR 3/3) sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; neutral; abrupt smooth boundary.

Bw1—6 to 14 inches; dark brown (10YR 3/3) sandy loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common fine and very fine roots; many fine and very fine pores; neutral; clear smooth boundary.

Bw2—14 to 32 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; common fine and very fine roots; many fine and very fine pores; neutral; clear smooth boundary.

Bk1—32 to 38 inches; brown (10YR 5/3) sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and nonplastic; common very fine roots; common very fine pores; disseminated lime; strong effervescence; moderately alkaline; clear smooth boundary.

Bk2—38 to 60 inches; light yellowish brown (2.5Y 6/4) sandy loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, friable, slightly sticky and nonplastic; few very fine roots; common very fine pores; disseminated lime; violent effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Percent rock fragments: Up to 15 percent above 40 inches and up to 25 percent below 40 inches
Depth to the Bk horizon: 15 to 35 inches
Depth to loamy fine sand and coarser material: More than 20 inches
Notes: Some pedons have a C horizon.

Ap horizon:
Hue: 7.5YR, 10YR, or 2.5Y
Value: 3 to 5, 2 to 4 moist
Texture: fine sandy loam, sandy loam, or loam

Bw horizon:
Hue: 7.5YR, 10YR, or 2.5Y
Texture: fine sandy loam or sandy loam

Bk horizon:
Hue: 7.5YR, 10YR, or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: fine sandy loam or sandy loam
Notes: It has textures of loamy fine sand, loamy sand, or fine sand below a depth of 40 inches in some pedons.

Telfer Series

Depth class: Very deep
Drainage class Somewhat excessively drained
Permeability: Rapid
Landform: Terraces and uplands
Parent material: Alluvium
Slope: 0 to 15 percent

Taxonomic class: Sandy, mixed, frigid Entic Haplustolls

Typical pedon:
Telfer loamy sand, 265 feet north and 150 feet west of the center of sec. 32, T. 138 N., R. 79 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 6 inches; dark grayish brown (10YR 4/2) loamy sand, very dark grayish brown (10YR 3/2) moist; single grain; loose; many roots; neutral; clear smooth boundary.

AC—6 to 14 inches; grayish brown (10YR 5/2) fine sand, very dark grayish brown (10YR 3/2) moist; single grain; loose; common roots; neutral; gradual boundary.

C—14 to 60 inches; light olive brown (2.5Y 5/4) fine sand, dark grayish brown (2.5Y 4/2) moist; single grain; loose; few roots at top and few fine roots at 40 inches; neutral.

Range in Characteristics

Mollic epipedon thickness: 10 to 20 inches

A horizon:
Value: 3 to 5, 2 or 3 moist
Texture: loamy sand or loamy fine sand in the lower part

AC horizon:
Value: 4 or 5
Texture: loamy sand, fine sand, or loamy fine sand

C horizon:
Hue: 10YR or 2.5Y
Value: 4 to 7, 4 or 5 moist
Texture: fine sand or sand

Temvik Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate over moderately slow
Landform: Uplands
Parent material: Loess over glacial till
Slope: 0 to 15 percent

Taxonomic class: Fine-silty, mixed, superactive, frigid Typic Haplustolls

Typical pedon: Temvik silt loam, 2,605 feet north and 280 feet east of the southwest corner of sec. 20, T. 135 N., R. 76 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky and weak fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many roots; many very fine pores; neutral; abrupt smooth boundary.

Bw1—7 to 11 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate coarse prismatic structure parting to moderate medium prismatic and weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many roots; many pores; faint clay films on vertical faces and common faint clay films on horizontal faces of peds; few thin tongues of Ap extend into this horizon; neutral; gradual wavy boundary.

Bw2—11 to 20 inches; brown (10YR 5/3) silt loam, dark brown (10YR 4/3) moist; moderate coarse and medium prismatic structure parting to moderate coarse and medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common roots; common fine pores; faint clay films on faces of peds; neutral; clear wavy boundary.

Bw3—20 to 24 inches; pale brown (10YR 6/3) silt loam, brown (10YR 4/3) moist; weak coarse prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; few roots; common fine pores; few pebbles and stones at the base of this horizon; neutral; clear wavy boundary.

2Bk1—24 to 36 inches; light brownish gray (2.5Y 6/2) clay loam, olive brown (2.5Y 4/4) moist; common fine distinct yellowish brown (10YR 5/4) redoximorphic concentrations; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, friable, sticky and plastic; about 3 percent gravel; many medium and few large masses of lime; strong effervescence; moderately alkaline; gradual wavy boundary.

2Bk2—36 to 44 inches; light olive gray (5Y 6/2) clay loam, olive brown (2.5Y 4/4) moist; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; weak coarse and fine subangular blocky structure; hard, friable, sticky and plastic; about 3 percent gravel; common masses of lime; strong effervescence; moderately alkaline; gradual boundary.

2C—44 to 60 inches; light olive gray (5Y 6/2) clay loam, olive gray (5Y 5/2) moist; weak subangular blocky structure; hard, firm, sticky and plastic; about 3 percent gravel; few small masses of lime; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to glacial till: 20 to 40 inches
Notes: Some pedons have soft bedded sandstone, siltstone, or shale below a depth of 40 inches.

A horizon:
Value: 4 or 5, 2 or 3 moist
Chroma: 2 or 3

Bw horizon:
Hue: 10YR or 2.5Y
Chroma: 2 to 4
Texture: silt loam or silty clay loam
Notes: Some pedons have a loam or clay loam 2Bw horizon.

2Bk horizon:
Value: 5 to 7, 4 to 6 moist
Texture: clay loam or loam
Notes: Some pedons have a silt loam or silty clay loam Bk horizon.

2C horizon:
Hue: 2.5Y or 5Y
Value: 4 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: loam or clay loam
Notes: It has 2 to 8 percent rock fragments.

Tonka Series

Depth class: Very deep
Drainage class: Poorly drained
Permeability: Slow
Landform: Till plains
Parent material: Alluvium
Slope: 0 to 1 percent

Taxonomic class: Fine, smectitic, frigid Argiaquic Argialbolls

Typical pedon:
Tonka silt loam, 2,500 feet west and 590 feet south of the northeast corner of sec. 2, T. 136 N., R. 56 W. (Colors are for moist soil unless otherwise stated.)

A—0 to 13 inches; black (10YR 2/1) silt loam, dark gray (10YR 4/1) dry; moderate fine granular structure parting to moderate thin platy; soft, friable, slightly sticky and slightly plastic; many fine roots; many fine pores; slightly acid; abrupt wavy boundary.

E—13 to 19 inches; dark gray (10YR 4/1) loam, light gray (10YR 7/1) dry; many medium prominent dark brown (10YR 3/3) and dark yellowish brown (10YR 3/4) redoximorphic concentrations; moderate thin platy and moderate fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; moderately acid; abrupt irregular boundary.

Bt1—19 to 24 inches; very dark gray (10YR 3/1) silty clay loam, grayish brown (10YR 5/2) dry; common fine faint brown (10YR 4/3) redoximorphic concentrations; strong coarse prismatic structure parting to moderate very fine angular blocky; very hard, firm, sticky and slightly plastic; common fine roots; bleached sand grains coat tops of prisms and vertical faces of peds; moderately acid; gradual wavy boundary.

Bt2—24 to 34 inches; dark grayish brown (10YR 4/2) silty clay loam, light brownish gray (10YR 6/2) dry; moderate coarse prismatic structure parting to moderate very fine angular blocky; very hard, firm, sticky and slightly plastic; common fine roots; bleached sand grains coat faces of peds; moderately acid; gradual wavy boundary.

2BC—34 to 50 inches; dark grayish brown (2.5Y 4/2) clay loam, light brownish gray (2.5Y 6/2) dry; common medium distinct dark yellowish brown (10YR 3/4) redoximorphic concentrations; weak coarse prismatic structure parting to moderate fine subangular blocky; very hard, firm, sticky and slightly plastic; few fine roots; common fine very dark brown (10YR 2/2) manganese concretions; about 2 percent gravel; neutral; gradual boundary.

2Cg—50 to 60 inches; gray (5Y 5/1) clay loam, light gray (5Y 6/1) dry; many medium distinct dark brown (7.5YR 4/4) redoximorphic concentrations; weak fine platy and moderate very fine angular blocky structure; hard, friable, sticky and slightly plastic; few fine roots; common fine very dark brown (10YR 2/2) manganese concretions; about 3 percent gravel; strong effervescence; slightly alkaline.

Range in Characteristics

Depth to lime: 20 to more than 60 inches
Depth to the Bt horizon: 12 to 28 inches
Notes: Some pedons have a Bk horizon.

A horizon:
Hue: 10YR or neutral
Value: 2 or 3, 3 to 5 dry
Chroma: 0 or 1
Texture: silt loam, loam, clay loam, or silty clay loam

E horizon:
Hue: 10YR, 2.5Y, or neutral
Value: 3 to 5, 5 to 7 dry
Chroma: 0 to 2
Texture: loam, silt loam, very fine sandy loam, or silty clay loam

Bt horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 4
Texture: clay loam, silty clay loam, silty clay, or clay

2Cg horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 2 to 6, 3 to 7 dry
Chroma: 1 to 6
Texture: silty clay loam, clay loam, or loam

Trembles Series

Depth class: Very deep
Drainage class: Moderately well drained
Permeability: Moderately rapid
Landform: Flood plains

Parent material: Alluvium
Slope: 0 to 1 percent
Notes: These soils are calcareous.

Taxonomic class: Coarse-loamy, mixed, superactive, calcareous, frigid Typic Ustifluvents

Typical pedon:
Trembles loam, 1,480 feet south and 1,320 feet east of the northwest corner of sec. 8, T. 23 N., R. 60 E. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 9 inches; grayish brown (2.5Y 5/2) loam, dark grayish brown (2.5Y 4/2) moist; moderate coarse subangular blocky structure parting to moderate coarse granular; hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; very slight effervescence (HCL, 1 normal); slightly alkaline; abrupt smooth boundary.

C1—9 to 15 inches; light yellowish brown (2.5Y 6/3) stratified fine sandy loam, olive brown (2.5Y 4/3) moist; massive; slightly hard, very friable, nonsticky and nonplastic; stratifications are 1 to 2 mm thick; few very fine roots throughout; common fine irregular dark yellowish brown (10YR 4/6) iron concretions pedogenic throughout; slight effervescence (HCL, 1 normal); slightly alkaline; clear smooth boundary.

C2—15 to 23 inches; light brownish gray (2.5Y 6/2) stratified silt loam, very fine sandy loam, and loam, grayish brown (2.5Y 5/2) moist; massive; hard, friable, slightly sticky and slightly plastic; stratifications are 1 to 2 mm thick; few very fine roots throughout; common medium irregular strong brown (7.5YR 4/6) iron concretions pedogenic throughout; few fine irregular masses of lime pedogenic throughout; strong effervescence (HCL, 1 normal); moderately alkaline; clear smooth boundary.

C3—23 to 27 inches; light yellowish brown (2.5Y 6/3) fine sandy loam, light olive brown (2.5Y 5/3) moist; massive; soft, very friable, nonsticky and nonplastic; stratifications are 1 to 2 mm thick; few very fine roots throughout; many fine irregular dark yellowish brown (10YR 4/6) iron concretions pedogenic throughout; strata of organic matter or coal 1 mm thick throughout; strong effervescence (HCL, 1 normal); moderately alkaline; clear smooth boundary.

C4—27 to 48 inches; light brownish gray (2.5Y 6/2) fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; soft, very friable, nonsticky and nonplastic; stratifications are 1 to 2 mm thick; few very fine roots throughout; strata of organic matter or coal 1 mm thick throughout; slight effervescence (HCL, 1 normal); moderately alkaline; clear smooth boundary.

C5—48 to 59 inches; light brownish gray (2.5Y 6/2) stratified very fine sandy loam, silt loam, and fine sandy loam, grayish brown (2.5Y 5/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; stratifications are 1 to 2 mm thick; strong effervescence; moderately alkaline; clear smooth boundary.

2C6—59 to 63 inches; light brownish gray (2.5Y 6/2) stratified sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; stratifications are 1 to 2 mm thick; common fine irregular dark yellowish brown (10YR 4/6) iron concretions pedogenic throughout; slight effervescence (HCL, 1 normal); strata of organic matter or coal 1 mm thick throughout; moderately alkaline; clear smooth boundary.

2C7—63 to 80 inches; light brownish gray (2.5Y 6/2) sand, grayish brown (2.5Y 5/2) moist; single grain; loose, nonsticky and nonplastic; common fine irregular dark yellowish brown (10YR 4/6) iron concretions pedogenic throughout; strata of coal 1 mm thick throughout; slight effervescence (HCL, 1 normal); moderately alkaline.

Range in Characteristics

Ap horizon
Hue: 10YR or 2.5Y
Texture: fine sandy loam or loam

C horizon
Hue: 2.5Y or 10YR
Texture: fine sandy loam, very fine sandy loam, sandy loam, loam, or silt loam

Ustipsamments

Depth class: Very shallow
Drainage class: Somewhat excessively drained
Permeability: Rapid
Landform: Uplands
Parent material: Residuum
Slope: 0 to 6 percent

Taxonomic class: Ustipsamments

Typical pedon:
Ustipsamments loamy fine sand, 750 feet west and 980 feet south of northeast corner of sec. 21, T. 139 N., R. 81 W. (Colors are for moist soil unless otherwise stated.)

A—0 to 4 inches; very dark grayish brown (10YR 3/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; weak fine subangular blocky structure; very friable, nonsticky and nonplastic; many roots; quartz grains stained; slight effervescence; slightly alkaline; gradual wavy boundary.

Cr—4 to 60 inches; olive brown (2.5Y 4/4) and light olive brown (2.5Y 5/4) soft sandstone that crushes to sand, light yellowish brown (2.5Y 6/4) dry; slight effervescence; moderately alkaline.

Range in Characteristics

Particle-size control section: loamy fine sand, fine sand, loamy sand, or sand
Depth to soft bedrock: 2 to 10 inches

A horizon:
Hue: 10YR or 2.5Y
Value: 2 to 4, 4 to 6 dry
Chroma: 2 or 3
Texture: loamy fine sand, loamy sand, fine sand, sandy loam, or fine sandy loam

Cr horizon:
Notes: It is soft sandstone bedrock that crushes to fine sand, sand, or loamy fine sand.

Ustorthents

Depth class: Very shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 0 to 6 percent

Taxonomic class: Ustorthents

Typical pedon:
Ustorthents silty clay loam, 500 feet west and 1,500 feet south of the northeast corner of sec. 21, T. 139 N., R. 81 W. (Colors are for moist soil unless otherwise stated.)

A—0 to 4 inches; dark grayish brown (2.5Y 4/2) silty clay loam, grayish brown (2.5Y 5/2) dry; moderate fine granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and fine roots; slight effervescence; slightly alkaline; clear smooth boundary.

Cr—4 to 60 inches; brown (10YR 5/3) semi-consolidated sedimentary beds consisting of interbedded sandstone and shale, pale brown (10YR 6/3) dry; few very fine and fine roots in vertical cracks in upper part; strong effervescence; moderately alkaline.

Range in Characteristics

Depth to soft bedrock: 2 to 10 inches

A horizon:
Hue: 10YR or 2.5Y
Value: 3 or 4, 3 to 6 dry
Chroma: 1 to 4

Cr horizon:
Notes: It is interbedded layers of siltstone, sandstone, or shale that crush to loam, silt loam, very fine sandy loam, clay loam, or silty clay loam

Vebar Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Moderately rapid
Landform: Uplands
Parent material: Residuum
Slope: 1 to 35 percent

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Vebar fine sandy loam, 2,570 feet west and 355 feet south of the northeast corner of sec. 16, T. 138 N., R. 95 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 5 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak coarse and medium prismatic structure parting to weak fine subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; many roots; many fine pores; slightly acid; gradual wavy boundary.

Bw1—5 to 14 inches; dark grayish brown (10YR 4/2) fine sandy loam, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; many fine roots; many fine pores; slightly acid; gradual wavy boundary.

Bw2—14 to 19 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; moderate coarse prismatic structure parting to weak medium and fine subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; common fine roots; common fine pores; neutral; clear wavy boundary.

Bw3—19 to 26 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak coarse prismatic structure; slightly hard, very friable, nonsticky and nonplastic; few roots; common fine pores; neutral; clear wavy boundary.

BCk—26 to 32 inches; light yellowish brown (2.5Y 6/4) fine sandy loam, light olive brown (2.5Y 5/4) moist; massive; slightly hard, very friable, nonsticky and nonplastic; few hard sandstone fragments; few small sandstone fragments; few small lime accumulations; strong effervescence (2 percent calcium carbonate equivalent); slightly alkaline; clear wavy boundary.

Cr—32 to 60 inches; light yellowish brown (2.5Y 6/4) soft sandstone; strong effervescence in upper part and slight effervescence in lower part; lense of hard sandstone 3 inches thick at 43 inches with lime accumulations around hard fragments; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to soft bedrock: 20 to 40 inches.

A horizon:
Value: 3 to 5, 2 or 3 moist

Bw horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6
Chroma: 2 to 4

BCk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Chroma: 2 to 4
Texture: fine sandy loam or loamy fine sand

Velva Series

Depth Class: Very deep
Drainage Class: Well drained
Permeability: Moderately rapid
Landform: Flood plains
Parent material: Alluvium
Slope: 0 to 6 percent

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Fluventic Haplustolls

Typical pedon:
Velva fine sandy loam, 1,090 feet west and 90 feet north of the southeast corner of sec. 13, T. 144 N., R. 87 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; very dark grayish brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many roots; many fine pores; neutral; abrupt smooth boundary.

AC—6 to 12 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak very coarse prismatic structure parting to weak coarse subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many roots; many fine pores; slightly alkaline; abrupt smooth boundary.

Ab—12 to 13 inches; very dark grayish brown (10YR 3/2) fine sandy loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; many roots; many fine pores; slight effervescence; slightly alkaline; clear smooth boundary.

C1—13 to 15 inches; grayish brown (2.5Y 5/2) fine sandy loam, very dark grayish brown (2.5Y 3/2) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common roots; common fine pores; strong effervescence; slightly alkaline; clear smooth boundary.

C2—15 to 36 inches; grayish brown (2.5Y 5/2) fine sandy loam with thin strata of loam and loamy fine sand less than 1 inch thick, dark grayish brown (2.5Y 4/2) moist; weak very coarse prismatic structure parting to weak coarse and medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common roots; common fine pores; strong effervescence; slightly alkaline; clear smooth boundary.

C3—36 to 52 inches; grayish brown (2.5Y 5/2) loamy fine sand, very dark grayish brown (2.5Y 3/2) moist; single grain; few roots; strong effervescence; moderately alkaline; clear smooth boundary.

C4—52 to 60 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak coarse subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; few roots; few pores; strong effervescence; moderately alkaline.

Range in Characteristics

10 to 40 inch particle-size control section: Averages 7 to 18 percent clay and 25 and 60 percent fine sand and coarser sand
Notes: Some pedons have Bw or Bk horizons.

Ap horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 or 3 moist
Chroma: 1 to 3
Texture: loam or fine sandy loam

C horizon:
Hue: 10YR or 2.5Y
Value: 4 to 7, 3 to 5 moist
Chroma: 2 to 4
Texture: averages fine sandy loam, very fine sandy loam, or loam

Virgelle Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Rapid over very slow
Landform: Terraces
Parent material: Alluvium
Slope: 0 to 6 percent

Taxonomic class: Sandy over clayey, mixed over smectitic, frigid Entic Haplustolls

Typical pedon:
Virgelle loamy fine sand, 1,350 feet north and 330 feet east of the southwest corner of sec. 9, T. 132 N., R. 83 E. (Colors are for dry soil unless otherwise stated.)

A—0 to 9 inches; dark grayish brown (10YR 4/2) loamy fine sand, very dark brown (10YR 2/2) moist; weak medium granular structure; soft, very friable, slightly sticky and slightly plastic; many very fine and few fine roots; neutral; clear smooth boundary.

Bw—9 to 17 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to weak medium subangular; soft, very friable, slightly sticky and nonplastic; many very fine and few fine roots; neutral; clear wavy boundary.

C—17 to 27 inches; light olive brown (2.5Y 5/3) loamy fine sand, olive brown (2.5Y 4/3) moist; single grain; loose, nonsticky and nonplastic; common very fine and few fine roots; slightly alkaline; abrupt wavy boundary.

2Btb—27 to 35 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to moderate fine and medium angular blocky; very hard, very firm, very sticky and very plastic; few very fine and fine roots; many distinct clay films on faces of peds; sand grains coating the vertical faces of peds; very slight effervescence; slightly alkaline; abrupt wavy boundary.

2Btkyb—35 to 50 inches; grayish brown (2.5Y 5/2) clay, dark grayish brown (2.5Y 4/2) moist; moderate medium prismatic structure parting to weak medium subangular; very hard, very firm, very sticky and very plastic; few very fine and fine roots; common distinct clay films (2.5Y 3/2) on faces of peds; few fine nests of gypsum; common fine and medium irregularly shaped masses and few medium rounded concretions of lime; violent effervescence; moderately alkaline; clear wavy boundary.

2Btkyb—50 to 60 inches; light yellowish brown (2.5Y 6/3) silty clay loam, olive brown (2.5Y 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; few very fine roots; few fine nests of gypsum; many fine and common medium irregularly shaped masses and few medium rounded concretions of lime; violent effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 10 to 20 inches
Depth to the 2Bt horizon: 20 to 35 inches
Notes: Some pedons have a 2Bk horizon.

A horizon:
Value: 4 or 5, 2 or 3 moist

Bw horizon:
Chroma: 2 or 3

C horizon:
Hue: 10YR or 2.5Y
Value: 5 or 6, 4 or 5 moist
Chroma: 2 or 3
Texture: loamy fine sand, loamy sand, or fine sand

2Bt horizon:
Hue: 10YR or 2.5Y
Value: 5 to 7, 4 to 6 moist
Texture: clay, silty clay, clay loam, or silty clay loam
Notes: Some pedons do not have a 2Bt horizon. It does not have gypsum in some pedons.

Wabek Series

Depth class: Very deep
Drainage class: Excessively drained
Permeability: Very rapid
Landform: Terraces
Parent material: Alluvium
Slope: 0 to 25 percent

Taxonomic class: Sandy-skeletal, mixed, frigid Entic Haplustolls

Typical pedon:
Wabek loam, 2,490 feet north of the southeast corner of sec. 1, T. 140 N., R. 77 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; soft, very friable, slightly sticky and slightly plastic; many roots; about 3 percent rock fragments; neutral; gradual wavy boundary.

Bk—5 to 9 inches; light brownish gray (10YR 6/2) gravelly coarse sandy loam, brown (10YR 4/3) moist; single grain; common roots; about 25 percent rock fragments; lime crusts coat undersides of rock fragments; strong effervescence; slightly alkaline; diffuse boundary.

C—9 to 60 inches; pale brown (10YR 6/3) very gravelly coarse sand, grayish brown (10YR 5/2) moist; stratified with varying amounts and mixtures of gravel and cobblestones; single grain; few roots in upper 10 inches; about 50 percent rock fragments; strong effervescence decreasing to slight effervescence in the lower part; slightly alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 11 inches
Depth to sand and gravel: 7 to 14 inches

Ap horizon:
Value: 3 or 4, 2 or 3 moist

C horizon:
Hue: 10YR or 2.5Y
Value: 4 to 7, 3 to 6 moist
Chroma: 2 to 4

Wanagan Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate
Landform: Terraces
Parent material: Alluvium
Slope: 0 to 9 percent

Taxonomic class: Loamy-skeletal, mixed, superactive, frigid Typic Haplustolls

Typical pedon:
Wanagan loam, 1,250 feet south and 1,700 feet east of the northwest corner of sec. 17, T. 141 N., R. 105 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak thin platy structure; slightly hard, very friable, sticky and plastic; few very fine roots; slightly acid; abrupt smooth boundary.

Bw—7 to 14 inches; brown (10YR 4/3) loam, dark brown (10YR 3/3) moist; weak medium and coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots; 2 percent gravel; slightly alkaline; clear wavy boundary.

Bk—14 to 18 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; 5 percent gravel; violent effervescence; slightly alkaline; clear wavy boundary.

2BCk—18 to 26 inches; very pale brown (10YR 7/3) and brown (10YR 5/3) very gravelly sandy clay loam, pale brown (10YR 6/3) and dark brown (10YR 4/3) moist; massive; slightly hard, friable, sticky and plastic; few very fine roots; 40 percent gravel; 5 percent cobbles; common fine masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

2C1—26 to 39 inches; pale brown (10YR 6/3) very gravelly fine sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; 60 percent gravel; 5 percent cobbles; violent effervescence; moderately alkaline; gradual wavy boundary.

2C2—39 to 50 inches; pale brown (10YR 6/3) very gravelly fine sandy loam, dark brown (10YR 4/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; 50 percent gravel; 5 percent cobbles; strong effervescence; moderately alkaline; clear wavy boundary.

2C3—50 to 60 inches; light brownish gray (2.5Y 6/2) extremely gravelly loam, grayish brown (2.5Y 5/3) moist; massive; slightly hard, friable, slightly sticky and slightly plastic; 60 percent gravel; 5 percent cobbles; violent effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 8 to 16 inches
Depth to lime: 8 to 16 inches
Depth to loamy-skeletal material: 14 to 28 inches

A horizon:
Value: 4 or 5, 2 or 3 moist

Bw horizon:
Value: 4 or 5, 3 or 4 moist
Chroma: 2 or 3
Notes: It has 1 to 15 percent rock fragments.

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 8, 4 to 7 moist
Chroma: 2 to 4
Notes: It has 5 to 15 percent rock fragments.

2BCk horizon:
Texture: loam or sandy clay loam
Notes: It has 15 to 60 percent rock fragments.

2C horizon:
Hue: 10YR, 2.5Y, or 5Y
Value: 5 to 7
Chroma: 2 to 4
Texture: loam, fine sandy loam, or clay loam
Notes: It has 35 to 85 percent rock fragments.

Wayden Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Slow
Landform: Uplands
Parent material: Residuum
Slope: 0 to 70 percent
Notes: These soils are calcareous.

Taxonomic class: Clayey, smectitic, calcareous, frigid, shallow Typic Ustorthents

Typical pedon:
Wayden silty clay, 475 feet north and 130 feet west of the southeast corner of sec. 13, T. 131 N., R. 102 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 3 inches; light gray (2.5Y 7/2) silty clay, grayish brown (2.5Y 5/2) moist; strong very fine granular structure; hard, friable, sticky and plastic; many fine and very fine roots; slight effervescence; moderately alkaline; clear wavy boundary.

Bk—3 to 7 inches; light gray (5Y 7/2) silty clay, olive gray (5Y 5/2) moist; moderate coarse and medium subangular blocky structure parting to moderate fine subangular blocky; very hard, friable, sticky and plastic; common fine and very fine roots; common fine pores; strong effervescence; moderately alkaline; gradual smooth boundary.

By—7 to 15 inches; light gray (5Y 7/2) silty clay, olive gray (5Y 5/2) moist; weak coarse subangular blocky structure parting to moderate fine subangular blocky; very hard, friable, sticky and plastic; common fine and very fine roots; many gypsum crystals; few soft shale chips; slight effervescence; moderately alkaline; gradual wavy boundary.

Cr—15 to 60 inches; olive (5Y 5/3) stratified silty clay shale, pale olive (5Y 6/3) moist; yellowish brown (10YR 5/6) moist stains on plates in places; extremely hard, very fine, slakes in water; slight effervescence; moderately alkaline.

Range in Characteristics

Depth to soft bedrock: 10 to 20 inches
Notes: Some pedons have an AC or ABk horizon. Some pedons have C horizons above the Cr.

A horizon:
Hue: 2.5Y or 5Y
Value: 5 to 7, 3 to 5 moist
Chroma: 2 or 3

Bk and By horizons:
Hue: 2.5Y or 5Y
Value: 5 to 8, 4 to 6 moist
Chroma: 1 to 4
Texture: silty clay, silty clay loam, clay, or clay loam
Notes: Some pedons do not have Bk or By horizons.

Werner Series

Depth class: Shallow
Drainage class: Well drained
Permeability: Moderate
Landform: Uplands
Parent material: Residuum
Slope: 3 to 50 percent

Taxonomic class: Loamy, mixed, superactive, frigid, shallow Entic Haplustolls

Typical pedon:
Werner loam, 1,585 feet north and 150 feet west of the southeast corner of sec. 31, T. 140 N., R. 80 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to moderate very fine subangular blocky; hard, friable, slightly sticky and slightly plastic; many roots; many fine pores; few small stones; neutral; clear wavy boundary.

ABk—6 to 13 inches; grayish brown (2.5Y 5/2) loam, very dark grayish brown (2.5Y 3/2) moist; weak medium prismatic structure parting to weak medium and fine subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many roots; common fine pores; few small pebbles; few fine masses of lime; slight effervescence; slightly alkaline; clear wavy boundary.

Bk—13 to 17 inches; light yellowish brown (2.5Y 6/4) loam, light olive brown (2.5Y 5/4) moist; weak medium prismatic structure parting to weak fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common roots; few fine pores; few pebbles; common fine masses of lime; strong effervescence; moderately alkaline; clear wavy boundary.

Cr1—17 to 30 inches; pale yellow (2.5Y 7/4) soft argillaceous sandstone; massive but fractures to plates; few roots in cracks; lime accumulations in cracks; slight effervescence; gradual boundary.

Cr2—30 to 60 inches; light gray (5Y 7/2) soft shale and sandstone strata; light yellowish brown and yellow (10Y 6/4 and 2.5Y 7/6) dry on faces of plates and blocks; slight effervescence.

Range in Characteristics

Mollic epipedon thickness: 7 to 13 inches
Percent rock fragments: 0 to 5 percent
Depth to soft bedrock: 7 to 20 inches

A horizon:
Hue: 10YR or 2.5Y
Value: 2 or 3, 4 or 5 dry
Chroma: 2 or 3

ABk horizon:
Hue: 10YR or 2.5Y
Value: 3 or 4, 4 to 6 dry
Chroma: 2 or 4
Texture: loam, very fine sandy loam, silt loam, or clay loam

Bk horizon:
Value: 4 or 5, 5 to 7 dry
Chroma: 2 to 4

Cr horizon:
Notes: It is soft mudstone, sandstone, or shale.

Whitebird Series

Depth class: Moderately deep
Drainage class: Well drained
Permeability: Slow
Landform: Uplands
Parent material: Residuum
Slope: 0 to 15 percent
Notes: These soils are saline-sodic.

Taxonomic class: Coarse-loamy, mixed, superactive, frigid Leptic Natrustolls

Typical pedon:
Whitebird fine sandy loam, 300 feet south and 200 feet east of the northwest corner of sec. 31, T. 130 N., R. 85 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 4 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and slightly plastic; many very fine roots; slightly acid; clear smooth boundary.

E—4 to 6 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 4/3) moist; weak medium subangular blocky structure parting to weak fine platy; soft, very friable, nonsticky and nonplastic; many very fine roots; slightly alkaline; abrupt wavy boundary.

Btn—6 to 12 inches; light olive brown (2.5Y 5/3) fine sandy loam, dark olive brown (2.5Y 3/3) moist; strong medium columnar structure parting to moderate medium and fine angular blocky; extremely hard, very firm, slightly sticky and slightly plastic; many very fine roots along faces of peds; column tops coated with light brownish gray (2.5Y 6/2) E material; common distinct dark brown (10YR 3/3) clay films on faces of peds; slightly alkaline; clear wavy boundary.

Bky—12 to 22 inches; pale olive (5Y 6/3) loamy fine sand, olive (5Y 4/3) moist; weak coarse and medium subangular blocky structure; hard, firm, nonsticky and nonplastic; few very fine roots; few fine and medium gypsum crystals; common fine irregularly shaped masses of lime; strong effervescence; strongly alkaline; gradual wavy boundary.

Cr—22 to 60 inches; light gray (5Y 7/2) soft sandstone bedrock, olive gray (5Y 5/2) moist; massive; moderately alkaline.

Range in Characteristics

Depth to gypsum or other salts: 10 to 16 inches
Depth to soft bedrock: 20 to 40 inches
Notes: Some pedons have a By horizon. Some pedons have a C horizon above the Cr horizon.

A horizon:
Value: 4 or 5, 2 or 3 moist
Chroma: 2 or 3

E horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 or 4 moist
Chroma: 1 to 3
Texture: loamy fine sand, fine sand, fine sandy loam, sandy loam, or loamy sand

Btn horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 3 or 4 moist
Chroma: 2 or 3
Texture: fine sandy loam or sandy loam

Bky horizon:
Hue: 2.5Y or 5Y
Value: 5 to 7, 4 or 5 moist
Chroma: 2 to 4
Texture: fine sandy loam, sandy loam, loamy fine sand, or loamy sand

Williams Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains

Parent material: Glacial till
Slope: 0 to 15 percent

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Argiborolls

Typical pedon:
Williams loam, 1,050 feet east and 60 feet south of the northwest corner of sec. 5, T. 158 N., R. 94 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 6 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots; few pebbles; neutral; abrupt smooth boundary.

Bt1—6 to 10 inches; brown (10YR 4/3) clay loam, dark brown (10YR 3/3) moist; strong medium prismatic structure parting to strong medium angular blocky; hard, firm, sticky and plastic; common very fine roots; many distinct clay films on faces of peds and lining pores; few pebbles; neutral; clear wavy boundary.

Bt2—10 to 15 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; moderate medium prismatic structure parting to strong medium subangular blocky; hard, firm, sticky and plastic; common very fine roots; many distinct clay films on faces of peds and lining pores; slightly alkaline; clear wavy boundary.

Btk—15 to 24 inches; light olive brown (2.5Y 5/4) clay loam, olive brown (2.5Y 4/4) moist; moderate coarse prismatic structure parting to moderate medium subangular blocky; hard, friable, sticky and plastic; common very fine roots; few faint clay films on faces of peds; few pebbles; common medium irregular masses of lime; violent effervescence; slightly alkaline; gradual wavy boundary.

Bk—24 to 36 inches; light brownish gray (2.5Y 6/2) and light gray (2.5Y 7/2) clay loam, grayish brown (2.5Y 5/2) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, friable, sticky and plastic; few very fine roots; few cobbles; lime disseminated throughout and in common masses; violent effervescence; moderately alkaline; gradual wavy boundary.

C—36 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, grayish brown (2.5Y 5/2) moist; few fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations and light gray (10YR 7/2) redoximorphic depletions; massive; soft, friable, sticky and plastic; few pebbles and cobbles; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 16 inches
Depth to lime: 10 to 30 inches
Percent rock fragments: 1 to 10 percent
Notes: Some pedons have a BCk horizon.

Ap horizon:
Value: 3 to 5, 2 or 3 moist

Bt horizon:
Hue: 10YR or 2.5Y
Value: 4 to 6, 2 to 5 moist
Chroma: 2 to 4
Texture: loam or clay loam

Btk horizon:
Notes: Some pedons do not have a Btk horizon.

Bk horizon:
Hue: 10YR or 2.5Y
Value: 4 to 8, 3 to 6 moist
Chroma: 2 to 4
Texture: loam or clay loam

C horizon:
Hue: 10YR or 2.5Y
Value: 5 to 8, 3 to 6 moist
Chroma: 2 to 4
Texture: loam or clay loam

Wilton Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderate over moderately slow
Landform: Uplands
Parent material: Loess over glacial till
Slope: 0 to 9 percent

Taxonomic class: Fine-silty, mixed, superactive, frigid Pachic Haplustolls

Typical pedon:
Wilton silt loam, 1,600 feet east and 300 feet north of southwest corner of sec. 31, T. 147 N., R. 83 W. (Colors are for dry soil unless otherwise stated.)

Ap—0 to 8 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to moderate fine granular; slightly hard, very friable; slightly sticky and slightly plastic; common roots, neutral; abrupt smooth boundary.

Bw1—8 to 13 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many fine roots; common fine pores; neutral; clear wavy boundary.

Bw2—13 to 18 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; faint clay films on some vertical faces of peds; very dark brown (10YR 2/2) coatings on peds; neutral; gradual wavy boundary.

Bw3—18 to 27 inches; grayish brown (10YR 5/2) silt loam, very dark grayish brown (10YR 3/2) moist; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common fine roots; common fine pores; slight effervescence in spots; slightly alkaline; clear wavy boundary.

2Bk1—27 to 36 inches; light brownish gray (2.5Y 6/2) clay loam, dark grayish brown (2.5Y 4/2) moist; weak coarse prismatic structure parting to weak coarse and medium subangular blocky; hard, friable, sticky and plastic; few fine roots; common fine pores; about 5 percent rock fragments; strong effervescence; many medium and few large masses of lime; slightly alkaline; gradual wavy boundary.

2Bk2—36 to 60 inches; light brownish gray (2.5Y 6/2) clay loam, olive brown (2.5Y 4/3) moist; few fine prominent strong brown (7.5YR 5/6) redoximorphic concentrations; massive; hard, friable, sticky and plastic; few roots; about 5 percent rock fragments; strong effervescence; common masses of lime; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 16 inches to more than 30 inches
Depth to glacial till: 20 to 40 inches
Notes: Some pedons have a 2C horizon

Ap horizon:
Value: 3 to 5, 2 or 3 moist

Bw horizon:
Hue: 10YR or 2.5Y
Value: 2 to 4
Chroma: 2 to 4

2Bk horizon:
Hue: 2.5Y or 5Y
Value: 5 to 7, 4 or 5 moist
Chroma: 2 to 4
Texture: loam or clay loam
Notes: It has 2 to 10 percent rock fragments.

Zahl Series

Depth class: Very deep
Drainage class: Well drained
Permeability: Moderately slow
Landform: Till plains
Parent material: Glacial till
Slope: 3 to 45 percent
Notes: These soils are highly calcareous.

Taxonomic class: Fine-loamy, mixed, superactive, frigid Typic Calciustolls

Typical pedon:
Zahl loam, 2,335 feet east and 25 feet south of the northwest corner of sec. 14, T. 156 N., R. 90 W. (Colors are for dry soil unless otherwise stated.)

A—0 to 5 inches; dark grayish brown (10YR 4/2) loam, very dark brown (10YR 2/2) moist; weak medium subangular blocky structure parting to weak medium granular; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots; many fine pores; strong effervescence; slightly alkaline; clear wavy boundary.

Bk—5 to 20 inches; light brownish gray (2.5Y 6/2) loam, dark grayish brown (2.5Y 4/2) moist; weak medium and fine subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine roots; many fine pores; few pebbles; many masses of lime; violent effervescence; moderately alkaline; gradual wavy boundary.

C—20 to 60 inches; light yellowish brown and light olive brown (2.5Y 6/4 and 2.5Y 5/4) clay loam, olive brown and light olive brown (2.5Y 4/4 and 2.5Y 5/4) moist; common fine faint olive gray (5Y 5/2) and common fine distinct gray

(5Y 5/1) redoximorphic depletions; massive; soft, friable, sticky and plastic; few very fine roots to 40 inches; few pebbles; strong effervescence; moderately alkaline.

Range in Characteristics

Mollic epipedon thickness: 7 to 10 inches
Depth to lime: 0 to 9 inches
Percent rock fragments: 1 to 10 percent

Ap horizon:
Hue: 10YR or 2.5Y
Value: 3 to 5, 2 or 3 moist

Bk horizon:
Hue: 10YR or 2.5Y
Value: 5 to 8, 3 to 7 moist
Chroma: 2 to 4
Texture: loam or clay loam

C horizon:
Hue: 10YR or 2.5Y
Value: 5 to 6, 4 to 6 moist
Chroma: 2 to 4
Texture: loam or clay loam

Agronomy

About 37 percent of Morton County is cultivated. In 1999, acreage planted to the principal close-grown crops were as follows: spring wheat, 145,000 acres; durum wheat, 13,500 acres; barley, 29,000 acres; and oats, 54,000 acres. The main row crops were sunflowers, dry beans, and corn. Sunflowers were planted on 33,500 acres; dry edible beans were planted on 900 acres; and corn on 27,000 acres. Alfalfa and other hay crops were planted on 192,500 acres. Small acreages were planted to canola, field peas with oats, mustard, lentils, millet, and safflower (Beard and Waldhaus, 2000). Approximately 4,000 acres were irrigated.

Cropland limitations and general management practices needed for crops and hay and pasture are discussed in this section. Soil interpretive groups used by the Natural Resources Conservation Service for important farmlands, soil productivity indexes, land capability, pasture and hay, and windbreaks are explained. Soil quality and the management of saline and sodic soils are also discussed.

Planners of management systems for individual fields or farms should consider obtaining specific information from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

Cropland Limitations and Management

Management concerns affecting the use of detailed map units in the survey area for crops are shown in Table 6, “Potential Cropland Limitations and Hazards.” The primary concerns in managing cropland are conserving moisture, controlling wind and water erosion, and maintaining or improving soil fertility and tilth.

Moisture at planting time is critical to the success of the crop during the growing season. In years where the amount of available soil moisture is low at planting time, crop success for the year is greatly reduced. Measures that reduce evaporation and runoff rates, increase the rate of water infiltration, and control weeds conserve moisture.

Applying conservation tillage and conservation cropping systems, farming on the contour, stripcropping, establishing field windbreaks, trapping snow, and leaving crop residue on the surface also conserve moisture. When fallow is used to carry moisture over to the next season, a cover of crop residue is essential during winter to guard against moisture loss and erosion.

Wind erosion may be a hazard on most of the soils in Morton County. It is severe on the coarse textured and moderately coarse textured soils, such as Banks, Beisigl, Ekalaka, Flasher, Lakota, Lihen, Manning, Minnewaukan, Parshall, Tally, Telfer, Vebar, Velva, and Virgelle. It is also a severe hazard on Cabba, Chama, Havrelon, Lallie, Mckeen, and Zahl soils. These soils have a relatively high content of lime and are susceptible to wind erosion in the spring if they have been bare throughout the winter. Because of freezing and thawing, soil structure can break down, resulting in aggregates that are susceptible to movement. This can cause fine textured soils, such as Dimmick, Lawther, Lohler, Moreau, and Wayden, to have a severe wind erosion hazard. Nearly all soils can be damaged by wind erosion if they are not protected by residue.

Water erosion is a severe hazard on gently rolling and steeper soils, such as Amor, Cabba, Chama, Flasher, Moreau, Telfer, Vebar, Williams, and Zahl. The hazard is greatest when the surface is bare.

Conservation practices that control both wind and water erosion are those that maintain a protective cover on the surface. An examples is conservation tillage systems that keep a protective amount of crop residue on the surface. Applications of approved herbicides can help to eliminate the need for summer fallow tillage. Cover crops are also effective in controlling both wind and water erosion. Field windbreaks, annual vegetative barriers, and stripcropping help to control wind erosion. Inclusion of grasses and legumes in the cropping sequence, grassed waterways, diversions, terraces, contour farming, and field stripcropping across the slope help to control water erosion. A management system that includes several measures is the best means of protecting the soil. For example, conservation tillage can control soil blowing during years when the amount of crop residue is adequate, but windbreaks are needed during years when the amount of residue is low.

Measures effective in maintaining or improving soil fertility and tilth include utilizing a nutrient management system that includes applying fertilizer, both organic and inorganic, including manure; incorporating crop residue or green manure crops into the soil; and using proper crop rotations. Wind and water erosion reduce productivity of soils. If the surface layer is lost, most of the available plant nutrients also are lost. As a result, applications of fertilizer are needed to maintain adequate crop production.

Of equal concern is the loss of organic matter through erosion. Soil structure, water infiltration, available water capacity, and tilth are all negatively affected by this loss. As organic matter is lost and the subsoil is exposed and tilled, the remaining soil becomes increasingly susceptible to both wind and water erosion. Controlling erosion helps prevent loss of organic matter and plant nutrients and helps maintain productivity. The level of fertility may be reduced even in areas where erosion is controlled. All soils used for crops generally respond well to a nutrient management system. Proper management of soils includes measures that maintain good tilth. These measures are especially needed on the Daglum, Ekalaka, and Rhoades soils that have a sodic subsoil and on the Heil, Lawther, Lohler, Magnus, Moreau, Scoria, and Wayden soils that have a silty clay surface layer. Measures that maintain the content of organic matter are very important if good tilth is to be maintained. The traditional practice of clean-tilled summer fallow contributes to the loss of organic matter partly because it increases the susceptibility to erosion.

Additional limitations and management practices are as follows:

Alkalinity. This limitation reduces availability of selected nutrients and is associated with restricted seedling emergence and water infiltration. This limitation can be reduced with a nutrient management system and timely tillage operations. Tilling when the soil is neither too wet nor too dry helps to maintain tilth and prevent surface compaction. Maintaining crop residue on the surface and adding organic material to the plow layer help increase organic matter, prevent surface crusting, and maintain or improve tilth and fertility.

This limitation exists if the soil’s pH is more that 7.8 at the surface.

Areas of rock outcrop. These areas are usually not accessible for cultivation and generally are unsuited to cultivated crops and hay and pasture. Farming around these areas may reduce the impact of this limitation on farming operations.

This limitation exists if “rock outcrop” is included in the name of the map unit.

Channels. These areas consist of meandering streams and oxbows. Most areas are isolated by streams or are irregularly shaped and often have standing water in the spring. These areas generally are unsuited to cultivated crops.

This limitation exists if “channeled” is included in the name of the map unit.

Dense layer. This limitation slows water infiltration and restricts root penetration. It can be managed by using a cropping system that includes deep-rooted legumes, such as alfalfa and sweetclover, and deep tillage to improve root and water penetration. Incorporating organic material into the soil also helps to improve root and water penetration.

This limitation exists if the bulk density is greater than 1.7 in any soil layer.

Depth to rock. This limitation restricts rooting depth. It can be managed by planting shallow-rooted, moisture-efficient crops adapted to the area. A moisture conservation program may be effective on these areas. Some areas that are less than 20 inches to bedrock are not suitable for cultivated crops.

This limitation exists if soft or hard bedrock is within a depth of 40 inches.

Depth to sand and gravel. This limitation restricts rooting depth and may increase the potential for pesticide and nutrient leaching. It can be managed by planting shallow-rooted, moisture-efficient crops adapted to the area. A moisture conservation program may be effective in these areas. Some areas less than 12 inches to sand and gravel are not suitable for cultivated crops.

This limitation exists if there is more than 35 percent gravel in any soil layer at a depth of less than 40 inches.

Excessive saturated hydraulic conductivity. This limitation may cause deep leaching of nutrients and pesticides. A nutrient and pesticide management system with a moisture conservation program, which includes following pesticide labels and fertilizing based on soil nutrient tests, can help manage these areas. Some areas may be unsuitable for cultivated crops.

This limitation exists if the saturated hydraulic conductivity of any soil layer is 6 inches per hour or more.

Flooding. This limitation can affect the timely seeding and survival of crops. In some situations this limitation can be managed by protecting the soil from flooding by diking or by building water retention structures and by planting vegetation that is adapted to flooded conditions. Some areas may be unsuitable for cultivated crops or protection measures may not be economical.

This limitation exists if the map unit is either occasionally flooded for long or very long periods or frequently flooded.

Gullies. This limitation makes cultivation difficult and hazardous. Generally, gullies are so deep that extensive reshaping is necessary for most uses. They generally are unsuited to cultivated crops, hay, and pasture.

This limitation exists if “gullied” is included in the name of the map unit.

High sodium content. This limitation restricts root, air, and water penetration in the subsoil. It may cause poor tilth and compaction. Tillage at the proper moisture content helps to maintain tilth. Tillage that loosens the dense, sodic subsoil or growing deep-rooted legumes, such as alfalfa and sweetclover, may improve soil physical conditions. For additional information about managing these soils see “Management of Saline and Sodic Soils.”

This limitation exists if the sodium adsorption ratio (SAR) is more than 15 within a depth of 30 inches or if the soil is classified as an Aridic, Borollic, Leptic, Typic, Udic, or Vertic Natriboroll.

High water table. Wetness in undrained areas can delay tillage, seeding, and harvest operations in most years and prevent them in some years. Drained areas are suited to cultivated crops but locating suitable drainage outlets generally is difficult. Planting crops that are tolerant to wetness minimizes the impact of the high water table.

This limitation exists if the water table is within a depth of 36 inches.

Lime content. High lime content at the surface may cause increased wind erosion and surface crusting. It may also reduce availability of selected nutrients. This limitation can be managed by a system of conservation tillage that leaves crop residue on the surface, field windbreaks, stripcropping, and annual buffer strips to help control wind erosion. Field windbreaks planted on slopes greater than 8 percent may contribute to water erosion by concentrating spring runoff. Crops may respond well to a nutrient management system that includes additions of phosphate fertilizer.

This limitation exists if the soil is assigned to wind erodibility group 4L or has more than 5 percent $CaCO_3$ in the upper 10 inches.

Limited available water capacity. This limitation reduces the capacity of the soil to retain moisture for plant use. A moisture conservation program can help manage these areas.

This limitation exists if the available water capacity calculated to a depth of 40 inches or to a root-limiting layer is 6.3 inches or less or the electrical conductivity (EC) is more than 8 at less than 30 inches and the soil is moderately well drained or better.

Limited organic matter. This limitation may cause an increase in surface crusting and reduce the soil's natural fertility. Soil organic matter can be managed by utilizing a nutrient management system, incorporating crop residue or green manure crops into the soil, and using proper crop rotations.

This limitation exists if the content of organic matter is 1 percent or less in the surface layer.

Pesticide and nutrient leaching. This limitation increases the hazard of contaminating aquifers, springs, and local water tables. A nutrient and pesticide management system with a moisture conservation program, which includes following pesticide labels and fertilizing based on soil nutrient tests, can help manage these areas. Some areas may be unsuitable for cultivated crops.

This limitation exists if the depth to the water table is less than 48 inches, depth to bedrock is less than 60 inches, or saturated hydraulic conductivity of any soil layer is 6 inches per hour or more.

Pesticide and nutrient runoff. This limitation increases the hazard of contaminating surface waters, such as lakes, ponds, streams, and rivers. It can be managed with nutrient, pesticide, and conservation tillage systems which include leaving crop residue on the surface, following pesticide labels, and fertilizing based on soil nutrient testing. Limiting row crops on slopes of more than 8 percent reduces the rate of runoff of pesticides and nutrients. Runoff from upland areas can concentrate pesticides on ponded soils. Draining ponded areas may adversely affect the receiving surface waters.

This limitation exists if the soil is occasionally flooded or frequently flooded; is subject to ponding; is assigned to hydrologic group C or D and has a slope of more than 2 percent; is assigned to hydrologic group A and has a slope of more than 6 percent; or is assigned to hydrologic group B, has a slope of 3 percent or more and has a K factor of more than 0.17.

Ponding. This limitation can affect the timely seeding, harvesting, and survival of crops. Because of wetness and ponding, this soil generally is unsuited to cultivated crops, hay and pasture, and range.

This limitation exists if ponding occurs on the soil.

Poor tilth and compaction. This limitation restricts seedling emergence and water infiltration. It can be managed by timely tillage operations, maintaining crop residue on the surface, and adding organic material to the plow layer to increase soil organic matter. A cropping system that includes deep-rooted legumes, such as alfalfa and sweetclover, may improve root and water penetration.

This limitation exists if the upper 10 inches of the soil has more than 35 percent clay; has less than 1 percent organic matter; or has SAR of 5 or more.

Restricted saturated hydraulic conductivity. This limitation restricts root penetration and water saturated hydraulic conductivity. It can be managed with timely tillage operations and by using a cropping system that includes deep-rooted legumes, such as alfalfa and sweetclover, to improve root and water penetration. Incorporating organic material into the soil also helps to improve root and water penetration.

This limitation exists if saturated hydraulic conductivity is 0.06 inch per hour or less within a depth of 40 inches.

Root limiting. This limitation reduces the effectiveness of roots when the soil dries and increases moisture stress during extended dry periods. It can be managed with a cropping system that includes deep-rooted legumes, such as alfalfa and sweetclover, and deep tillage to improve root and water penetration in the subsoil. Tillage when the soil is neither too wet nor too dry helps to maintain tilth. A moisture conservation system may be beneficial. For additional information about managing these soils see “Management of Saline and Sodic Soils.”

This limitation exists if the soil is classified as a Glossic or Glossic Udic Natrustolls.

Salt content. This limitation interferes with plant growth by restricting nutrient uptake and reducing available water. Using nutrient management and moisture conservation systems and growing salt-tolerant crops, such as barley, can help manage these areas. For additional information about managing these soils see “Management of Saline and Sodic Soils.”

This limitation exists if the soil has an EC of more than 4 in the surface layer or more than 8 within a depth of 30 inches.

Slickspots. The surface of these areas is non-vegetated and tends to puddle upon wetting. Slickspots are restrictive to air and water saturated hydraulic conductivity and root growth. These areas are best suited to range. Because of the dense and massive layers, they generally are unsuited to cultivated crops, hay, and pasture. For additional information about managing these soils see “Management of Saline and Sodic Soils.”

This limitation exists if “Slickspots” is included in the name of the map unit.

Slope. This limitation increases the potential for accelerated water erosion unless conservation farming practices are applied.

This limitation exists if the upper slope range of the map unit is more than 8 percent.

Soil slumping. This limitation indicates a potential for mass soil movement. These areas generally are unsuited to cultivated crops, hay, and pasture.

This limitation exists if the slope is more than 35 percent and the surface or subsoil has more than 35 percent clay; or if the slope is more than 25 percent and the subsoil contains more than 35 percent clay and bedrock is at a depth of less than 60 inches; or if “slumped” is a modifier of any named component of the map unit.

Surface crusting. This limitation restricts seedling emergence and water infiltration. It can be managed with a system of conservation tillage that leaves crop residue on the surface and by incorporating organic material into the surface layer.

This limitation exists if the surface texture is silt, silt loam, silty clay loam, or very fine sandy loam and the surface layer organic matter content is less than 3 percent; or if the surface texture is loamy very fine sand, very fine sandy loam, fine sandy loam, sandy loam, sandy clay loam, loam, clay loam, silt, silt loam, or silty clay loam and the surface layer Calcium Carbonate Equivalent ($CaCO_3$) is equal to or greater than 1; or if the surface layer or upper 10 inches has a SAR of 4 or more.

Surface rock fragments. This limitation adversely affects the use of mechanical equipment for cultivation and causes rapid wear of tillage equipment and difficult seedbed preparation. It cannot be easily overcome. These areas are generally unsuited to cultivated crops, hay, and pasture.

This limitation exists if the texture of the surface layer includes any rock fragment modifier except for gravelly or channery and “surface stones” are not already indicated as a limitation.

Surface stones. This limitation restricts normal cultivation practices. These areas are generally unsuited to cultivated crops, hay, and pasture. Economical removal of the surface stones generally is not feasible.

This limitation exists if the surface layer texture includes stony or bouldery modifiers or if “stony” or “bouldery” are included in the map unit name.

Water erosion. This limitation indicates an increased hazard of water erosion. This limitation can be managed by a system of conservation tillage that leaves crop residue on the surface, contour stripcropping, and grassed waterways in areas where runoff concentrates.

This limitation exists if the surface K factor (soil erodibility factor) multiplied by the upper slope percent is more than 2.

Wind erosion. This limitation indicates an increased hazard of wind erosion. This limitation can be managed by using a system of conservation tillage that leaves crop residue on the surface, field windbreaks, stripcropping, annual crop barriers, and a cropping sequence that includes grass-legume hay.

This limitation exists if the wind erodibility group is 1, 2, 3, 4, or 4L.

Erosion Factors

Soil erosion factors are used with other information to estimate the amount of soil lost though water and wind erosion. The procedure for predicting soil loss is useful in guiding and comparing the selection of soil and water conservation practices. The soil erodibility factors (K and Kf), the soil-loss tolerance factor (T), wind erodibility index (I), and wind erodibility groups (WEG) are described in “Physical Properties” in the “Soil Properties” section. Additional information about soil factors affecting wind and water erosion can be obtained from local offices of the Natural Resources Conservation Service or the Cooperative Extension Service.

Prime Farmland and Other Important Farmland

In this section, prime farmland and other important farmland are defined. The map units in the survey area that are considered prime farmland, prime farmland where drained, additional farmland of statewide importance, or other land are listed on Table 7, “Map Unit Productivity Index and Farmland Designation.” Most map units have minor areas or inclusions that do not meet the listed farmland designation. More information about the criteria for prime farmland and other important farmland can be obtained at the local office of the Natural Resources Conservation Service.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the Nation’s short- and long-range needs for food and fiber. Because the supply of high-quality farmland is limited, the U.S. Department of Agriculture recognizes that responsible levels of government, as well as individuals, should encourage and facilitate the wise use of our Nation’s prime farmland.

Prime farmland, as defined by the U.S. Department of Agriculture, is land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses. It could be cultivated land, pastureland, forest land, or other land, but it is not urban, built-up land, or water areas. The soil qualities, growing season, and moisture supply are those needed for a well managed soil to produce sustained high yields of crops in an economic manner.

Prime farmland has an adequate and dependable supply of moisture from precipitation or irrigation, a favorable temperature and growing season, acceptable acidity or alkalinity, an acceptable salt and sodium content, and few or no rocks. It is permeable to water and air. It is not excessively erodible or saturated with water for long periods and it is not frequently flooded during the growing season or it is protected from flooding. The slope ranges mainly from 0 to 6 percent.

Soils with a seasonal high water table may qualify as prime farmland where this limitation is overcome by drainage measures. Onsite evaluation is necessary to determine the effectiveness of corrective measures.

A recent trend in land use in some parts of the nation has been the loss of some prime farmland to industrial and urban uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are more erodible, droughty, and less productive.

About 23,730 acres, or nearly 2 percent of the survey area, meets the requirements for prime farmland. The location of each map unit is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section “Detailed Map Units” and “Soil Series and Their Morphology”.

Additional Farmland of Statewide Importance

Some areas, other than areas of prime farmland, are of statewide importance in the production of food, feed, fiber, forage, and oilseed crops. The criteria used in defining and delineating these areas are determined by appropriate state and federal agencies. Generally, additional farmland of statewide importance includes areas that nearly meet the criteria for prime farmland and that economically produce high yields of crops when treated and managed with acceptable farming methods. Some areas can produce as high a yield as areas of prime farmland if conditions are favorable.

Other Land

Lands not meeting the criteria for Prime Farmland or Additional Farmland of Statewide Importance are placed into Other Land on Table 7, “Map Unit Productivity Index and Farmland Designation”.

This group includes Additional Farmland of Local Importance, Unique Farmland, and Other Land. These farmlands may have agricultural or nonagricultural uses.

Productivity Indexes and Crop Yield Estimates

Productivity indexes are relative ratings of the ability of a soil to produce a particular crop yield in comparison to other soils. They are useful in estimating long-term average crop yields, comparing the production capacity of soils, and in various economic analyses. Productivity indexes are shown in Table 7, “Map Unit Productivity Index and Farmland Designation.” Productivity indexes are given for drained conditions and, where applicable, undrained conditions. The average yields per acre that can be expected of the principal crops grown in the county under a high level of management are shown in Table 8, “Yields per Acre of Crops”.

Productivity indexes are based on soil properties important to crop production. Knowledgeable and experienced soil scientists, conservationists, and university researchers developed the indexes. They used results from field trials, demonstrations and records, and experiences of producers (Ulmer and Patterson, 1988 a, b, c). In North Dakota, productivity indexes are based on long-term average spring wheat production. Similar and contrasting map unit inclusions are considered along with the named map unit components when the productivity index is calculated. The index ranges from 0, which indicates no long-term economic production, to 100, which indicates the highest potential production. Productivity indexes are based on the best available information, but they are difficult to determine for soils with variable properties such as salinity, sodicity, and degree of drainage.

In Morton County, a productivity index of 100 was considered equal to a long-term average yield of 37 bushels per acre of spring wheat. Multiplying the productivity index by 37 and dividing the product by 100 converts the index number to a figure representing the expected long-term average yield per acre. For example, map unit 11B - Amor-Shambo loams, 3 to 6 percent slopes, has a productivity index of 76. This number multiplied by 37 and then divided by 100 converts to 28, which is the expected long-term average yield of spring wheat in bushels per acre for this map unit. In any given year, yields may be higher or lower than those indicated in the table because of variations in management, rainfall, and other production and climatic factors. Estimated yields reflect the production capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. Productivity of a given soil compared with that of other soils, however, is not likely to change.

Management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include nutrient management systems, moisture conservation, and conservation tillage.

Crops other than those shown in the table are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Natural Resources Conservation Service or the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for most kinds of field crops. Crops that require special management are excluded. Soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. Criteria used in grouping the soils do not take into account extensive and generally expensive landforming that would change slope, depth, or other characteristics of the soils, nor do they include unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, woodland, or engineering purposes. The capability classification of each map unit is given in Table 9, “Interpretive Groupings Report.”

In the land capability system, as described in “Land Capability Classification” (USDA-SCS, 1961), soils generally are grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. Capability classes are given for drained conditions and, where applicable, undrained conditions.

Capability classes, the broadest groups, are designated by numerals 1 through 8. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class 1 soils have few limitations that restrict their use.

Class 2 soils have moderate limitations that reduce the choice of plants or require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants and require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, such as wetness, that are impractical to remove and limit their use.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation.

Class 7 soils have very severe limitations that make them unsuitable for cultivation.

Class 8 soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are designated by adding the letter, **e, w, s,** or **c**, to the class numeral, for example, **2e**. The letter **e** shows the main hazard is the risk of erosion unless a close-growing plant cover is maintained; **w** shows that water in or on the soil interferes with plant growth or cultivation (in some soils wetness can be partly corrected by artificial drainage); **s** shows the soil is limited mainly because it is droughty, stony, or saline; and **c**, used in only some parts of the United States, shows the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because soils of this class have few limitations. Class 5 contains only the subclasses indicated by **w, s,** or **c** because the soils in class 5 are subject to little or no erosion. They have other limitations that restrict their use mainly to pasture, rangeland, woodland, wildlife habitat, or recreation. There are no subclasses in class 8.

Pasture and Hayland Interpretations

Pastureland is land devoted to the production of adapted introduced or native forage plants for grazing by livestock. Hayland is land primarily used for the production of hay from long-term stands of adapted forage plants. Both pastureland and hayland receive cultural treatments to enhance forage quality and yields. Because of the relatively short growing season, some producers have established cool-season tame pasture to complement the forage produced on rangeland and to extend the grazing season in the spring and fall.

Generally, large amounts of hay are needed to maintain livestock through the long, harsh winters. Hay was harvested on about 192,500 acres in Morton County in 1999 (Beard and Waldhaus, 2000).

Proper pasture or hayland management is essential for the production of high-quality forage, stand survival, and erosion control. Proper grazing management on pastureland during the growing season helps plants maintain sufficient and vigorous top and root growth for sustained production. Brush and weed control is essential in many areas. Fertilizer increases production and enhances longevity of stands. Rotation grazing and renovation also are important management practices.

Soils are assigned to pasture and hayland groups according to their suitability for production of forage under intensive management. Soils in each suitability group are similar enough to be suited to the same species of grasses or legumes. They also have similar management concerns, productivity levels, and limitations and hazards.

Pasture and hayland suitability groups are given in Table 9, “Interpretive Groupings Report.” They are given for drained conditions and, where applicable, undrained conditions. The local office of the Natural Resources Conservation Service or of the Cooperative Extension Service can provide information on adapted varieties and forage yields.

Pasture and Hayland Groups

The following paragraphs describe the Pasture and Hayland Groups in Major Land Resource Area (MLRA) 54 which includes Morton County. They specify the production potential under improved management and list representative adapted species for each group. The notations in parenthesis following the group name are suitability group reference symbols, often used in lieu of the name.

Clayey. (A4) These soils are deep and well, moderately well, and somewhat poorly drained. They are moderately fine and fine textured soils on uplands. They have few limitations for the management and growth of adapted plants. Production potential is high. Suitable forage species include smooth bromegrass, meadow bromegrass, Russian wildrye, Altai wildrye, intermediate and pubescent wheatgrass, crested wheatgrass, hard fescue, western wheatgrass, green needlegrass, slender wheatgrass, switchgrass, and sweetclover.

Clayey Subsoil. (F1) These soils are deep and moderately well and well drained. They are medium to fine textured soils on uplands. They have a claypan that is a moderate restriction to root growth. Otherwise, these soils have few limitations for the management and growth of adapted plants. Production potential is moderate to high. Suitable forage species include crested wheatgrass, smooth bromegrass, Russian wildrye, intermediate and pubescent wheatgrass, western wheatgrass, green needlegrass, alfalfa, and sweetclover.

Claypan. (G1) These soils are deep and somewhat poorly to well drained. They are moderately coarse to fine textured soils on uplands. The claypan is dense with very little root penetration. Typically these soils are strongly alkaline in the claypan and below. These soils are saline below 16 inches. Production potential is low. Suitable forage species include western wheatgrass, slender wheatgrass, crested wheatgrass, alfalfa, and sweetclover.

Limy Subirrigated. (A5) These soils are deep and somewhat poorly drained. They are moderately coarse to moderately fine textured, calcareous soils on uplands. They typically have a water table at about 1.5 to 3.5 feet during spring and early summer. The hazard of wind erosion is a concern during establishment. Production potential is high. Suitable forage species include big bluestem, indiangrass, switchgrass, little bluestem, tall wheatgrass, intermediate and pubescent wheatgrass, slender wheatgrass, alfalfa, birdsfoot trefoil, and sweetclover.

Loamy and Silty. (A1) These soils are deep and mostly well and moderately well drained. They are medium textured soils on uplands. They have few limitations for the management and growth of adapted plants. Production potential is high. Suitable forage species include smooth bromegrass, meadow bromegrass, Russian wildrye, Altai wildrye, intermediate and pubescent wheatgrass, western wheatgrass, switchgrass, indiangrass, big bluestem, thickspike wheatgrass, slender wheatgrass, green needlegrass, alfalfa, and sweetclover.

Moderately Deep Sandy. (F3) These soils are moderately deep and well and somewhat excessively drained. They are moderately coarse textured soils on uplands. These soils are underlain by weathered sandstone or mudstone at depths of 20 to 40 inches. Root penetration is limited by the bedrock. Production potential is low to moderate. Species suitable for planting include prairie sandreed, green needlegrass, western wheatgrass, sand bluestem, switchgrass, crested wheatgrass, and sweetclover.

Moderately Deep Silty. (F2) These soils are moderately deep and well drained. They are medium and moderately fine textured soils on uplands. Weathered siltstone or shale bedrock is at depths of 20 to 40 inches. Root penetration is limited by bedrock. Production potential is moderate to high. Suitable forage species include smooth bromegrass, Russian wildrye, intermediate and pubescent wheatgrass, crested wheatgrass, western wheatgrass, slender wheatgrass, green needlegrass, sideoats grama, alfalfa, and sweetclover.

Overflow and Run-On. (A3) These soils are deep and well to moderately well drained. They are moderately coarse to fine textured soils on flood plains or upland swales and drainageways. Landscapes are typically plane or concave and receive run-on water from adjacent areas. Some soils are subject to flooding. Soils in this group have few limitations for adapted plants. Production potential is high. Suitable forage species include smooth bromegrass, meadow bromegrass, intermediate and pubescent wheatgrass, Russian wildrye, Altai wildrye, western wheatgrass, thickspike wheatgrass, green needlegrass, slender wheatgrass, big bluestem, indiangrass, switchgrass, alfalfa, and sweetclover.

Saline. (G4) These soils are deep and somewhat poorly and poorly drained. They are coarse to fine textured, saline soils surrounding depressions and on flood plains. The available water capacity is moderate because of salinity. Adapted plant species are those with moderate to high salt tolerance. Severely affected areas will need to be seeded and then mulched to reduce salt concentrations during seedling establishment. The better suited forage species include tall wheatgrass, western wheatgrass, thickspike wheatgrass, slender wheatgrass, streambank wheatgrass, alkali sacaton, alsike clover, and sweetclover. Late fall, dormant seedings are recommended.

Sands. (A7) These soils are deep and moderately well to excessively drained. They are coarse textured soils on uplands and flood plains. Wind erosion is a severe hazard during establishment and renovation. Production potential is moderate to high. Species selection is limited for pasture and hayland. Suitable forage species include sand bluestem, switchgrass, prairie sandreed, intermediate and pubescent wheatgrass, and alfalfa.

Sands Soils. (H5) These soils are deep and moderately well to excessively drained. They are very sandy soils on uplands. The soils have a severe wind erosion hazard and are very droughty. They are low in organic matter and very fragile. Blowouts are common. These soils are not suited to pasture and hayland planting. Cultivated areas should be converted to rangeland.

Sandy. (A6) These soils are deep and well and moderately well drained. They are moderately coarse textured soils on uplands and flood plains. The hazard of wind erosion is a concern during establishment and renovation. Production potential is high. Species selection is somewhat limited. Suitable forage species include green needlegrass, western wheatgrass, slender wheatgrass, sand bluestem, prairie sandreed, switchgrass, intermediate and pubescent wheatgrass, alfalfa, and sweetclover.

Shallow. (H4) These soils are shallow and well to excessively drained. They are coarse to fine textured soils on uplands. They are less than 20 inches to weathered bedrock and have a severe water erosion hazard. They are not suited to pasture and hayland plantings. Cultivated areas should be converted to rangeland.

Shallow to Gravel. (B1) These soils are deep and well to excessively drained. They are medium to coarse textured soils on outwash plains. They typically have gravel and/or coarse sand at depths from 14 to 24 inches. These soils are droughty. Production potential is moderate. Only drought-tolerant species such as western wheatgrass, crested wheatgrass, intermediate and pubescent wheatgrass, alfalfa, and sweetclover should be planted.

Sodic-Saline. (G3) These soils are deep and poorly drained. They are moderately coarse to fine textured claypan soils. These soils occur in drainageways, basins, and upland depressions. They typically are strongly alkaline and saline. Plant selection is limited because of wetness, salinity, and alkalinity. Production potential ranges from low to moderate. Establishment is difficult, so mulching is recommended on more severely affected areas. Suitable forage species include tall wheatgrass, western wheatgrass, slender wheatgrass, streambank wheatgrass, switchgrass, alkali sacaton, alsike clover, and sweetclover. Late fall, dormant seedings are recommended.

Steeply Sloping. (H3) These soil areas are on slopes that average 25 percent or greater. Water erosion is a very severe hazard. These soils are not suited to pasture and hayland plantings. Cultivated areas should be converted to rangeland.

Stony. (H2) These are very stony and extremely stony soils. They are not suited to pasture and hayland plantings. Cultivated areas that have had stone removal should be treated the same as the nonstony phase of the same soil in regard to pasture and hayland planting.

Strongly Saline. (H1) These are deep, poorly drained, moderately fine textured, strongly saline soils in drainageways and on flood plains. High salinity makes it extremely difficult to establish grass stands. They are not suited to pasture and hayland plantings. Cultivated areas should be converted to rangeland.

Thin Claypan. (G2) These soils are deep and somewhat poorly to well drained. They are medium to fine textured thin claypan soils on uplands. The claypan is very dense with very little root penetration. Typically they are strongly alkaline in the claypan and below. They are saline within 16 inches of the surface. Production potential is very low to low. Species selection is extremely limited. The best suited forage species include western wheatgrass, slender wheatgrass, crested wheatgrass, and alfalfa. Where cultivated, returning these soils to rangeland may be a better alternative than pasture or hayland.

Thin Upland. (A2) These soils are deep and well and excessively drained. They are medium textured soils on uplands. They are on ridges, knobs, and other convex positions subject to runoff. The hazards of wind and water erosion are a concern during establishment. Production potential is moderate. Suitable forage species include intermediate and pubescent wheatgrass, crested wheatgrass, western wheatgrass, green needlegrass, prairie sandreed, little bluestem, sideoats grama, alfalfa, and sweetclover

Very Shallow to Gravel. (B2) These soils are deep and well to excessively drained. They are medium to moderately coarse textured soils on outwash plains and scoria topped buttes. They typically have coarse sand and gravel or shattered porcelanite at depths of less than 14 inches. These soils are very droughty. Production potential is low and species selection is severely limited. Suitable species include crested wheatgrass, western wheatgrass, thickspike wheatgrass, and slender wheatgrass. Where cultivated, returning these soils to rangeland may be a better alternative than pasture or hayland.

Wet. (C1) These soils are deep and poorly drained. They are coarse to fine textured soils on flood plains or low areas on till and lake plains. Wetness limits selection of locally adapted forage plants. Production potential is high to very high. Select plant species on the basis of flooding tolerance or inundation tolerance. Suitable species include reed canarygrass, creeping foxtail, big bluestem, switchgrass, indiangrass, western wheatgrass, intermediate and pubescent wheatgrass, smooth bromegrass, tall wheatgrass, and alsike clover.

Wetland. (H6) These soils are deep and very poorly drained. They are coarse to fine textured soils. They are usually too wet for cultivation and are not suited to pasture and hayland plantings unless drained. If drained, treat the same as the Wet pasture and hayland group.

Management of Saline and Sodic Soils

Saline and sodic soils make up over 20 percent of Morton County. Saline soils make up about 0.2 percent of the area, or about 2,500 acres; sodic soils make up about 19 percent of the area, or about 237,600 acres; and saline-sodic soils make up less than 1 percent of the area or about 13,500 acres.

Saline soils have a high concentration of soluble salts, or salts that dissolve in water. Saline soils in Morton County are phases of the Regan and Scorio series.

Saline soils generally develop in areas of restricted drainage, such as those adjacent to sloughs and waterways. Where drainage is poor, salts rise with the water table and are concentrated near the surface. This salt buildup is reduced by plants and a surface cover. The plant roots use the soil water before it can reach the surface and before the salts accumulate. The surface cover prevents evaporation at the surface, the upward movement of water in the soil, and the concentration of salts at the surface (Seelig and Richardson, 1991).

Plants growing on saline soils absorb salts from the soil water. Excess amounts of certain salts may interfere with plant growth. High concentrations of some salts are toxic to certain plants. Some salts cause nutritional imbalances or deficiencies by restricting the uptake or availability of certain plant nutrients. Detecting salinity by visual observations in the field is difficult. The salts are generally not visible during much of the growing season, particularly when the soil is moist. Flecks, threads, or masses of soluble salts are usually visible when the soil is dry. Laboratory analysis or special field instruments are needed to determine the actual degree of salinity in soils.

Crop response, particularly during periods of soil moisture stress, is a useful indicator of the degree of salinity in saline soils. For instance, a small grain crop growing on saline soils tends to be stunted and has fewer tillers than small grain on nonsaline soils. Strongly saline soils are best suited to native grasses or to salt-tolerant introduced grasses. Slightly saline or moderately saline soils can produce salt-tolerant crops and forage. Barley is the most salt-tolerant of the small grains. Of the forage crops, tall wheatgrass, western wheatgrass, and alfalfa are salt tolerant once they are established. Continuous cropping is beneficial because it reduces evaporation and salt accumulation in the surface layer.

Sodic soils are characterized by a high content of exchangeable sodium which adheres to the clay particles in the soil (Seelig and Richardson, 1991).
The sodic soils in Morton County are phases of the Belfield, Daglum, Desart, Dogtooth, Ekalaka, Janesburg, Lakota, Lemert, and Rhoades series. Locally, sodic soils are known as “black alkali,” “slickspots,” “pan spots,” or “gumbo.”

Sodic soils develop in a complex pattern with a very distinct microrelief. The physical and chemical properties of these soils differ markedly within very short distances. In many areas the distance between the sodic soils and the surrounding soils that have normal physical properties is only a few feet.

Sodic soils developed in areas of saline soils that contained large quantities of sodium salts. Over a long period, usually centuries, as the water table lowers, precipitation gradually leaches the salts from the surface to lower horizons. During this leaching process, the clay in the soil becomes saturated with sodium, disperses, and moves downward with the percolating water. As the moving clay concentrates, a dense, sodic subsoil forms (fig. 20). The dense subsoil is hard when dry, sticky when wet, and nearly impervious to roots, water, and air. Examples are the Daglum, Desart, Dogtooth, Ekalaka, Janesburg, and Rhoades soils.

As the leaching by soil water continues, the sodium is gradually moved lower in the soil profile and eventually is carried below rooting depth. The result is a more manageable soil, such as the Belfield soil. If the leaching process continues and nearly all of the sodium is removed from the profile, the soil eventually changes into a nonsodic soil. This change requires a long period, usually centuries.

If plowed, sodic soils are characterized by a surface layer that is sticky when wet and hard and cloddy when dry. A crust forms easily at the surface. The chemical and physical properties of these soils are unfavorable for plant growth. The harmful effects of the properties on plants generally increase as the sodium content increases. The effects of the reduced amount of water available to plants are more harmful than the toxic effect of the sodium. The plants also are affected by the depth to the dense subsoil.

Figure 20. A dense, sodic subsoil restricts the penetration of roots.

Identification of sodic soils in cultivated fields commonly is difficult because many of the physical characteristics, such as columnar structure, have been altered by tillage. Crop response, particularly during periods of soil moisture stress, is a useful indicator of the level of sodicity in a soil. Crops grown on soils with varying amounts of sodium exhibit varying heights and stages of development. If the level of sodicity is very high, the crop cannot grow.

The effects of sodium on crop growth are influenced by weather conditions, stage of crop growth, and soil moisture status. A measure of the effect of sodicity on vegetative growth is not necessarily a reliable measure of crop yields. In many areas the yields of barley and wheat are affected less than the vegetative growth of these crops.

Variability of sodic soils can cause management problems. Soils that have a dense, sodic subsoil near the surface, such as Rhoades, are better suited to grass than to small grain and sunflower. Timely tillage is an important management need in areas of sodic soils. These areas should be tilled and seeded only when the moisture content is favorable. If worked when too wet, the soils puddle and crust. If the soils are tilled when too dry, tillage and seeding implements cannot easily penetrate the soils. Deep plowing and chemical amendments can help to reclaim sodic soils, but they may not be feasible. To be effective, deep tillage should reach below the sodic subsoil and mix several inches of the underlying material with the subsoil and topsoil. Depending on the soil, tillage to a depth of 15 to 36 inches may be needed. Any reclamation of sodic soils is a long-term endeavor. Complete reclamation may never be achieved. Onsite investigation is needed to confirm the feasibility of deep tillage in a particular area.

Saline-sodic soils develop in areas of restricted drainage where salts rise with the water table but where some downward leaching of clay and some saturation with sodium are evident and a dense, sodic subsoil has formed. Examples are the Harriet and Heil soils. The management needs and crop responses on these soils are a combination of those on saline soils and those on sodic soils.

Additional information about management or reclamation of saline and sodic soils is available from the Natural Resources Conservation Service, the North Dakota Agricultural Experiment Station, and the Cooperative Extension Service (Franzen et. al., 1994).

Soil Quality

Definition of Soil Quality

Soil quality is the ability of a soil to function within its surroundings, support plant and animal productivity, and maintain or enhance water and air quality. This is also referred to as soil health.

Functions of Soil

Soil is a living, dynamic resource. It has biological, chemical, and physical properties which are continually changing. Soil provides a physical, chemical, and biological environment for the exchange of water, air, and nutrients necessary for living organisms.

Soil controls the movement of rainfall or irrigation water on the land. Some of the water runs off the soil and directly enters surface water drainage systems. The remaining water either evaporates or infiltrates the soil. There it is stored and used for plant growth or percolates through the soil into the ground water. This control of water flow affects the movement of soluble materials, such as nitrate nitrogen and pesticides, through the environment.

Soil regulates biological activity and chemical exchanges. This affects nutrient cycling, plant growth, and decomposition of organic materials. Soil also acts as a filter to protect the quality of water and air. It provides mechanical support and a rooting environment for living organisms.

Soil quality can be viewed in two ways: In the first view, some soils are better suited than others to perform specific functions. For example, soils that are shallow to bedrock are poorly suited for supporting deep-rooted crops or trees. Soils high in sand and gravel content may have an inherently poor quality for filtering septic system wastes. Alternatively, these same soils may have a high quality or suitability for road and street construction. This view of soil quality is useful when comparing soils and is often used to evaluate the suitability of soils for specific uses.

The second view of soil quality relates to the dynamic nature of soils. Even though a soil may have a certain ability or level of quality for a specific activity, it may be functioning at a level below its inherent capability. This may be due to past disturbance or current management systems. For example, a farming system that does not protect the surface layer from erosion may result in soil erosion and loss of organic matter, nutrients, and other beneficial properties. In most cases, the eroded soil functions at less than its original potential for production. Its condition or health is considered impaired or lower in quality. In another example, a soil in a wetland, if drained or covered with sediment from nearby uplands, may not serve as effectively as a filter as it would in its natural condition.

Importance of Soil Quality to Landowners

Soil quality has a direct affect on plant growth and productivity for crop, range, hay, and woodland production. It affects how water moves into and through the soil. Maintaining or enhancing soil quality can help reduce the negative effects of soil erosion. Increasing soil quality can reduce the movement of nitrates and other chemicals to adjacent water bodies and ground water. Maintaining a high level of soil quality will ensure the soil resource is sustained for the future.

Many soils have undergone a degradation of their inherent quality through past agricultural operations. However, improved management practices, such as conservation tillage, implementing nutrient and moisture management systems, and establishment of riparian buffers or windbreaks can improve soil quality. As a rule, management practices that maintain a vegetative cover on the soil, return the maximum practical amount of residue, and minimize soil disturbance (tillage), will result in higher levels of soil quality.

Degradation of soil quality can have negative effects on the soil resource and costly offsite impacts. Soil erosion and the consequential deposition of sediment by wind or water are examples. Other negative effects of soil degradation include: compaction and loss of granular structure of surface soil layers, reduction of infiltration rates and organic matter levels, and formation of surface crusts. Degradation of soils can also lead to nutrient loss or imbalances, pesticide carryover, and reduced biological activity.

Soil Quality Indicators

The quality of most soils can be improved over time if managed properly. Key indicators of soil quality can be observed and monitored periodically to ensure the quality of the soil is maintained or enhanced.

Soil quality indicators are soil properties or processes that can be monitored to establish changes in the soil. Indicators can be categorized into four general groups: visual (sensory), physical, chemical, and biological.

Visual indicators may be obtained from observation or photographic interpretation. Exposure of subsoils, change in soil color, ephemeral gullies, ponding, plant response, and surface crusting are a few examples. Visual evidence can be a clear indication that soil quality is changing in either a negative or a positive way. The senses of feel and smell can also be used to evaluate certain soil properties.

Physical indicators are usually obtained by observation or field and laboratory analyses. They include topsoil thickness, bulk density, porosity, aggregate stability, texture, crusting, and compaction. These indicators reflect factors affecting root growth, soil biological activity, seedling emergence, and infiltration and movement of water and air within the soil.

Chemical indicators usually require sampling and field or laboratory analyses. They include measurements of pH, salinity, organic matter, phosphorus concentrations, cation-exchange capacity, and nutrients. The chemical condition of soil affects soil-plant relationships, water quality, buffering capacities, and mobility of nutrients and contaminants.

Biological indicators may be obtained by observation or measurement. They include measurements of micro- and macro-organisms and their activities. Respiration rates to detect microbial decomposition of organic matter and populations of bacteria, fungi, earthworms, nematodes, and mites can be used as biological indicators of soil quality.

Soil quality can be monitored through observation and/or measurement of key soil quality indicators. Soil quality score cards and a test kit (USDA-Soil Quality Institute, 1998) are available to assist in the assessment process. The monitoring program should include several indicators and take into consideration the time of year that sites are monitored, stage of crop growth, and location within the field where observations are made.

Monitoring soil quality should primarily be used to detect trends that are measurable over a 1- to 10-year period. Monitoring trends determines whether the soil is improving, degrading, or remaining steady under the current management system. This allows land managers to detect problems before undesired and possibly irreversible loss of soil quality occurs.

The local office of the Natural Resources Conservation Service, Soil Conservation District, or Cooperative Extension Service can help establish a plan for monitoring soil quality.

Woodland, Windbreaks and Environmental Plantings

Morton County has approximately 6,100 acres of native woodland (Jakes and Smith, 1982). Most of this woodland is found along the Missouri River and its tributaries. Isolated pockets of woodlands can be found in woody draws.

The woodland type is mostly cottonwood and green ash. Other less common species may include bur oak and hackberry.

The understory species include chokecherry, juneberry, boxelder, Russian olive, buffaloberry, and rose.

The forest type along the Missouri River can be divided into two main types. Grazed woodlands tend to be dominated by overmature cottonwood stands. Stands that do not have a recent grazing history will tend to have scattered cottonwoods with a second generation of green ash dominating the site. With the elimination of flooding, the cottonwood forest type is being replaced by green ash, boxelder, Russian olive, and/or eastern redcedar.

Windbreaks protect livestock, buildings, and yards from wind and snow. They also protect fruit trees and gardens and furnish habitat for wildlife. Several rows of low- and high-growing broadleaf and coniferous trees and shrubs provide the most protection.

Field windbreaks are narrow tree/shrub rows interspersed with cropland at specified intervals. Field windbreaks oriented perpendicular to the prevailing winds are the most efficient. Intervals depend on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on fields, and provide food and cover for wildlife.

Environmental plantings help to beautify and screen houses and other buildings and abate noise. The plants, mostly evergreen shrubs and trees, are closely spaced. To ensure plant survival, a healthy planting stock of suitable species should be properly planted on a well prepared site and maintained in good condition.

The following items should be considered before a planting is made: purpose of the planting, suitability of various species of trees and shrubs to the soils and climate, location and design of the windbreak, and selection of hardy seedlings. Planting stock should be from parent material originally from the Northern Great Plains or southern Canadian Prairie provinces. If these items are not considered, a poor, unsuccessful windbreak may result.

Establishment of a windbreak or an environmental planting and growth of trees and shrubs also depend on suitable site preparation and adequate maintenance after the trees and shrubs are planted. Grasses and weeds should be eliminated before the trees and shrubs are planted and competing ground cover should be controlled for the life of the windbreak. Competition from sod-forming grasses will greatly harm and sometimes kill tree and shrub plantings. Some replanting may be necessary during the first two years after the trees and shrubs are planted.

Windbreaks are often planted on land that did not originally support trees. Knowledge of how trees perform on such land can be gained only by observing and recording the performance of trees that have been planted and survived. Many popular windbreak species are not indigenous to the areas in which they are planted.

Each tree or shrub species has certain climatic and physiographic limits. Within these parameters, a tree or shrub may grow well or grow poorly, depending on the characteristics of the soil.

Windbreak suitability groups consist of soils in which the kinds and degrees of hazards and limitations that affect the survival and growth of trees and shrubs in windbreaks are similar. They are a guide for selecting species best suited for different kinds of soils. Windbreak suitability groups are shown for each soil in Table 9, “Interpretive Groupings Report.” They are given for drained conditions and, where applicable, undrained conditions.

Each tree or shrub has definable potential heights in a given physiographic area and under a given climate. Accurate definitions of potential heights are necessary when a windbreak is planned and designed.

Table 10, “Windbreak Suitability Groups,” shows the height locally grown trees and shrubs are expected to reach in 20 years on various soils. Estimates in this table are based on measurements and observations of established plantings that have been given adequate care. They can be used as a guide in planning windbreaks and screens. Additional information on planning windbreaks and screens and planting and caring for trees and shrubs can be obtained from local offices of the Natural Resources Conservation Service, the Cooperative Extension Service, or from a nursery.

Windbreak Suitability Groups

The following paragraphs describe the windbreak suitability groups.

Group 1. These are very deep, well to somewhat poorly drained soils that receive beneficial moisture from favorable landscape positions, flooding, or runoff from adjacent land. They may also have a beneficial seasonally high water table during the spring. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Occasionally, somewhat poorly drained soils may have excessive water for some species.

Group 1K. These are very deep, calcareous, well to somewhat poorly drained soils on low rises near wetlands that receive beneficial moisture from favorable landscape positions or have a beneficial seasonally high water table during the spring. High calcium carbonate content will have an effect on the selection of species on soils in this group. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Occasionally, somewhat poorly drained soils may have excessive water for some species. Wind erosion is a concern on these soils.

Group 2. Soils in this group are very deep, poorly or very poorly drained, and excessively wet or ponded during the spring or overflow periods. Wetness and drainage will have an affect on the selection of tree and shrub species for soils in this group. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Spring planting may be delayed because of wet conditions. Wind erosion is a concern on the sandy and organic soils in this group.

Group 2H. Soils in this group are very deep, have an organic mat about 24 inches thick, are poorly or very poorly drained, and are excessively wet or ponded during the spring or overflow periods. Wetness and drainage will have an affect on the selection of tree and shrub species for soils in this group. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Spring planting may be delayed because of wet conditions. Wind erosion is a concern on these soils.

Group 2K. Soils in this group are very deep, calcareous, poorly or very poorly drained, and are on rims of potholes and broad flats that are excessively wet or ponded during the spring or overflow periods. Wetness, high calcium carbonate content, and drainage will have an affect on the selection of tree and shrub species for soils in this group. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs. Spring planting may be delayed because of wet conditions. Wind erosion is a concern on these soils.

Group 3. Soils in this group are very deep, well drained, loamy textured soils with moderate and moderately slow saturated hydraulic conductivity on uplands. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs on these soils. Water erosion is a concern on the gently sloping to moderately steep areas.

Group 4. Soils in this group are moderately deep to very deep, have loamy surface textures with clayey subsoils, have slow or very slow saturated hydraulic conductivity and occur on uplands. High clay content has an affect on the selection of tree and shrub species for these soils. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs on these soils. Water erosion is a concern on the gently sloping to moderately steep areas.

Group 4C. Soils in this group are moderately deep to very deep, are clayey throughout, have slow or very slow saturated hydraulic conductivity, and occur on uplands. High clay content has an affect on the selection of tree and shrub species for these soils. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs on these soils. Wind erosion is a concern on these soils and water erosion is a concern on the gently sloping to moderately steep areas.

Group 5. Soils in this group are very deep with loamy and sandy textures. This group typically includes soils that normally have adequate soil moisture. Competition from grass and weeds and abrasion from wind erosion are the principal concerns in establishing and managing trees and shrubs on these soils.

Group 6D. Soils in this group are well drained, mostly loamy textured, and moderately deep over bedrock and other cemented layers that can severely restrict root growth. They have low or moderate available water capacity. Droughtiness will have an affect on the selection of tree and shrub species for use on these soils. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs on these soils. Water erosion is a concern on the gently sloping to moderately steep areas. Supplemental watering may be needed for establishment.

Group 6G. Soils in this group are well drained, mostly loamy textured, and moderately deep over sand and gravel. The sand and gravel can restrict root growth and reduce available water capacity. Droughtiness will have an affect on the selection of tree and shrub species for use on these soils. Competition from grass and weeds is the principal concern in establishing and managing trees and shrubs on these soils. Water erosion is a concern on the gently sloping to moderately steep areas. Supplemental watering may be needed for establishment.

Group 7. Soils in this group are very deep, excessively to moderately well drained, and sandy textured. They typically have low to very low available water capacity and do not normally have adequate moisture. Drought conditions and abrasion from wind erosion are the principal concerns in establishing and managing trees and shrubs on these soils. Specialized site preparation and planting methods (vegetation between the rows is normally left undisturbed) are needed to establish trees and shrubs. Supplemental watering may be essential for successful establishment.

Group 8. Soils in this group are calcareous at or near the surface. They do not receive beneficial moisture from run-on, flooding, or seasonal high water tables. High calcium carbonate content and competition from grass and weeds are the principal concerns in establishing and managing trees and shrubs on these soils. Wind erosion is a concern on these soils and water erosion is a concern on gently sloping to moderately steep areas.

Group 9C. Soils in this group are clayey and affected by salinity and/or sodicity. These soils do not have a seasonal high water table. Concentrations of salt will severely affect the establishment, vigor, and growth of trees and shrubs on these soils.

Group 9L. Soils in this group are loamy and affected by salinity and/or sodicity. These soils do not have a seasonal high water table. Concentrations of salt will severely affect the establishment, vigor, and growth of trees and shrubs on these soils.

Group 9W. Soils in this group are affected by salinity and/or sodicity and have a high water table. Concentrations of salt will severely affect the establishment, vigor, and growth of trees and shrubs on these soils.

Group 10. Soils in this group have one or more characteristics such as soil depth, texture, drainage, channeled phases, available water capacity, slope, or salt toxicity which severely limit planting, survival, or growth of trees and shrubs. Soils in this group are usually not recommended for farmstead and feedlot windbreaks, field windbreaks, and plantings for recreation and wildlife. However, onsite investigations may reveal tree and shrub plantings can be made with special treatments (hand planting, no-till planting, scalp planting, specialized site preparation, drainage, or other specialized treatments). Selection of species must be tailored to soil conditions existing at each site.

All soils on moderately steep, steep, or very steep slopes (generally 15 percent or greater) and soils that are generally too wet, too shallow, or have other severely restrictive conditions fall into group 10. When an onsite investigation reveals a planting can be made on a soil in group 10, species should be selected from the most comparable windbreak suitability group. For example, for a shallow soil over bedrock, trees or shrubs would be selected from group 6D; an excessively wet soil would most closely match group 2.

Table 6.--Potential Cropland Limitations and Hazards

(See text for a description and criteria of the limitations and hazards listed in this table)

Map symbol and component name	Cropland limitations and hazards
1:	
Tonka	High water table Pesticide and nutrient leaching Pesticide and nutrient runoff Ponding Restricted saturated hydraulic conductivity
3:	
Velva	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Wind erosion
4:	
Lallie	Alkalinity Flooding High water table Lime content Pesticide and nutrient leaching Pesticide and nutrient runoff Ponding Poor tilth and compaction Restricted saturated hydraulic conductivity Surface crusting Wind erosion
5:	
Dimmick	High water table Pesticide and nutrient leaching Pesticide and nutrient runoff Ponding Poor tilth and compaction Restricted saturated hydraulic conductivity Wind erosion
6:	
Heil	High sodium content High water table Pesticide and nutrient leaching Pesticide and nutrient runoff Ponding Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
7:	
Korell	None
8:	
Straw	None
9:	
Channel	Onsite required
Straw	Channels Flooding Pesticide and nutrient leaching Pesticide and nutrient runoff

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
9:(cont.)	
Velva	Channels Excessive saturated hydraulic conductivity Flooding Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Wind erosion
10:	
Arnegard	None
10B:	
Arnegard	Pesticide and nutrient runoff
11:	
Amor	Depth to rock Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity
Arnegard	Pesticide and nutrient runoff
11B:	
Amor	Depth to rock Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity
Shambo	Pesticide and nutrient runoff
12C:	
Amor	Depth to rock Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
13D:	
Amor	Depth to rock Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
13D:(cont.)	
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
15B:	
Chama	Alkalinity Depth to rock Lime content Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Surface crusting Wind erosion
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Surface crusting Wind erosion
15C:	
Chama	Alkalinity Depth to rock Lime content Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
Sen	Depth to rock Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
15D:	
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
Chama	Alkalinity Depth to rock Lime content Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
Sen	Depth to rock Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion
15F:	
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
Chama	Alkalinity Depth to rock Lime content Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
Arnegard	Pesticide and nutrient runoff Slope Water erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
16D:	
Ringling	Depth to sand and gravel Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Water erosion
Daglum	High sodium content Limited available water capacity Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Surface crusting Water erosion
16F:	
Brandenburg	Depth to sand and gravel Excessive saturated hydraulic conductivity Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Surface crusting Surface rock fragments Water erosion
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
Savage	Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Slope Water erosion
17B:	
Sen	Depth to rock Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity
Chama	Alkalinity Depth to rock Lime content Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Surface crusting Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
18B:	
Reeder	Depth to rock Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity
Farnuf	Pesticide and nutrient runoff
19:	
Farland	None
19B:	
Farland	Pesticide and nutrient runoff
19C:	
Farland	Pesticide and nutrient runoff Slope Water erosion
19D:	
Farland	Pesticide and nutrient runoff Slope Water erosion
20:	
Shambo	None
20B:	
Shambo	Pesticide and nutrient runoff
21B:	
Morton	Depth to rock Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity
Farland	Pesticide and nutrient runoff
22F:	
Cabba	Alkalinity Areas of rock outcrop Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
Rock outcrop	Onsite required
Chama	Alkalinity Areas of rock outcrop Depth to rock Lime content Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
23C:	
Morton	Depth to rock Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
26:	
Grail	Pesticide and nutrient leaching Poor tilth and compaction Restricted saturated hydraulic conductivity
27:	
Belfield	Restricted saturated hydraulic conductivity Root limiting
Grail	Pesticide and nutrient leaching Poor tilth and compaction Restricted saturated hydraulic conductivity
27B:	
Grail	Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Water erosion
Belfield	Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Root limiting Water erosion
28:	
Belfield	Restricted saturated hydraulic conductivity Root limiting
Daglum	High sodium content Limited available water capacity Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
28B:	
Belfield	Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Root limiting

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
28B:(cont.)	
Daglum	High sodium content Limited available water capacity Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
29:	
Savage	Poor tilth and compaction Restricted saturated hydraulic conductivity
29B:	
Savage	Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Water erosion
29C:	
Savage	Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Slope Water erosion
30:	
Regent	Depth to rock Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity
Savage	Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity
30B:	
Regent	Depth to rock Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Water erosion
Savage	Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Water erosion
30C:	
Regent	Depth to rock Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Slope Water erosion
Savage	Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Slope Water erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
31B:	
Regent	Depth to rock
	Pesticide and nutrient leaching
	Pesticide and nutrient runoff
	Poor tilth and compaction
	Restricted saturated hydraulic conductivity
	Water erosion
Janesburg	Depth to rock
	Excessive saturated hydraulic conductivity
	High sodium content
	Limited available water capacity
	Pesticide and nutrient leaching
	Pesticide and nutrient runoff
	Poor tilth and compaction
	Restricted saturated hydraulic conductivity
	Salt content
	Surface crusting
31C:	
Regent	Depth to rock
	Pesticide and nutrient leaching
	Pesticide and nutrient runoff
	Poor tilth and compaction
	Restricted saturated hydraulic conductivity
	Slope
	Water erosion
Janesburg	Depth to rock
	Excessive saturated hydraulic conductivity
	High sodium content
	Limited available water capacity
	Pesticide and nutrient leaching
	Pesticide and nutrient runoff
	Poor tilth and compaction
	Restricted saturated hydraulic conductivity
	Salt content
	Slope
	Surface crusting
	Water erosion
35B:	
Moreau	Alkalinity
	Depth to rock
	Lime content
	Limited available water capacity
	Pesticide and nutrient leaching
	Pesticide and nutrient runoff
	Poor tilth and compaction
	Restricted saturated hydraulic conductivity
	Salt content
	Wind erosion
35C:	
Moreau	Alkalinity
	Depth to rock
	Lime content
	Limited available water capacity
	Pesticide and nutrient leaching
	Pesticide and nutrient runoff
	Poor tilth and compaction
	Restricted saturated hydraulic conductivity
	Salt content
	Slope
	Water erosion
	Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
35C:(cont.)	
Wayden	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Water erosion Wind erosion
35D:	
Moreau	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Water erosion Wind erosion
Wayden	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Water erosion Wind erosion
36:	
Lawther	Alkalinity Limited available water capacity Poor tilth and compaction Restricted saturated hydraulic conductivity Wind erosion
38B:	
Searing	Depth to sand and gravel Excessive saturated hydraulic conductivity Pesticide and nutrient leaching Pesticide and nutrient runoff
Ringling	Depth to sand and gravel Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
40C:	
Rhoades	High sodium content Lime content Limited available water capacity Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
Slickspots	Alkalinity High sodium content Lime content Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Ponding Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting Wind erosion
Daglum	High sodium content Limited available water capacity Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
41B:	
Daglum	High sodium content Limited available water capacity Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
Rhoades	High sodium content Lime content Limited available water capacity Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
41C:	
Daglum	High sodium content Limited available water capacity Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Surface crusting Water erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
41C:(cont.)	
Rhoades	High sodium content Lime content Limited available water capacity Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Surface crusting Water erosion
42F:	
Dogtooth	Depth to rock High sodium content Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Surface crusting Water erosion
Janesburg	Depth to rock Excessive saturated hydraulic conductivity High sodium content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Surface crusting Water erosion
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
43C:	
Rhoades	Excessive saturated hydraulic conductivity High sodium content Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
43C:(cont.)	
Daglum	Excessive saturated hydraulic conductivity High sodium content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting Wind erosion
44B:	
Ekalaka	Excessive saturated hydraulic conductivity High sodium content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Salt content Wind erosion
Lakota	Excessive saturated hydraulic conductivity High sodium content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting Wind erosion
45:	
Harriet	Alkalinity Flooding High sodium content High water table Lime content Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
46C:	
Lakota	Excessive saturated hydraulic conductivity Gullies High sodium content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Surface crusting Water erosion Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
46C:(cont.)	
Ekalaka	Excessive saturated hydraulic conductivity Gullies High sodium content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Salt content Slope Water erosion Wind erosion
47B:	
Dogtooth	Depth to rock High sodium content Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
Janesburg	Depth to rock Excessive saturated hydraulic conductivity High sodium content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Surface crusting
48B:	
Desart	Excessive saturated hydraulic conductivity High sodium content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Wind erosion
Ekalaka	Excessive saturated hydraulic conductivity High sodium content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Salt content Wind erosion
Telfer	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Wind erosion
49B:	
Lefor	Depth to rock Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
51D:	
Vebar	Depth to rock Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion Wind erosion
Flasher	Alkalinity Depth to rock Excessive saturated hydraulic conductivity Lime content Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion Wind erosion
Tally	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Water erosion Wind erosion
51F:	
Flasher	Alkalinity Depth to rock Excessive saturated hydraulic conductivity Lime content Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion Wind erosion
Vebar	Depth to rock Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion Wind erosion
Parshall	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Water erosion Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
52B:	
Vebar	Depth to rock Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Wind erosion
Parshall	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Wind erosion
53B:	
Tally	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Wind erosion
Parshall	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Wind erosion
53C:	
Tally	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Wind erosion
Parshall	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Wind erosion
54C:	
Vebar	Depth to rock Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Wind erosion
Flasher	Alkalinity Depth to rock Excessive saturated hydraulic conductivity Lime content Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
55B:	
Beisigl	Alkalinity Depth to rock Excessive saturated hydraulic conductivity Lime content Limited available water capacity Pesticide and nutrient leaching Restricted saturated hydraulic conductivity Wind erosion
Lihen	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Wind erosion
56:	
Parshall	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Wind erosion
57D:	
Beisigl	Alkalinity Depth to rock Excessive saturated hydraulic conductivity Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion Wind erosion
Flasher	Alkalinity Depth to rock Excessive saturated hydraulic conductivity Lime content Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion Wind erosion
58B:	
Lihen	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Wind erosion
Parshall	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
59F:	
Flasher	Alkalinity Depth to rock Excessive saturated hydraulic conductivity Lime content Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Areas of rock outcrop Slope Water erosion Wind erosion
Rock outcrop	Onsite required
Vebar	Depth to rock Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Areas of rock outcrop Slope Water erosion Wind erosion
60D:	
Wabek	Alkalinity Depth to sand and gravel Excessive saturated hydraulic conductivity Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Surface crusting Water erosion
Manning	Depth to sand and gravel Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Water erosion Wind erosion
62B:	
Manning	Depth to sand and gravel Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Wind erosion
63B:	
Lehr	Depth to sand and gravel Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
63B:(cont.)	
Stady	Depth to sand and gravel Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff
64:	
Stady	Depth to sand and gravel Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff
65:	
Wanagan	Depth to sand and gravel Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff
66F:	
Wabek	Alkalinity Depth to sand and gravel Excessive saturated hydraulic conductivity Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Surface crusting Water erosion
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
Shambo	Pesticide and nutrient runoff Slope Water erosion
67B:	
Virgelle	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Wind erosion
68D:	
Telfer	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Water erosion Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
68E:	
Telfer	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Water erosion Wind erosion
70:	
Bowbells	Pesticide and nutrient leaching Pesticide and nutrient runoff
71:	
Williams	Pesticide and nutrient runoff
Bowbells	Pesticide and nutrient leaching Pesticide and nutrient runoff
71B:	
Williams	Pesticide and nutrient runoff
Bowbells	Pesticide and nutrient leaching Pesticide and nutrient runoff
73B:	
Williams	Pesticide and nutrient runoff
Reeder	Depth to rock Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity
76C:	
Williams	Pesticide and nutrient runoff Slope Water erosion
Zahl	Alkalinity Lime content Pesticide and nutrient runoff Slope Surface crusting Water erosion Wind erosion
76D:	
Zahl	Alkalinity Lime content Pesticide and nutrient runoff Slope Surface crusting Water erosion Wind erosion
Williams	Pesticide and nutrient runoff Slope Water erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
76F:	
Zahl	Alkalinity Lime content Pesticide and nutrient runoff Slope Surface crusting Water erosion Wind erosion
Williams	Pesticide and nutrient runoff Slope Water erosion
77:	
Temvik	Pesticide and nutrient runoff
Wilton	Pesticide and nutrient runoff
77B:	
Temvik	Pesticide and nutrient runoff
Williams	Pesticide and nutrient runoff
80:	
Breien	Excessive saturated hydraulic conductivity Limited available water capacity Pesticide and nutrient leaching Wind erosion
82:	
Mckeen	Excessive saturated hydraulic conductivity Flooding High water table Lime content Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Surface crusting Wind erosion
83:	
Mckeen	Excessive saturated hydraulic conductivity Flooding High water table Lime content Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Ponding Restricted saturated hydraulic conductivity Surface crusting Wind erosion
85B:	
Banks	Excessive saturated hydraulic conductivity Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
86:	
Havrelon	Alkalinity Excessive saturated hydraulic conductivity Lime content Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Surface crusting Wind erosion
87:	
Minnewaukan	Excessive saturated hydraulic conductivity Flooding High water table Lime content Pesticide and nutrient leaching Pesticide and nutrient runoff Ponding Surface crusting Wind erosion
88:	
Havrelon	Alkalinity Lime content Limited organic matter Pesticide and nutrient runoff Surface crusting Wind erosion
91:	
Lohler	Alkalinity Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Wind erosion
98:	
Mandan	Pesticide and nutrient runoff
Linton	Pesticide and nutrient runoff
98B:	
Linton	Pesticide and nutrient runoff
Mandan	Pesticide and nutrient runoff
99F:	
Badland, outcrop	Alkalinity Depth to rock High sodium content Lime content Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Salt content Slope Soil slumping Water erosion Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
99F:(cont.)	
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
100:	
Pits	Alkalinity Depth to sand and gravel Excessive saturated hydraulic conductivity Lime content Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Slope Surface rock fragments Water erosion
105:	
Dumps and Pits	Alkalinity Dense layer High sodium content Lime content Limited available water capacity Limited organic matter Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Salt content Slope Surface crusting Water erosion Wind erosion
110:	
Ustorthents	Alkalinity Dense layer Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Restricted saturated hydraulic conductivity Surface crusting Wind erosion
115:	
Riverwash	Excessive saturated hydraulic conductivity Flooding High water table Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Poor tilth and compaction Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
154F:	
Arikara	Pesticide and nutrient runoff Slope Water erosion
Shambo	Pesticide and nutrient runoff Slope Water erosion
Cabba	Alkalinity Depth to rock Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Surface crusting Water erosion Wind erosion
161F:	
Beisigl	Alkalinity Depth to rock Excessive saturated hydraulic conductivity Lime content Limited available water capacity Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion Wind erosion
Flasher	Alkalinity Depth to rock Excessive saturated hydraulic conductivity Lime content Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Restricted saturated hydraulic conductivity Slope Water erosion Wind erosion
Arikara	Pesticide and nutrient runoff Slope Water erosion
185B:	
Banks	Excessive saturated hydraulic conductivity Limited available water capacity Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Wind erosion

Table 6.--Potential Cropland Limitations and Hazards--Continued

Map symbol and component name	Cropland limitations and hazards
186:	
Havrelon	Alkalinity Excessive saturated hydraulic conductivity Lime content Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Surface crusting Wind erosion
188:	
Havrelon	Alkalinity Lime content Limited organic matter Pesticide and nutrient leaching Pesticide and nutrient runoff Surface crusting Wind erosion
M-W:	
Miscellaneous water	Onsite required
W:	
Water	Onsite required

Table 7.--Map Unit Productivity Index and Farmland Designation

(Entries in ( ) are for undrained conditions.)

Map symbol	Spring wheat productivity index	Farmland designation
1	86 (44)	Prime farmland if drained
3	64	Farmland of statewide importance
4	39 (12)	Other land
5	68 (30)	Other land
6	36	Other land
7	84	Farmland of statewide importance
8	87	Prime farmland
9	41	Other land
10	94	Prime farmland
10B	90	Prime farmland
11	81	Farmland of statewide importance
11B	76	Farmland of statewide importance
12C	53	Farmland of statewide importance
13D	41	Other land
15B	61	Other land
15C	49	Other land
15D	37	Other land
15F	23	Other land
16D	29	Other land
16F	25	Other land
17B	72	Farmland of statewide importance
18B	79	Farmland of statewide importance
19	90	Farmland of statewide importance
19B	86	Farmland of statewide importance
19C	68	Farmland of statewide importance
19D	47	Other land
20	84	Farmland of statewide importance
20B	82	Farmland of statewide importance
21B	77	Farmland of statewide importance
22F	12	Other land
23C	65	Other land
26	95	Prime farmland

Table 7.--Map Unit Productivity Index and Farmland Designation--Continued

Map symbol	Spring wheat productivity index	Farmland designation
27	83	Farmland of statewide importance
27B	80	Farmland of statewide importance
28	63	Other land
28B	61	Other land
29	89	Farmland of statewide importance
29B	84	Farmland of statewide importance
29C	69	Other land
30	85	Farmland of statewide importance
30B	77	Farmland of statewide importance
30C	63	Other land
31B	64	Other land
31C	52	Other land
35B	65	Other land
35C	47	Other land
35D	34	Other land
36	79	Farmland of statewide importance
38B	59	Farmland of statewide importance
40C	29	Other land
41B	49	Other land
41C	30	Other land
42F	21	Other land
43C	31	Other land
44B	35	Other land
45	26	Other land
46C	27	Other land
47B	32	Other land
48B	46	Other land
49B	58	Farmland of statewide importance
51D	33	Other land
51F	20	Other land
52B	62	Farmland of statewide importance
53B	66	Farmland of statewide importance

Table 7.--Map Unit Productivity Index and Farmland Designation--Continued

Map symbol	Spring wheat productivity index	Farmland designation
53C	50	Other land
54C	44	Other land
55B	36	Other land
56	68	Farmland of statewide importance
57D	26	Other land
58B	50	Other land
59F	13	Other land
60D	28	Other land
62B	46	Other land
63B	52	Other land
64	64	Farmland of statewide importance
65	62	Farmland of statewide importance
66F	27	Other land
67B	60	Other land
68D	30	Other land
68E	20	Other land
70	96	Prime farmland
71	92	Other land
71B	86	Other land
73B	83	Other land
76C	60	Other land
76D	45	Other land
76F	33	Other land
77	90	Farmland of statewide importance
77B	82	Farmland of statewide importance
80	41	Other land
82	57 (23)	Other land
83	50 (1)	Other land
85B	39	Other land
86	68	Other land
87	44 (33)	Other land
88	76	Farmland of statewide importance

Table 7.--Map Unit Productivity Index and Farmland Designation--Continued

Map symbol	Spring wheat productivity index	Farmland designation
91	79	Farmland of statewide importance
98	92	Farmland of statewide importance
98B	83	Farmland of statewide importance
99F	10	Other land
100	9	Other land
105	7	Other land
110	36	Other land
115	6	Other land
154F	25	Other land
161F	14	Other land
185B	39	Other land
186	72	Farmland of statewide importance
188	84	Farmland of statewide importance
M-W	0	Other land
W	0	Other land

Table 8.--Yields per Acre of Crops

(Yields are those that can be expected under a high level of management. They are for nonirrigated areas. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil. Entries in () are for undrained conditions.)

Map symbol and soil name	Spring wheat	Oats	Barley	Sunflowers	Grass-legume hay
	Bu	Bu	Bu	Lbs	Tons
1: Tonka	32(16)	68(26)	52(26)	1,600(800)	2.4(2.1)
3: Velva	24	50	38	1,000	1.6
4: Lallie	14(4)	31(7)	23(7)	700(200)	2.1(0.5)
5: Dimmick	25(11)	24(22)	41(18)	1,250(550)	2.1(0.7)
6: Heil	13	28	22	650	1.1
7: Korell	31	66	51	1,550	1.8
8: Straw	32	68	52	1,600	1.8
9: Channel, Straw, and Velva	15	32	25	650	1.0
10: Arnegard	35	74	57	1,750	1.8
10B: Arnegard	33	71	54	1,500	2.4
11: Amor-Arnegard	30	64	49	1,500	1.6
11B: Amor-Shambo	28	60	46	1,400	1.6
12C: Amor-Cabba	20	42	32	1,000	1.0
13D: Amor-Cabba	15	32	25	750	0.8
15B: Chama-Cabba	23	48	37	1,000	0.8
15C: Chama-Cabba-Sen	18	39	29	900	1.1
15D: Cabba-Chama-Sen	14	29	22	700	0.7
15F: Cabba-Chama-Arnegard	9	18	14	450	0.3

Table 8.--Yields per Acre of Crops--Continued

Map symbol and soil name	Spring wheat	Oats	Barley	Sunflowers	Grass-legume hay
	Bu	Bu	Bu	Lbs	Tons
16D: Ringling-Daglum	11	23	17	450	0.6
16F: Brandenburg-Cabba-Savage	9	20	15	450	0.2
17B: Sen-Chama	27	57	43	1,150	1.2
18B: Reeder-Farnuf	29	62	47	1,250	1.6
19: Farland	33	71	54	1,650	1.8
19B: Farland	32	68	52	1,400	1.8
19C: Farland	24	51	39	1,200	1.8
19D: Farland	17	37	28	750	1.4
20: Shambo	31	66	51	1,550	1.8
20B: Shambo	30	64	49	1,500	1.8
21B: Morton-Farland	28	61	46	1,250	1.6
22F: Cabba-Rock outcrop-Chama	4	9	7	200	0.4
23C: Morton-Cabba	24	51	39	1,200	1.0
26: Grail	35	75	57	1,750	2.4
27: Belfield-Grail	31	66	50	1,550	1.7
27B: Grail-Belfield	30	63	48	1,500	1.6
28: Belfield-Daglum	23	50	38	1,000	1.2
28B: Belfield-Daglum	23	48	37	1,000	1.2
29: Savage	33	70	54	1,650	1.6
29B: Savage	31	66	51	1,550	1.6

Table 8.--Yields per Acre of Crops--Continued

Map symbol and soil name	Spring wheat	Oats	Barley	Sunflowers	Grass-legume hay
	Bu	Bu	Bu	Lbs	Tons
29C: Savage	26	54	41	1,100	1.6
30: Regent-Savage	31	67	51	1,550	1.5
30B: Regent-Savage	28	61	46	1,450	1.4
30C: Regent-Savage	23	50	38	1,000	1.4
31B: Regent-Janesburg	24	50	38	1,000	1.3
31C: Regent-Janesburg	19	41	31	850	1.3
35B: Moreau	24	51	39	1,200	1.6
35C: Moreau-Wayden	17	37	28	750	1.2
35D: Moreau-Wayden	13	27	20	550	0.9
36: Lawther	29	62	47	1,250	1.6
38B: Searing-Ringling	22	46	35	1,100	1.4
40C: Rhoades-Slickspots-Daglum	11	23	17	450	0.7
41B: Daglum-Rhoades	18	39	29	900	0.9
41C: Daglum-Rhoades	11	24	18	550	0.9
42F: Dogtooth-Janesburg-Cabba	8	17	13	400	0.4
43C: Rhoades-Daglum	11	24	19	500	0.8
44B: Ekalaka-Lakota	13	28	21	650	0.9
45: Harriet	10	20	16	500	1.1
46C: Lakota-Ekalaka	10	21	16	400	0.8
47B: Dogtooth-Janesburg	12	25	19	600	0.9

Table 8.--Yields per Acre of Crops--Continued

Map symbol and soil name	Spring wheat	Oats	Barley	Sunflowers	Grass-legume hay
	Bu	Bu	Bu	Lbs	Tons
48B: Desart-Ekalaka-Telfer	17	36	28	750	1.3
49B: Lefor	21	46	35	1,050	1.3
51D: Vebar-Flasher-Tally	12	26	20	650	0.8
51F: Flasher-Vebar-Parshall	7	16	12	350	0.4
52B: Vebar-Parshall	23	49	37	1,150	1.3
53B: Tally-Parshall	24	52	40	1,050	1.4
53C: Tally-Parshall	18	39	29	800	1.4
54C: Vebar-Flasher	17	35	27	850	1.0
55B: Beisigl-Lihen	13	28	22	600	1.3
56: Parshall	25	53	41	1,100	1.4
57D: Beisigl-Flasher	10	20	16	400	0.7
58B: Lihen-Parshall	19	39	30	950	1.4
59F: Flasher-Rock outcrop-Vebar	5	10	8	250	0.1
60D: Wabek-Manning	10	22	17	450	0.8
62B: Manning	17	36	28	850	1.4
63B: Lehr-Stady	20	42	32	850	1.8
64: Stady	24	50	38	1,200	1.8
65: Wanagan	23	49	37	1,000	1.8
66F: Wabek-Cabba-Shambo	10	21	16	450	0.2
67B: Virgelle	22	47	36	1,100	1.4

Table 8.--Yields per Acre of Crops--Continued

Map symbol and soil name	Spring wheat	Oats	Barley	Sunflowers	Grass-legume hay
	Bu	Bu	Bu	Lbs	Tons
68D: Telfer	11	24	18	550	1.1
68E: Telfer	7	16	12	350	0.7
70: Bowbells	36	75	58	1,550	2.4
71: Williams-Bowbells	34	72	55	1,450	2.0
71B: Williams-Bowbells	32	68	52	1,400	2.0
73B: Williams-Reeder	31	65	50	1,350	1.6
76C: Zahl-Williams	22	48	37	1,000	1.5
76D: Zahl-Williams	17	35	27	850	1.0
76F: Zahl-Williams	12	26	20	550	0.3
77: Temvik-Wilton	33	71	54	1,650	2.0
77B: Temvik-Williams	30	64	49	1,300	2.0
80: Breien	15	32	25	650	1.4
82: Mckeen	21(9)	45(14)	34(14)	1,050(450)	2.1(0.6)
83: Mckeen	0	0	0	0	0
85B: Banks	14	31	23	700	1.4
86: Havrelon	25	53	41	1,250	1.8
87: Minnewaukan	16(12)	34(26)	26(20)	800(600)	2.4(2.1)
88: Havrelon	28	60	46	1,400	1.8
91: Lohler	29	62	47	1,450	1.6
98: Mandan-Linton	34	72	55	1,450	2.1
98B: Linton-Mandan	31	65	50	1,350	2.0

Table 8.--Yields per Acre of Crops--Continued

Map symbol and soil name	Spring wheat	Oats	Barley	Sunflowers	Grass-legume hay
	Bu	Bu	Bu	Lbs	Tons
99F:--------------------- Badland, outcrop-Cabba	4	8	6	200	0.1
100:--------------------- Pits	3	7	5	150	0.0
105:--------------------- Dumps and Pits	3	6	4	100	0.0
110:--------------------- Ustorthents	13	28	22	650	0.7
115:--------------------- Riverwash	0	0	0	0	0.1
154F:-------------------- Arikara-Shambo-Cabba	9	20	15	450	0.4
161F:-------------------- Beisigl-Flasher-Arikara	5	11	8	200	0.3
185B:-------------------- Banks, slightly wet	14	31	23	600	1.4
186:--------------------- Havrelon, slightly wet	25	53	41	1,100	1.8
188:--------------------- Havrelon, slightly wet	31	66	51	1,350	1.8
M-W:--------------------- Miscellaneous water	—	—	—	—	—
W:----------------------- Water	—	—	—	—	—

Table 9.--Interpretive Groupings Report

(Dashes (--) indicate an interpretive group is not assigned. Entries in ( ) are for undrained conditions.)

Map symbol and soil name	Pasture and hayland group	Land capability class	Windbreak suitability group
1:			
Tonka-----------	Overflow and Run-on A3 (Wet C1)	2w (4w)	1 (2)
3:			
Velva-----------	Sandy A6	3e	5
4:			
Lallie----------	Wetland H6	3w (8w)	2k (10)
5:			
Dimmick---------	Wet C1 (Wetland H6)	3w (5w)	2 (10)
6:			
Heil------------	Sodic-Saline G3	6s	10
7:			
Korell----------	Loamy and Silty A1	2c	1
8:			
Straw-----------	Loamy and Silty A1	2c	1
9:			
Channel---------	---	7e	10
Straw-----------	Overflow and Run-on A3	2c	1
Velva-----------	Overflow and Run-on A3	3e	5
10:			
Arnegard--------	Overflow and Run-on A3	2c	1
10B:			
Arnegard--------	Loamy and Silty A1	2e	1
11:			
Amor------------	Moderately Deep Silty F2	2s	6d
Arnegard--------	Overflow and Run-on A3	2c	1
11B:			
Amor------------	Moderately Deep Silty F2	2e	6d
Shambo----------	Loamy and Silty A1	2e	3
12C:			
Amor------------	Moderately Deep Silty F2	3e	6d
Cabba-----------	Shallow H4	6e	10
13D:			
Amor------------	Moderately Deep Silty F2	4e	6d
Cabba-----------	Shallow H4	6e	10
15B:			
Chama-----------	Moderately Deep Silty F2	3e	8
Cabba-----------	Shallow H4	6s	10

Table 9.--Interpretive Groupings Report--Continued

Map symbol and soil name	Pasture and hayland group	Land capability class	Windbreak suitability group
15C:			
Chama-----------	Moderately Deep Silty F2	4e	8
Cabba-----------	Shallow H4	6e	10
Sen-------------	Moderately Deep Silty F2	3e	6d
15D:			
Cabba-----------	Shallow H4	6e	10
Chama-----------	Moderately Deep Silty F2	6e	10
Sen-------------	Moderately Deep Silty F2	4e	6d
15F:			
Cabba-----------	Shallow H4	7e	10
Chama-----------	Moderately Deep Silty F2	7e	10
Arnegard--------	Loamy and Silty A1	6e	10
16D:			
Ringling--------	Very Shallow to Gravel B2	6s	10
Daglum----------	Claypan G1	6s	9c
16F:			
Brandenburg-----	Steeply Sloping H3	7s	10
Cabba-----------	Shallow H4	7e	10
Savage----------	Clayey A4	4e	4
17B:			
Sen-------------	Moderately Deep Silty F2	2e	6d
Chama-----------	Moderately Deep Silty F2	3e	8
18B:			
Reeder----------	Moderately Deep Silty F2	2e	6d
Farnuf----------	Loamy and Silty A1	2e	3
19:			
Farland---------	Loamy and Silty A1	2c	3
19B:			
Farland---------	Loamy and Silty A1	2e	3
19C:			
Farland---------	Loamy and Silty A1	3e	3
19D:			
Farland---------	Loamy and Silty A1	4e	3
20:			
Shambo----------	Loamy and Silty A1	2c	3
20B:			
Shambo----------	Loamy and Silty A1	2e	3

Table 9.--Interpretive Groupings Report--Continued

Map symbol and soil name	Pasture and hayland group	Land capability class	Windbreak suitability group
21B:			
Morton----------	Moderately Deep Silty F2	2e	6d
Farland---------	Loamy and Silty A1	2e	3
22F:			
Cabba-----------	Shallow H4	7e	10
Rock outcrop----	---	8s	10
Chama-----------	Moderately Deep Silty F2	7e	10
23C:			
Morton----------	Moderately Deep Silty F2	3e	6d
Cabba-----------	Shallow H4	6e	10
26:			
Grail-----------	Overflow and Run-on A3	2c	1
27:			
Belfield--------	Clayey Subsoil F1	2s	4
Grail-----------	Overflow and Run-on A3	2c	1
27B:			
Grail-----------	Loamy and Silty A1	2e	1
Belfield--------	Clayey Subsoil F1	2e	4
28:			
Belfield--------	Clayey Subsoil F1	2s	4
Daglum----------	Claypan G1	4s	9c
28B:			
Belfield--------	Clayey Subsoil F1	2e	4
Daglum----------	Claypan G1	4s	9c
29:			
Savage----------	Clayey A4	2s	4
29B:			
Savage----------	Clayey A4	2e	4
29C:			
Savage----------	Clayey A4	3e	4
30:			
Regent----------	Moderately Deep Silty F2	2s	4
Savage----------	Clayey A4	2s	4
30B:			
Regent----------	Moderately Deep Silty F2	2e	4
Savage----------	Clayey A4	2e	4

Table 9.--Interpretive Groupings Report--Continued

Map symbol and soil name	Pasture and hayland group	Land capability class	Windbreak suitability group
30C:			
Regent----------	Moderately Deep Silty F2	3e	4
Savage----------	Clayey A4	3e	4
31B:			
Regent----------	Moderately Deep Silty F2	2e	4
Janesburg-------	Claypan G1	4s	9c
31C:			
Regent----------	Moderately Deep Silty F2	3e	4
Janesburg-------	Claypan G1	6s	9c
35B:			
Moreau----------	Clayey A4	3e	4c
35C:			
Moreau----------	Clayey A4	4e	4c
Wayden----------	Shallow H4	6s	10
35D:			
Moreau----------	Clayey A4	6e	10
Wayden----------	Shallow H4	6s	10
36:			
Lawther---------	Clayey A4	2e	4c
38B:			
Searing---------	Loamy and Silty A1	3e	6d
Ringling--------	Very Shallow to Gravel B2	6s	10
40C:			
Rhoades---------	Thin Claypan G2	6s	10
Slickspots------	N/A	8s	10
Daglum----------	Claypan G1	4s	9c
41B:			
Daglum----------	Claypan G1	4s	9c
Rhoades---------	Thin Claypan G2	6s	10
41C:			
Daglum----------	Claypan G1	6s	9c
Rhoades---------	Thin Claypan G2	6s	10
42F:			
Dogtooth--------	Thin Claypan G2	7s	10
Janesburg-------	Claypan G1	6s	10
Cabba-----------	Shallow H4	7e	10

Table 9.--Interpretive Groupings Report--Continued

Map symbol and soil name	Pasture and hayland group	Land capability class	Windbreak suitability group
43C:			
Rhoades---------	Thin Claypan G2	6s	10
Daglum----------	Claypan G1	4s	9c
44B:			
Ekalaka---------	Claypan G1	4s	9l
Lakota----------	Thin Claypan G2	6s	10
45:			
Harriet---------	Sodic-Saline G3	6s	10
46C:			
Lakota----------	Thin Claypan G2	6s	10
Ekalaka---------	Claypan G1	4s	9l
47B:			
Dogtooth--------	Thin Claypan G2	6s	10
Janesburg-------	Claypan G1	4s	9c
48B:			
Desart----------	Moderately Deep Sandy F3	4s	9l
Ekalaka---------	Claypan G1	4s	9l
Telfer----------	Sands A7	4e	7
49B:			
Lefor-----------	Moderately Deep Sandy F3	3e	6d
51D:			
Vebar-----------	Moderately Deep Sandy F3	6e	6d
Flasher---------	Shallow H4	6e	10
Tally-----------	Sandy A6	6e	5
51F:			
Flasher---------	Shallow H4	7e	10
Vebar-----------	Steeply Sloping H3	7e	10
Parshall--------	Sandy A6	6e	5
52B:			
Vebar-----------	Moderately Deep Sandy F3	3e	6d
Parshall--------	Sandy A6	3e	5
53B:			
Tally-----------	Sandy A6	3e	5
Parshall--------	Sandy A6	3e	5
53C:			
Tally-----------	Sandy A6	4e	5
Parshall--------	Sandy A6	4e	5

Table 9.--Interpretive Groupings Report--Continued

Map symbol and soil name	Pasture and hayland group	Land capability class	Windbreak suitability group
54C:			
Vebar-----------	Moderately Deep Sandy F3	4e	6d
Flasher---------	Shallow H4	6e	10
55B:			
Beisigl---------	Moderately Deep Sandy F3	4e	7
Lihen-----------	Sands A7	4e	7
56:			
Parshall--------	Sandy A6	3e	5
57D:			
Beisigl---------	Moderately Deep Sandy F3	6e	10
Flasher---------	Shallow H4	6e	10
58B:			
Lihen-----------	Sands A7	4e	7
Parshall--------	Sandy A6	3e	5
59F:			
Flasher---------	Shallow H4	7e	10
Rock outcrop----	---	8s	10
Vebar-----------	Steeply Sloping H3	7e	10
60D:			
Wabek-----------	Very Shallow to Gravel B2	6s	10
Manning---------	Shallow to Gravel B1	6e	6g
62B:			
Manning---------	Shallow to Gravel B1	3e	6g
63B:			
Lehr------------	Shallow to Gravel B1	3e	6g
Stady-----------	Loamy and Silty A1	3e	6g
64:			
Stady-----------	Loamy and Silty A1	2e	6g
65:			
Wanagan---------	Loamy and Silty A1	3s	6g
66F:			
Wabek-----------	Very Shallow to Gravel B2	7s	10
Cabba-----------	Shallow H4	7e	10
Shambo----------	Loamy and Silty A1	4e	3
67B:			
Virgelle--------	Sandy A6	3e	5

Table 9.--Interpretive Groupings Report--Continued

Map symbol and soil name	Pasture and hayland group	Land capability class	Windbreak suitability group
68D:			
Telfer----------	Sands A7	6e	10
68E:			
Telfer----------	Sands A7	7e	10
70:			
Bowbells--------	Overflow and Run-on A3	2c	1
71:			
Williams--------	Loamy and Silty A1	2c	3
Bowbells--------	Overflow and Run-on A3	2c	1
71B:			
Williams--------	Loamy and Silty A1	2e	3
Bowbells--------	Loamy and Silty A1	2e	1
73B:			
Williams--------	Loamy and Silty A1	2e	3
Reeder----------	Moderately Deep Silty F2	2e	6d
76C:			
Williams--------	Loamy and Silty A1	3e	3
Zahl------------	Thin Upland A2	4e	8
76D:			
Zahl------------	Thin Upland A2	6e	10
Williams--------	Loamy and Silty A1	4e	3
76F:			
Zahl------------	Steeply Sloping H3	7e	10
Williams--------	Loamy and Silty A1	6e	10
77:			
Temvik----------	Loamy and Silty A1	2c	3
Wilton----------	Overflow and Run-on A3	2c	1
77B:			
Temvik----------	Loamy and Silty A1	2e	3
Williams--------	Loamy and Silty A1	2e	3
80:			
Breien----------	Sandy A6	3e	6g
82:			
Mckeen----------	Wet C1 (Wetland H6)	3w (5w)	10
83:			
Mckeen----------	Wetland H6	5W (8w)	10

Table 9.--Interpretive Groupings Report--Continued

Map symbol and soil name	Pasture and hayland group	Land capability class	Windbreak suitability group
85B:			
Banks-----------	Sands A7	4e	7
86:			
Havrelon--------	Overflow and Run-on A3	2e	1k
87:			
Minnewaukan-----	Wet C1 (Wetland H6)	6w	10
88:			
Havrelon--------	Overflow and Run-on A3	2e	1k
91:			
Lohler----------	Clayey A4	2e	4c
98:			
Mandan----------	Loamy and Silty A1	2e	1
Linton----------	Loamy and Silty A1	2e	3
98B:			
Linton----------	Loamy and Silty A1	2e	3
Mandan----------	Loamy and Silty A1	2e	1
99F:			
Badland, outcrop	---	8e	10
Cabba-----------	Shallow H4	7e	10
100:			
Pits------------	---	8s	10
105:			
Dumps and Pits--	---	8s	10
110:			
Ustorthents-----	Shallow H4	7e	10
115:			
Riverwash-------	---	8w	10
154F:			
Arikara---------	Steeply Sloping H3	7e	10
Shambo----------	Loamy and Silty A1	7e	10
Cabba-----------	Shallow H4	7e	10
161F:			
Beisigl---------	Moderately Deep Sandy F3	7e	10
Flasher---------	Shallow H4	7e	10
Arikara---------	Steeply Sloping H3	7e	10
185B:			
Banks, slightly wet------------	Sands A7	4e	7

Table 9.--Interpretive Groupings Report--Continued

Map symbol and soil name	Pasture and hayland group	Land capability class	Windbreak suitability group
186:			
Havrelon, slightly wet---	Overflow and Run-on A3	2e	1k
188:			
Havrelon, slightly wet---	Overflow and Run-on A3	2e	1k
M-W:			
Miscellaneous water----------	---	8w	10
W:			
Water-----------	---	---	

Table 10.--Windbreak Suitability Groups

Expected Shrub Heights at 20 Years

(Dashes (--) indicate the species are not expected to perform adequately on these suitability groups under most conditions.)

Species	Windbreak suitability groups					
	1	1K	2	2K	2H	3
	ft.	ft.	ft.	ft.	ft.	ft.
Almond, Russian	4-6	3-4	--	--	--	4-6
Buffaloberry, Silver	8-12	8-12	--	--	--	8-11
Caragana (Peashrub, Siberian)	8-10	8-10	--	--	--	8-10
Cherry, Nanking	6-8	--	--	--	--	5-7
Cherry, Mongolian	5-6	--	--	--	--	4-6
Chokecherry, Common	10-12	8-10	--	--	--	8-10
Cotoneaster, Peking	6-8	5-7	--	--	--	5-7
Cotoneaster, European	10-12	8-11	--	--	--	9-11
Currant, Golden	5-7	4-6	--	--	--	5-6
Dogwood, Redosier	6-7	--	6-7	--	4-6	4-6
Forsythia, ‘Meadowlark’	6-10	5-7	--	--	--	6-8
Honeysuckle, Amur	8-10	7-9	--	--	--	6-8
Honeysuckle, Blueleaf ‘Freedom’	8-10	7-9	--	--	--	7-9
Honeysuckle, Tatarian	8-10	6-8	--	--	--	7-9
Indigo, False	6-8	5-7	6-8	5-7	--	4-6
Juneberry (Serviceberry)	5-6	--	--	--	--	4-6
Lilac, Common	8-10	8-10	--	--	--	7-9
Lilac, Late	8-10	6-8	--	--	--	7-9
Plum, American	5-8	--	--	--	--	6-8
Rose, Species	4-5	4-5	--	--	--	4-5
Sandcherry, Western	4-6	--	--	--	--	4-6
Sea-buckthorn (Seaberry)	8-10	8-10	--	--	--	6-8
Silverberry	5-7	5-7	--	--	--	5-7
Snowberry 11	1-3	--	--	--	--	1-3
Sumac, Skunkbush	3-9	3-7	--	--	--	3-9
Willow, Bebbs	12-15	--	10-14	--	10-14	--
Willow, Purpleosier	8-13	--	8-13	--	8-13	--
Willow, Sandbar	5-6	--	5-7	--	5-7	--
Viburnum, Nannyberry	10-14	--	--	--	--	8-10

Table 10.--Windbreak Suitability Groups--Continued

Expected Shrub Heights at 20 Years

Species	Windbreak suitability groups					
	4	4C	5	6D	6G	7
	ft.	ft.	ft.	ft.	ft.	ft.
Almond, Russian	4-5	4-5	3-4	--	--	--
Buffaloberry, Silver	6-8	6-8	4-7	4-5	4-5	--
Caragana (Peashrub, Siberian)	7-8	5-6	7-9	6-8	6-8	--
Cherry, Nanking	--	--	--	--	--	--
Cherry, Mongolian	--	--	--	--	--	--
Cherry, Western Sand	--	--	3-5	2-4	2-4	--
Chokecherry, Common	7-9	6-8	6-8	4-6	4-6	--
Cotoneaster, Peking	--	--	--	--	--	--
Cotoneaster, European	5-7	4-6	4-6	--	--	--
Currant, Golden	3-5	3-5	3-5	--	--	--
Dogwood, Redosier	4-6	--	--	--	--	--
Forsythia, ‘Meadowlark’	4-6	4-6	5-7	--	--	--
Honeysuckle, Amur	6-8	6-8	5-7	--	--	--
Honeysuckle, Blueleaf ‘Freedom’	5-7	5-7	4-6	3-5	3-5	--
Honeysuckle, Tatarian	6-8	6-8	5-7	4-6	4-6	--
Indigo, False	--	--	--	--	--	--
Juneberry (Serviceberry)	3-5	3-5	--	--	--	--
Lilac, Common	6-7	5-6	6-8	4-6	4-6	--
Lilac, Late	5-7	5-7	--	--	--	--
Plum, American	5-7	5-7	4-6	--	--	--
Rose, Species	3-5	3-5	3-4	2-4	2-4	--
Sandcherry, Western	--	--	3-5	2-4	2-4	--
Sea-buckthorn (Seaberry)	6-8	6-8	5-7	--	--	--
Silverberry	5-7	5-7	4-6	4-5	4-5	--
Snowberry 11	1-3	1-3	1-3	--	--	--
Sumac, Skunkbush	3-7	3-7	3-7	3-5	3-5	--
Willow, Bebbs	--	--	--	--	--	--
Willow, Purpleosier	--	--	--	--	--	--
Willow, Sandbar	--	--	--	--	--	--
Viburnum, Nannyberry	5-7	5-7	--	--	--	--

Table 10.--Windbreak Suitability Groups--Continued

Expected Shrub Heights at 20 Years

Species	Windbreak suitability groups				
	8	9C	9W	9L	10
	ft.	ft.	ft.	ft.	ft.
Almond, Russian	--	--	--	--	--
Buffaloberry, Silver	3-5	3-5	3-5	3-5	--
Caragana (Peashrub, Siberian)	4-5	3-5	--	3-5	--
Cherry, Nanking	--	--	--	--	--
Cherry, Mongolian	--	--	--	--	--
Cherry, Western Sand	--	--	--	--	--
Chokecherry, Common	--	--	--	--	--
Cotoneaster, Peking	--	--	--	--	--
Cotoneaster, European	--	--	--	--	--
Currant, Golden	--	--	--	--	--
Dogwood, Redosier	--	--	--	--	--
Forsythia, ‘Meadowlark’	--	--	--	--	--
Honeysuckle, Amur	--	--	--	--	--
Honeysuckle, Blueleaf ‘Freedom’	--	--	--	--	--
Honeysuckle, Tatarian	4-6	4-6	--	4-6	--
Indigo, False	--	--	--	--	--
Juneberry, (Serviceberry)	--	--	--	--	--
Lilac, Common	4-6	3-5	--	3-5	--
Lilac, Late	--	--	--	--	--
Plum, American	--	--	--	--	--
Rose, Species	--	--	--	--	--
Sandcherry, Western	--	--	--	--	--
Sea-buckthorn (Seaberry)	3-5	3-5	3-4	3-5	--
Silverberry	3-5	3-5	3-4	3-5	--
Snowberry 11	--	--	--	--	--
Sumac, Skunkbush	--	3-5	--	3-5	--
Willow, Bebbs	--	--	--	--	--
Willow, Purpleosier	--	--	--	--	--
Willow, Sandbar	--	--	--	--	--
Viburnum, Nannyberry	--	--	--	--	--

Table 10.--Windbreak Suitability Groups--Continued

Expected Deciduous Heights at 20 Years

Species	Windbreak suitability groups					
	1	1K	2	2K	2H	3
	ft.	ft.	ft.	ft.	ft.	ft.
Apricot, Species	10-12	--	--	--	--	9-11
Ash, Green	18-22	16-20	--	--	--	17-21
Aspen, Quaking	25-30	20-25	--	17-23	--	18-20
Boxelder	15-18	13-15	--	--	--	13-16
Cottonwood, Species	38-46	34-42	--	34-42	--	--
Crabapple, Species	15-16	--	--	--	--	13-16
Elm, Siberian	24-30	24-30	--	--	--	22-27
Hackberry, Common	18-22	16-20	--	--	--	17-21
Hawthorn, Arnold	12-16	10-14	--	--	--	11-13
Hawthorn	10-12	18-22	--	--	--	9-11
Maple, Amur	10-12	--	--	--	--	9-10
Maple, Tatarian	10-12	--	--	--	--	9-10
Oak, Bur	17-20	15-18	--	--	--	17-20
Olive, Russian	13-16	12-15	--	10-13	--	12-15
Pear, Ussurian (Harbin)	15-17	--	--	--	--	15-17
Poplar Species, Balsam	40-45	--	--	--	--	--
Poplar, White	28-35	--	--	--	--	20-30
Willow, Laurel	20-25	--	15-20	--	15-20	--
Willow, Missouri River	21-23	--	17-20	--	17-20	--
Willow, Peachleaf	18-23	--	16-21	--	16-21	--
Willow, White	20-25	--	18-23	--	18-23	--

Table 10.--Windbreak Suitability Groups--Continued

Expected Deciduous Heights at 20 Years

Species	Windbreak suitability groups					
	4	4C	5	6D	6G	7
	ft.	ft.	ft.	ft.	ft.	ft.
Apricot, Species	8-10	8-10	8-10	--	--	--
Ash, Green	14-18	14-18	13-16	12-15	12-15	--
Aspen, Quaking	--	--	--	--	--	--
Boxelder	--	--	--	--	--	--
Cottonwood, Species	--	--	--	--	--	--
Crabapple, Species	13-15	13-15	10-12	--	--	--
Elm, Siberian	16-20	16-20	20-25	16-20	16-20	--
Hackberry, Common	15-17	15-17	--	--	--	--
Hawthorn, Arnold	8-10	8-10	11-13	7-9	7-9	--
Hawthorn	6-8	6-8	--	--	--	--
Maple, Amur	--	--	--	--	--	--
Maple, Tatarian	--	--	--	--	--	--
Oak, Bur	14-16	14-16	12-15	--	--	--
Olive, Russian	10-12	10-12	11-14	10-12	10-12	--
Pear, Ussurian (Harbin)	--	--	10-12	--	--	--
Poplar Species (Balsam)	--	--	--	--	--	--
Poplar, White	--	--	--	--	--	--
Willow, Laurel	--	--	--	--	--	--
Willow, Missouri River	--	--	--	--	--	--
Willow, Peachleaf	--	--	--	--	--	--
Willow, White	--	--	--	--	--	--

Table 10.--Windbreak Suitability Groups--Continued

Expected Deciduous Heights at 20 Years

Species	Windbreak suitability groups				
	8	9C	9W	9L	10
	ft.	ft.	ft.	ft.	ft.
Apricot, Species	--	--	--	--	--
Ash, Green	8-9	8-10	--	8-12	--
Aspen, Quaking	--	--	--	--	--
Boxelder	--	--	--	--	--
Cottonwood, Species	--	--	--	--	--
Crabapple, Species	--	--	--	--	--
Elm, Siberian	10-12	9-11	--	9-11	--
Hackberry, Common	--	--	--	--	--
Hawthorn, Arnold	--	--	--	--	--
Hawthorn	--	--	--	--	--
Maple, Amur	--	--	--	--	--
Maple, Tatarian	--	--	--	--	--
Oak, Bur	--	--	--	--	--
Olive, Russian	8-9	6-8	5-7	6-8	--
Pear, Ussurian(Harbin)	--	--	--	--	--
Poplar, Hybrid Species	--	--	--	--	--
Poplar, White	--	--	--	--	--
Willow, Laurel	--	--	--	--	--
Willow, Missouri River	--	--	--	--	--
Willow, Peachleaf	--	--	--	--	--
Willow, White	--	--	--	--	--

Table 10.--Windbreak Suitability Groups--Continued

Expected Conifer Heights at 20 Years

Species	Windbreak suitability groups					
	1	1K	2	2K	2H	3
	ft.	ft.	ft.	ft.	ft.	ft.
Juniper, Rocky Mountain	10-12	9-11	--	--	--	10-12
Larch, Siberian	14-18	--	--	--	--	13-16
Pine, Ponderosa	16-20	14-16	--	--	--	16-20
Pine, Scotch	16-18	--	--	--	--	14-17
Redcedar, Eastern	10-12	9-11	--	--	--	10-12
Spruce, Black Hills	16-20	--	--	--	--	15-19
Spruce, Colorado Blue	16-20	--	--	--	--	15-19

Table 10.--Windbreak Suitability Groups--Continued

Expected Conifer Heights at 20 Years

Species	Windbreak suitability groups					
	4	4C	5	6D	6G	7
	ft.	ft.	ft.	ft.	ft.	ft.
Juniper, Rocky Mountain	9-11	9-11	8-10	7-9	7-9	7-9
Larch, Siberian	--	--	12-15	--	--	--
Pine, Ponderosa	15-17	15-17	13-18	12-14	11-13	11-13
Pine, Scotch	13-16	13-16	14-17	11-13	--	--
Redcedar, Eastern	9-11	9-11	8-10	7-9	7-9	7-9
Spruce, Black Hills	--	--	--	--	--	--
Spruce, Colorado Blue	10-15	--	--	--	--	--

Table 10.--Windbreak Suitability Groups--Continued

Expected Conifer Heights at 20 Years

Species	Windbreak suitability groups				
	8	9C	9W	9L	10
	ft.	ft.	ft.	ft.	ft.
Juniper, Rocky Mountain	6-8	5-7	--	5-7	--
Larch, Siberian	--	--	--	--	--
Pine, Ponderosa	11-13	--	--	--	--
Pine, Scotch	--	--	--	--	--
Redcedar, Eastern	6-8	5-7	--	5-7	--
Spruce, Black Hills	--	--	--	--	--
Spruce, Colorado Blue	--	--	--	--	--

Rangeland

Rangeland makes up about 534,250 acres or 43 percent of the land in Morton County. The majority of rangeland is on rolling to steep dissected till plains and associated wetlands and in stream valleys and on outwash plains. The soils are generally unsuited to poorly suited for cultivated crops. Rangeland is used primarily for grazing by domestic livestock; however, it also provides wildlife habitat, watershed protection, recreational areas, and aesthetic value.

Rangeland is defined as land on which the native vegetation (historic climax or natural potential plant community) is predominantly grasses, grasslike plants, forbs, and shrubs. Rangeland includes natural grasslands, savannas, marshes, and wet meadows. Cultural treatments, such as fertilization and cultivation, generally are not used or needed to maintain productivity of rangeland. The composition and production of the plant community are largely determined by soil, climate, topography, and grazing influences.

Range Sites

In areas that have similar climate and topography, differences in the kind and amount of vegetation produced on rangeland are closely related to the kind of soil. Soils vary in their capacity to produce grasses and other native plants. Soils that produce similar kinds, proportions, and amounts of vegetation are grouped into a range site.

Range Site is a distinctive kind of rangeland that produces a characteristic natural plant community that differs from natural plant communities on other range sites in kind, amount, and proportion of range plants. Over time, the combination of plants best suited to a particular soil and climate has become established. In the absence of excessive disturbances, this group of plants is the natural plant community or climax community for the site. Natural plant communities are not static but vary slightly from year to year and place to place. The natural potential plant community is generally, but not always, the most productive and diverse combination of plants that may occur on a site.

The relationship between soils and vegetation was determined during this survey. In most cases, range sites can be determined directly from the soil map. Soil properties that affect moisture supply and plant nutrients have the greatest influence on the productivity of range sites. Soil reaction, salt content, and a seasonal high water table are also important. Many different range sites occur in the survey area. Range sites for each map unit component under undrained conditions are given in Table 11, "Range Sites."

The following paragraphs describe soil and landscape features and limitations associated with range sites in Major Land Resource Areas (MLRA) 54. Some of the range sites described may not occur in Morton County.

Clayey range site. These are very deep, well and moderately well drained, moderately fine and fine textured soils. Saturated hydraulic conductivity is slow or very slow. Available water capacity is high. This site is on nearly level to gently rolling plains, lake plains, and terraces of large streams. Slope ranges from 1 to 9 percent.

Very few problems affect management of this site. The water infiltration rate is slow. As a result, an adequate cover of vegetation is needed to help reduce runoff and evapotranspiration. The site is easily damaged when it is wet. Grazing during wet periods results in soil compaction, trampling, and root shearing.

Site retrogression results in a decrease in the abundance of plants such as green needlegrass, prairie junegrass, porcupinegrass, plains reedgrass, and winterfat. The plants that increase in abundance under these conditions are western wheatgrass, blue grama, upland sedges, Sandberg bluegrass, fringed sagewort, and other unpalatable forbs. Further deterioration may result in a dominance of blue grama, upland sedges, Sandberg bluegrass, fringed sagewort, clubmoss, and unpalatable forbs. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forbs will dominate the site.

Claypan range site. These are very deep, moderately well and well drained soils. They have moderately coarse to moderately fine textured surface layers underlain by a sodic subsoil. The subsoils are moderately coarse to fine textured and are high in sodium. Saturated hydraulic conductivity is very slow and available water capacity is moderate. This site is on nearly level to undulating glacial till plains and lake plains. Slope ranges from 0 to 6 percent.

This site is easily damaged by mismanagement. Because of a dense subsoil and the content of salts in the soil, reestablishing the vegetation is difficult in denuded areas. This site is easily damaged when it is wet. Grazing during wet periods results in soil compaction, trampling, and root shearing. Management that maintains an abundance of the climax species will maintain production, reduce runoff and evapotranspiration, and protect the soil from erosion.

Site retrogression results in a decrease in the abundance of plants such as western wheatgrass, needleandthread, green needlegrass, prairie junegrass, and winterfat. The plants that tend to increase in abundance under these conditions include blue grama, buffalograss, inland saltgrass, Sandberg bluegrass, upland sedges, and clubmoss. Further deterioration may result in a dominance of short grasses, upland sedges, clubmoss, fringed sagewort, and unpalatable forbs. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forbs will slowly dominate the site.

Closed Depression range site. These are very deep, poorly drained, fine textured soils. They have a dense sodic subsoil that restricts root growth. Saturated hydraulic conductivity is very slow and available water capacity is moderate. The site is on flats and in enclosed depressions on glacial till and residual uplands.

The site is easily damaged by mismanagement. Because of the dense subsoil and the content of salts in the soil, reestablishing vegetation is difficult in denuded areas. The site is easily damaged when it is wet. Grazing during wet periods results in soil compaction, trampling, and root shearing. Management that maintains an abundance of the climax species will maintain production and protect the quality of the site.

Site retrogression results in a decrease in the abundance of plants such as prairie cordgrass, common spikesedge, and slender wheatgrass. The plants that tend to increase in abundance under continued heavy utilization include western wheatgrass, inland saltgrass, foxtail barley, and needle spikesedge. Further deterioration may result in an abundance of fowl bluegrass, foxtail barley, inland saltgrass, and unpalatable forbs. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forbs will slowly dominate the site.

Limy Subirrigated range site. These are very deep soils that are typically somewhat poorly drained, but include some moderately well drained soils. They have a loamy fine sand to silty clay loam surface layer and typically have a water table at about 1.5 to 3.5 feet during the spring and early summer. These soils have a layer high in lime within 16 inches of the surface. This site is on level, nearly level, and gently sloping glacial lake plains, glacial till plains, and outwash plains. Slope ranges from 0 to 6 percent.

Generally, no major problems affect management if left in perennial forages. The dominant warm-season grasses on this site provide high-quality forage and wildlife habitat late in the growing season.

Site retrogression results in a decrease in the abundance of plants such as big bluestem, switchgrass, and indiangrass. Little bluestem initially increases and then decreases with more severe deterioration. Further deterioration may result in a dominance of sedges, Kentucky bluegrass, annual forbs, and annual grasses. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forbs, as well as woody species will rapidly dominate the site.

Overflow range site. These are very deep, moderately well and well drained, moderate to moderately fine textured soils that regularly receive additional run-on from surrounding uplands or flooding. Saturated hydraulic conductivity is moderate and available water capacity is high to very high. This site occurs on slightly concave swales, depressions, and footslopes on the uplands and on frequently flooded stream terraces and flood plains. Slope ranges from 0 to 3 percent.

As a result of flooding and the upland runoff received by this site, it is very productive when properly managed.

Site retrogression results in a decrease in the abundance of plants such as big bluestem, bearded wheatgrass, switchgrass, green needlegrass, porcupinegrass, sideoats grama, and little bluestem. The plants that increase in abundance under these conditions are western wheatgrass, blue grama, Penn sedge, fescue sedge, and Kentucky bluegrass. Further deterioration may result in a dominance of blue grama, Kentucky bluegrass, sedges, and unpalatable forbs. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forbs species will dominate the site.

Saline Lowland range site. These are very deep, somewhat poorly and poorly drained, medium and fine textured saline soils. Also included are some saline-sodic soils. This range site receives additional water from ground water seepage and/or run-on. Surface layers commonly are saline. Saturated hydraulic conductivity is moderate to very slow and available water capacity is moderate. This site occurs on shallow basins and lake plains and on low terraces and bottom lands along streams. Slope ranges from 0 to 3 percent.

A high content of salts and a moderate available water capacity limit production on this site. Proper management of the adapted salt-tolerant plants will maintain optimum production. If the plant community has been severely damaged, however, the site recovers slowly. Wind and water erosion are hazards in denuded areas. This site is easily damaged when it is wet. Grazing during wet periods results in soil compaction, trampling, and root shearing. Stock water ponds on this site frequently contain salty water.

Site retrogression results in a decrease in the abundance of plants such as Nuttall alkaligrass, slender wheatgrass, and alkali cordgrass. The plants that increase in abundance under these conditions are western wheatgrass, inland saltgrass, foxtail barley, and mat muhly. Further deterioration may result in a dominance of inland saltgrass, foxtail barley, mat muhly, and unpalatable forbs such as silverweed cinquefoil and dock species.

Sands range site. These are very deep, well or excessively drained, coarse textured soils. Saturated hydraulic conductivity is rapid and available water capacity is low to moderate. Soils on this site are highly susceptible to wind erosion. This site is on nearly level to steep outwash and delta plains. Slope ranges from 1 to 35 percent.

The limited available water capacity, potentially high evaportranspiration, and the hazard of wind erosion are concerns in managing this site. In severely disturbed areas, blowouts are common. The vegetation responds rapidly to improved management.

Site retrogression results in a decrease in the abundance of plants such as prairie sandreed, little bluestem, sand bluestem, spiderwort, penstemons, and leadplant amorpha. The plants that increase in abundance under these conditions are blue grama, needleandthread, sand dropseed, upland sedges, and several forbs. Needleandthread and little bluestem initially increase and then decrease. Further deterioration may result in a dominance of blue grama, Penn sedge, threadleaf sedge, sun sedge, clubmoss, and unpalatable forbs such as green sagewort, fringed sagewort, and cudweed sagewort. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forb species will dominate the site.

Sandy range site. These are very deep, well drained, moderately coarse textured soils. Saturated hydraulic conductivity is moderately rapid and available water capacity is moderate. These soils are friable and susceptible to wind erosion. This site is on nearly level to rolling plains, lake plains, and outwash plains. Slope ranges from 1 to 15 percent.

Moderate available water capacity and potentially high evapotranspiration are concerns in managing this site. Also, wind erosion is a hazard in denuded areas. Management that maintains an abundance of the climax species results in a productive natural plant community and provides a good protective plant cover.

Site retrogression results in a decrease in the abundance of plants such as prairie sandreed, green needlegrass, and western wheatgrass. The plants that increase in abundance under these conditions are needleandthread, sand dropseed, blue grama, upland sedges, and several forbs. Needleandthread initially increases and then decreases. Further deterioration may result in a dominance of blue grama, Penn sedge, threadleaf sedge, sun sedge, clubmoss, and unpalatable forbs such as green sagewort, fringed sagewort, and cudweed sagewort. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forb species will dominate the site.

Sandy Claypan range site. These are very deep, somewhat poorly drained soils. They have moderately coarse textured surface layers underlain by a sodic subsoil. The subsoils are moderately coarse to medium textured and are high in sodium. Saturated hydraulic conductivity is very slow and available water capacity is low. This site is on nearly level outwash and lake plains. Slope ranges from 0 to 3 percent.

The soils have a dense, sodic subsoil and limited available water capacity. The site is fragile and the natural plant community can deteriorate rapidly. Management that maintains a protective plant cover will reduce runoff and evapotranspiration and control erosion.

Site retrogression results in a decrease in the abundance of plants such as western wheatgrass, prairie sandreed, green needlegrass, and palatable forbs. Needleandthread and western wheatgrass initially increase and then decrease. The plants that increase in abundance under these conditions are blue grama, upland sedges, and fringed sagewort. Further deterioration may result in a dominance of blue grama, upland sedges, clubmoss, fringed sagewort, annual forbs, and annual grasses. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forb species will dominate the site.

Shallow range site. These are shallow, medium and moderately fine to moderately coarse textured soils overlying weathered siltstone and sandstone bedrock at 10 to 20 inches. They are well to somewhat excessively drained.

Saturated hydraulic conductivity is slow to rapid and available water capacity is low to moderately low. This site occurs on gently sloping to very steep knobs and ridges of sandy and loamy sedimentary uplands. Slope ranges from 3 to over 70 percent.

Low available water capacity limits production on this site. The site is fragile and the plant community can deteriorate rapidly and recover very slowly. The plant community should be kept near its potential and maintained in a high state of vigor in order to optimize the use of available moisture by reducing runoff and evapotranspiration.

Site retrogression results in a decrease in the abundance of plants such as sand bluestem, little bluestem, prairie sandreed, western wheatgrass, green needlegrass, bluebunch wheatgrass, plains reedgrass, plains muhly, sideoats grama, winterfat, and palatable forbs. The plants that increase in abundance under these conditions are blue grama, needleandthread, red threeawn, upland sedges, fringed sagewort, broom snakeweed, cactus, and creeping juniper. Further deterioration may result in a dominance of upland sedges, blue grama, clubmoss, green sagewort, broom snakeweed, cactus, and creeping juniper. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forb species can slowly dominate the site.

Shallow Clayey range site. These are shallow, fine textured soils overlying weathered shales at less than 20 inches. They are well drained. Saturated hydraulic conductivity is slow or very slow and available water capacity is very low. This site occurs on undulating to very steep uplands. Slope ranges from 3 to 35 percent.

Low available water capacity limits production on this site. The site is fragile and the plant community can deteriorate rapidly. The plant community should be kept near its potential and maintained in a high state of vigor in order to optimize use of available moisture by reducing runoff and evapotranspiration. This site is easily damaged when it is wet. Grazing during wet periods results in soil compaction, trampling, and root shearing.

Site retrogression results in a decrease in the abundance of plants such as western wheatgrass, green needlegrass, plains muhly, sideoats grama, little bluestem, and Nuttall saltbush. The plants that increase in abundance under these conditions are blue grama, Sandberg bluegrass, inland saltgrass, needleleaf sedge, and other upland sedges. Further deterioration may result in an abundance of blue grama, inland saltgrass, fringed sagewort, upland sedges, broom snakeweed, rabbitbrush, and clubmoss.

Shallow to Gravel range site. These are shallow, moderately coarse and medium textured soils overlying sand and gravel at about 20 inches. They are somewhat excessively drained. Saturated hydraulic conductivity is moderate over moderately rapid and available water capacity is low. This site occurs on nearly level to steep outwash plains and stream terraces. Slope ranges from 1 to 25 percent.

Low available water capacity limits production on this site. The site is fragile and the plant community can deteriorate rapidly. The plant community should be kept near its potential and maintained in a high state of vigor, in order to optimize use of available moisture by reducing runoff and evapotranspiration.

Site retrogression results in a decrease in the abundance of plants such as needleandthread, western wheatgrass, prairie junegrass, and plains muhly. The plants that increase in abundance under these conditions are blue grama, Penn sedge, threadleaf sedge, needleleaf sedge, and red threeawn. Further deterioration may result in a dominance of blue grama, sedges, fringed sagewort, clubmoss, broom snakeweed, cactus, and forbs. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forb species will slowly dominate the site.

Silty range site. These are moderately deep and very deep, well drained, medium and moderately fine textured soils on residual and glacial till plains.

Saturated hydraulic conductivity is moderate and available water capacity is high or very high. This site is on nearly level to rolling plains, lake plains, and high stream terraces. Slope ranges from 1 to 15 percent.

Generally, no major problems affect management of this site. The plant community should be kept near its potential and maintained in a high state of vigor, in order to optimize use of available moisture by reducing runoff and evapotranspiration. In the more sloping areas, however, gullies can form on low vigor and denuded areas as well as on trails.

Site retrogression results in a decrease in the abundance of plants such as green needlegrass, western wheatgrass, porcupinegrass, big bluestem, and palatable forbs. The plants that increase in abundance under these conditions are needleandthread, western wheatgrass, blue grama, upland sedges, and fringed sagewort. Further deterioration may result in a dominance of blue grama, upland sedges, and varying amounts of fringed sagewort, green sagewort, cudweed sagewort, clubmoss, and other unpalatable forbs. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forb species will dominate the site.

Subirrigated range site. These are very deep, somewhat poorly and poorly drained, moderately coarse to coarse textured soils. These soils have a high water table which keeps the rooting zone moist for most of the growing season. Saturated hydraulic conductivity is moderate to moderately slow and available water capacity is high. This site is on low-lying level to gently undulating plains in depressions and drainageways and on toe slopes. Slope ranges from 0 to 3 percent.

The high percentage of warm-season species on this site can provide high quality forage and wildlife habitat late in the growing season.

Site retrogression results in a decrease in the abundance of plants such as big bluestem, switchgrass, prairie cordgrass, northern reedgrass, indiangrass, and little bluestem. The plants that increase in abundance under these conditions are mat muhly, fowl bluegrass, Kentucky bluegrass, Baltic rush, common spikerush, and undesirable forbs. Further deterioration may result in a dominance of short grasses, low-stature grasslikes, and undesirable forbs. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forb species will rapidly dominate the site.

Thin Claypan range site. These are very deep, somewhat poorly to moderately well drained soils. The surface layer is thin, moderately coarse to moderately fine textured, and underlain by a dense sodic subsoil. The subsoils are moderately coarse to fine textured and high in sodium. Saturated hydraulic conductivity is very slow and available water capacity is low to moderate. This site is on nearly level to moderately level uplands and on stream terraces. Slope ranges from 0 to 9 percent.

Because of the dense subsoil and high content of subsoil salts, productivity is quite low on this site. This site is easily damaged when it is wet. Grazing during wet periods results in soil compaction, trampling, and root shearing. Ponds constructed on this site are likely to be salty.

Site retrogression results in a decrease in the abundance of plants such as western wheatgrass, prairie junegrass, Nuttall alkaligrass, and needleandthread. The plants that increase in abundance under these conditions are blue grama, inland saltgrass, Sandberg bluegrass, and alkali muhly. Further deterioration may result in a dominance of blue grama, Sandberg bluegrass, buffalograss, upland sedges, clubmoss, fringed sagewort, broom snakeweed, cactus species, and undesirable forbs.

Thin Sands range site. These are very deep, excessively drained, coarse textured soils that have a thin surface horizon. Saturated hydraulic conductivity is rapid and available water capacity is low or very low. These soils are highly susceptible to wind erosion and require careful management. This site is on undulating to hilly, choppy, or duned sandy areas and on terraces of streams. Slope ranges from 3 to 25 percent.

This site is very fragile. It is subject to wind erosion if the vegetation is damaged by continued over-utilization or the soil is denuded. Blowouts are common in disturbed areas. Proper management will maintain protective cover and optimum production.

Site retrogression results in a decrease in the abundance of plants such as prairie sandreed, needleandthread, and sand bluestem. The plants that increase in abundance under these conditions are Penn sedge, threadleaf sedge, blue grama, and hairy grama. Further deterioration may result in a dominance of dryland sedges, blue grama, and several unpalatable forbs. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant introduced cool-season grasses and forb species will dominate the site.

Thin Upland range site. These very deep, well drained, medium and moderately fine textured soils have a thin surface horizon. Saturated hydraulic conductivity is moderately slow and available water capacity is high. This site is on gently sloping to very steep glacial till uplands. Slope ranges from 3 to 50 percent.

Generally, no major problems affect management of this site. Wind and water erosion are a problem in denuded areas. In the more sloping areas, however, gullies can form along trails.

Site retrogression results in a decrease in the abundance of plants such as little bluestem, porcupinegrass, western wheatgrass, plains muhly, and sideoats grama. The plants that increase in abundance under these conditions are needleandthread, blue grama, red threeawn, upland sedges, and unpalatable forbs. Further deterioration may result in a dominance of blue grama, upland sedges, clubmoss, fringed sagewort, and undesirable forbs. Under continued non-use, Kentucky bluegrass, smooth bromegrass, and other shade-tolerant, introduced cool-season grasses and forb species will dominate this site.

Very Shallow range site. These are very shallow soils over weathered bedrock, sand, or gravel. They are moderately coarse to medium textured soils underlain by weathered bedrock at about 10 inches. They are excessively drained. Saturated hydraulic conductivity is rapid and available water capacity is very low. This site occurs on undulating to steep or broken uplands and on nearly level to steep outwash plains and terraces. Slope ranges from 1 to 35 percent.

Available water capacity is very low on this site. Water erosion is a hazard in the more sloping areas. Gullies can form along trails and in denuded areas. Productivity can be maintained by proper management of the dominant mid-grasses.

Site retrogression results in a decrease in the abundance of plants such as needleandthread, western wheatgrass, little bluestem, sideoats grama, plains muhly, and purple prairieclover. The plants that increase in abundance under these conditions are blue grama, red threeawn, sand dropseed, Sandberg bluegrass, and upland sedges. Further deterioration may result in a dominance of blue grama, red threeawn, upland sedges, clubmoss, unpalatable forbs, and creeping juniper.

Wet Meadow range site. These are very deep, poorly drained, medium and fine textured soils that are briefly flooded in the spring and summer. The soils dry at the surface by midsummer but have water in the root zone. This site occurs in swales and depressions on glacial till and rolling soft shale plains, and on low terraces and bottom lands of stream valleys and outwash channels. The site normally receives additional water from surface runoff and/or underground seepage. Slope ranges from 0 to 3 percent.

This site is easily damaged when it is wet. Grazing during wet periods results in compaction, trampling, and root shearing. The site also is an excellent source of high quality prairie hay.

Site retrogression results in a decrease in the abundance of plants such as slim sedge, northern reedgrass, prairie cordgrass, and switchgrass. The plants that increase in abundance under these conditions are fescue sedge, common spikerush, mat muhly, fowl bluegrass, and Baltic rush. Further deterioration may result in a dominance of low stature sedges, Baltic rush, foxtail barley, inland saltgrass, and forbs such as western dock. Under limited use shade-tolerant, introduced species like creeping foxtail can dominate the site.

Wetland range site. These are very deep, very poorly drained soils. Soil texture has little affect as to the kind of vegetation on the site. Water stands over the surface for a major part of the growing season. Saturated hydraulic conductivity of these soils is slow and available water capacity is high. This site is on level, slightly concave lake basins, depressions, and outwash channels. This site normally receives additional amounts of water from surface run-on and/or underground seepage. Slope is commonly less than 1 percent.

This site is easily damaged when it is wet. Grazing during wet periods results in soil compaction, trampling, and root shearing. Climax vegetation and the important wetland wildlife values are maintained under proper management.

Site retrogression results in a decrease in the abundance of plants such as whitetop, slough sedge, prairie cordgrass, and northern reedgrass. The plants that increase in abundance under these conditions are slim sedge, Baltic rush, common spikesedge, and American mannagrass. Further deterioration may result in a dominance of Baltic rush, common spikesedge, foxtail barley, smartweed, buttercup, Nuttall cinquefoil, and Mexican dock.

Range Site Plant Community, Composition, and Production

Characteristic vegetation, species composition, total annual production, and stocking rates by condition class are shown in Table 12, "Range Site Descriptions" for Major Land Resource Areas (MLRA) 54.

The **characteristic vegetation** consists of grasses, grasslikes, forbs, shrubs, and trees that dominate the natural potential plant community on each range site. The plant species within these groups are listed by **common name**. Under **composition by weight**, the expected percentage of the total annual production is given for each major species and groups of minor species making up the characteristic vegetation.

The range site description helps interpret the ecological and utilitarian values of a given site, including grazing, wildlife habitat, watershed protection, recreation, and others.

Total annual production is the amount of vegetation that can be expected to grow annually on well managed rangeland, supporting the potential natural plant community. It includes all vegetation, whether or not palatable to grazing animals. It includes the current year's herbaceous growth, as well as growth of leaves, twigs, and fruit of woody plants. It does not include the increase in stem diameter of trees and shrubs. Potential production depends on the kind of range site. Current production depends on the rangeland condition and the amount of moisture available to the plants during the growing season. Production is expressed in pounds per acre of air-dry herbage for **favorable**, **average**, and **unfavorable** years, as determined by the amount and distribution of precipitation and the temperatures favorable to growing conditions.

Stocking rates are based on production and expressed as **animal-unit months** per acre for **excellent**, **good**, **fair**, and **poor** range condition classes. Animal-Unit Month (AUM) is the amount of forage required monthly by an animal unit, generally described as one cow and one calf up to 6 months old.

Range Condition

Range condition indicates the present composition of the plant community on a range site in relation to the climax vegetation. Range condition is determined by comparing the present plant community with the natural potential plant community on a particular range site. The more closely the existing community resembles the potential community, the higher the range condition. Range condition is an ecological rating only, not a forage value rating. Range condition is expressed as **excellent, good, fair,** or **poor,** depending on how closely the present plant community resembles the natural potential plant community. **Excellent** indicates that 76 to 100 percent of the present plant community is the same as the climax vegetation; **good**, 51 to 75 percent; **fair**, 26 to 50 percent; and **poor**, 25 percent or less.

In some cases the plant community found on a site may not look similar to the potential plant community described in Table 12. This is usually due to a lower condition class, reflecting past disturbances, or in some cases long-term exclusion from grazing or fire. Abnormal disturbances that change the natural plant community include prolonged overgrazing or season-long grazing, excessive or untimely burning, erosion, and plowing. Under these circumstances, some of the climax plants decrease in proportion while others increase. Also, plants which were not part of the original native plant community may invade the site. A very severe disturbance, such as plowing, can completely destroy the natural plant community, resulting in dominance of annuals or weedy perennials of a lower plant successional status. If the plant community has not deteriorated significantly, it eventually can return to a higher condition class under proper range management.

Range Management

Range management requires a knowledge of the kinds of soils and of the potential natural plant community. It also requires an evaluation of the present range condition and trend. The primary objective in range management is to manipulate grazing in such a manner that the plants growing on a site are similar in kind and amount to the potential natural plant community for that site. Such management generally results in the optimum production and diversity of vegetation, suppression of undesirable brush and weeds, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets forage needs, provides wildlife habitat, and protects soil and water resources.

Ecologically sound range management maintains excellent or good range condition. Water is conserved, yields are optimized, and soils are protected. An important management concern is recognizing the changes in the plant community that take place gradually and that can be misinterpreted or overlooked. Growth encouraged by heavy rainfall, for example, may lead to the conclusion that the range is in good condition when actually the plant cover is weedy and the long-term trend is toward lower production. On the other hand, some rangeland that has been grazed closely for a short period may have a degraded appearance that temporarily obscures its quality and ability to recover rapidly.

Rangeland can recover from prolonged overgrazing or other disturbance if the climax species have not been completely eliminated from the plant community. Generally an adequate population of climax plants remains to restore the rangeland to excellent condition through sound grazing management. In areas where the climax plant community has been severely disturbed or destroyed, range seeding can accelerate improvement in range condition. Seeding the proper climax species also can restore productive rangeland on areas of depleted or low quality cropland or pastureland. Brush suppression, water developments, fencing, and other mechanical practices may be needed to facilitate proper grazing management for range improvement on some rangeland. Proper grazing management is the key to maintaining or improving the productivity and diversity of rangeland.

For additional information about rangeland management, contact the local Natural Resources Conservation Service or Cooperative Extension Service office.

Table 11.--Range Site Report

(Dashes (—) indicate a range site is not assigned. Range sites are for undrained conditions.)

Map symbol and soil name	Range site
1:	
Tonka	Wet Meadow
3:	
Velva	Sandy
4:	
Lallie	Wetland
5:	
Dimmick	Wetland
6:	
Heil	Closed Depression
7:	
Korell	Silty
8:	
Straw	Silty
9:	
Channel	—
Straw	Overflow
Velva	Sandy
10:	
Arnegard	Overflow
10B:	
Arnegard	Silty
11:	
Amor	Silty
Arnegard	Overflow
11B:	
Amor	Silty
Shambo	Silty
12C:	
Amor	Silty
Cabba	Shallow
13D:	
Amor	Silty
Cabba	Shallow
15B:	
Chama	Thin Upland
Cabba	Shallow

Table 11.--Range Site Report--Continued

Map symbol and soil name	Range site
15C:	
Chama	Thin Upland
Cabba	Shallow
Sen	Silty
15D:	
Cabba	Shallow
Chama	Thin Upland
Sen	Silty
15F:	
Cabba	Shallow
Chama	Thin Upland
Arnegard	Silty
16D:	
Ringling	Very Shallow
Daglum	Claypan
16F:	
Brandenburg	Very Shallow
Cabba	Shallow
Savage	Clayey
17B:	
Sen	Silty
Chama	Thin Upland
18B:	
Reeder	Silty
Farnuf	Silty
19:	
Farland	Silty
19B:	
Farland	Silty
19C:	
Farland	Silty
19D:	
Farland	Silty
20:	
Shambo	Silty
20B:	
Shambo	Silty
21B:	
Morton	Silty
Farland	Silty

Table 11.--Range Site Report--Continued

Map symbol and soil name	Range site
22F:	
Cabba	Shallow
Rock outcrop	—
Chama	Thin Upland
23C:	
Morton	Silty
Cabba	Shallow
26:	
Grail	Overflow
27:	
Belfield	Clayey
Grail	Overflow
27B:	
Grail	Clayey
Belfield	Clayey
28:	
Belfield	Clayey
Daglum	Claypan
28B:	
Belfield	Clayey
Daglum	Claypan
29:	
Savage	Clayey
29B:	
Savage	Clayey
29C:	
Savage	Clayey
30:	
Regent	Clayey
Savage	Clayey
30B:	
Regent	Clayey
Savage	Clayey
30C:	
Regent	Clayey
Savage	Clayey
31B:	
Regent	Clayey
Janesburg	Claypan

Table 11.--Range Site Report--Continued

Map symbol and soil name	Range site
31C:	
Regent	Clayey
Janesburg	Claypan
35B:	
Moreau	Clayey
35C:	
Moreau	Clayey
Wayden	Shallow Clayey
35D:	
Moreau	Clayey
Wayden	Shallow Clayey
36:	
Lawther	Clayey
38B:	
Searing	Silty
Ringling	Very Shallow
40C:	
Rhoades	Thin Claypan
Slickspots	—
Daglum	Claypan
41B:	
Daglum	Claypan
Rhoades	Thin Claypan
41C:	
Daglum	Claypan
Rhoades	Thin Claypan
42F:	
Dogtooth	Thin Claypan
Janesburg	Claypan
Cabba	Shallow
43C:	
Rhoades	Thin Claypan
Daglum	Claypan
44B:	
Ekalaka	Sandy Claypan
Lakota	Thin Claypan
45:	
Harriet	Saline Lowland

Table 11.--Range Site Report--Continued

Map symbol and soil name	Range site
46C:	
Lakota	Thin Claypan
Ekalaka	Sandy Claypan
47B:	
Dogtooth	Thin Claypan
Janesburg	Claypan
48B:	
Desart	Sandy
Ekalaka	Sandy Claypan
Telfer	Sands
49B:	
Lefor	Sandy
51D:	
Vebar	Sandy
Flasher	Shallow
Tally	Sandy
51F:	
Flasher	Shallow
Vebar	Sandy
Parshall	Sandy
52B:	
Vebar	Sandy
Parshall	Sandy
53B:	
Tally	Sandy
Parshall	Sandy
53C:	
Tally	Sandy
Parshall	Sandy
54C:	
Vebar	Sandy
Flasher	Shallow
55B:	
Beisigl	Thin Sands
Lihen	Sands
56:	
Parshall	Sandy

Table 11.--Range Site Report--Continued

Map symbol and soil name	Range site
57D:	
Beisigl	Thin Sands
Flasher	Shallow
58B:	
Lihen	Sands
Parshall	Sandy
59F:	
Flasher	Shallow
Rock outcrop	—
Vebar	Sandy
60D:	
Wabek	Very Shallow
Manning	Shallow to Gravel
62B:	
Manning	Shallow to Gravel
63B:	
Lehr	Shallow to Gravel
Stady	Silty
64:	
Stady	Silty
65:	
Wanagan	Silty
66F:	
Wabek	Very Shallow
Cabba	Shallow
Shambo	Silty
67B:	
Virgelle	Sands
68D:	
Telfer	Sands
68E:	
Telfer	Sands
70:	
Bowbells	Overflow
71:	
Williams	Silty
Bowbells	Overflow
71B:	
Williams	Silty
Bowbells	Silty

Table 11.--Range Site Report--Continued

Map symbol and soil name	Range site
73B:	
Williams	Silty
Reeder	Silty
76C:	
Williams	Silty
Zahl	Thin Upland
76D:	
Zahl	Thin Upland
Williams	Silty
76F:	
Zahl	Thin Upland
Williams	Silty
77:	
Temvik	Silty
Wilton	Overflow
77B:	
Temvik	Silty
Williams	Silty
80:	
Breien	Sandy
82:	
Mckeen	Wetland
83:	
Mckeen	Wetland
85B:	
Banks	Thin Sands
86:	
Havrelon	Silty
87:	
Minnewaukan	Subirrigated
88:	
Havrelon	Silty
91:	
Lohler	Clayey
98:	
Mandan	Overflow
Linton	Silty
98B:	
Linton	Silty
Mandan	Silty

Table 11.--Range Site Report--Continued

Map symbol and soil name	Range site
99F:	
Badland, outcrop	—
Cabba	Shallow
100:	
Pits	—
105:	
Dumps and Pits	—
110:	
Ustorthents	Shallow
115:	
Riverwash	—
154F:	
Arikara	—
Shambo	Silty
Cabba	Shallow
161F:	
Beisigl	Thin Sands
Flasher	Shallow
Arikara	—
185B:	
Banks, slightly wet	Thin Sands
186:	
Havrelon, slightly wet	Silty
188:	
Havrelon, slightly wet	Silty
M-W:	
Miscellaneous water	—
W:	
Water	—

Table 12.--Range Site Descriptions

Clayey Range Site

Plant Community		
Characteristic vegetation	Common name	Composition by weight (percent)
Grasses and Grasslikes (75% to 90% of Total)	Western Wheatgrass	35
	Green Needlegrass	20
	Blue Grama	10
	Prairie Junegrass	5
	Sandberg Bluegrass	5
	Bearded Wheatgrass *	
	Needleandthread *	
	Plains Reedgrass *	
	Porcupinegrass *	5
	Prairie Dropseed *	
	Other Perennial Grasses *	
	Other Wheatgrasses *	
	Needleleaf Sedge *	5
	Other Sedges/Rushes *	
Forbs (5 to 15% of Total)	Cudweed Sagewort *	
	Fringed Sagewort *	
	Goatsbeard *	
	Prairie Coneflower *	10
	Scarlet Globemallow *	
	Silverleaf Scurfpea *	
	Western Yarrow *	
	Other Perennial Forbs *	
Shrubs and Trees (5% to 10% of Total)	Nuttall Saltbush *	
	Prairie Rose *	
	Silver Sage *	5
	Western Snowberry *	
	Winterfat *	
	Other Perennial Shrubs *	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	1800 to 2100
Average	1500 to 1800
Unfavorable	1200 to 1500

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.52 to 0.70
Good	0.35 to 0.52
Fair	0.17 to 0.35
Poor	0.08 to 0.17

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Claypan Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Western Wheatgrass		25
	Blue Grama		20
	Needleandthread		15
	Green Needlegrass		5
	Prairie Junegrass		5
	Sandberg Bluegrass		5
	Buffalograss	*	
	Inland Saltgrass	*	5
	Sand Dropseed	*	
	Other Perennial Grasses	*	
	Needleleaf Sedge	*	
	Threadleaf Sedge	*	10
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Club Moss	*	
	Fringed Sagewort	*	
	Rush Skeletonplant	*	
	Scarlet Globemallow	*	5
	Silverleaf Scurfpea	*	
	Western Yarrow	*	
	Yellow Coneflower	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 15% of Total)	Broom Snakeweed	*	
	Nuttall Saltbush	*	
	Silver Sagebrush	*	5
	Winterfat	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	1400 to 1650
Average	1150 to 1400
Unfavorable	900 to 1150

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.40 to 0.54
Good	0.27 to 0.40
Fair	0.13 to 0.27
Poor	0.05 to 0.13

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Closed Depression Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Western Wheatgrass		50
	Prairie Cordgrass		10
	Fowl Bluegrass		5
	Foxtail Barley		5
	Inland Saltgrass	*	
	Slender Wheatgrass	*	10
	Other Perennial Grasses	*	
	Common Spikerush	*	
	Needle Spikerush	*	5
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Curled Dock		5
	Nuttall Cinquefoil	*	
	Povertyweed	*	10
	Smartweed Species	*	
	Other Perennial Forbs	*	
Shrubs and Trees (0% of Total)			None

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	2400 to 2800
Average	2000 to 2400
Unfavorable	1400 to 2000

Stocking Rates

Condition class	**AUM per acre per year
Excellent	0.67 to 0.90
Good	0.45 to 0.67
Fair	0.23 to 0.45
Poor	0.10 to 0.23

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Limy Subirrigated Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (80% to 95% of Total)	Little Bluestem		45
	Big Bluestem		15
	Indiangrass		5
	Switchgrass		5
	Western Wheatgrass		5
	Canada Wildrye	*	
	Green Needlegrass	*	
	Needleandthread	*	5
	Porcupinegrass	*	
	Slender Wheatgrass	*	
	Other Perennial Grasses	*	
	Rushes	*	10
	Sedge Species	*	
Forbs (5% to 15% of Total)	American Licorice	*	
	Goldenrod Species	*	
	Maximillian Sunflower	*	10
	Stiff Sunflower	*	
	Other Perennial Forbs	*	
Shrubs and Trees (0% of Total)			None

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	3500 to 4000
Average	3000 to 3500
Unfavorable	2500 to 3000

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	1.01 to 1.35
Good	0.68 to 1.01
Fair	0.34 to 0.68
Poor	0.10 to 0.34

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Overflow Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Big Bluestem		20
	Green Needlegrass		15
	Western Wheatgrass		10
	Little Bluestem		5
	Porcupinegrass		5
	Sideoats Grama		5
	Bearded Wheatgrass	*	
	Canada Wildrye	*	5
	Needleandthread	*	
	Blue Grama	*	
	Prairie Cordgrass	*	
	Prairie Dropseed	*	10
	Switchgrass	*	
	Other Perennial Grasses	*	
	Bicknell Sedge	*	
	Fescue Sedge	*	5
	Penn Sedge	*	
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	American Licorice	*	
	American Vetch	*	
	Cudweed Sagewort	*	
	Heath Aster	*	10
	Stiff Sunflower	*	
	Wooly Goldenrod	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 15% of Total)	Green Ash	*	
	Western Snowberry	*	10
	Other Perennial Forbs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	2600 to 3000
Average	2200 to 2600
Unfavorable	1900 to 2200

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.75 to 1.00
Good	0.50 to 0.75
Fair	0.25 to 0.50
Poor	0.10 to 0.25

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Saline Lowland Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (85% to 95% of Total)	Western Wheatgrass		35
	Inland Saltgrass		20
	Nuttall Alkaligrass		15
	Slender Wheatgrass		5
	Alkali Cordgrass	*	5
	Foxtail Barley	*	
	Little Bluestem	*	5
	Mat Muhly	*	
	Alkali Muhly	*	
	Plains Bluegrass	*	5
	Other Perennial Grasses	*	
	Prairie Bulrush	*	Trace
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Alkali Plantain	*	
	Dock Species	*	
	Pursh Seepweed	*	10
	Silverweed Cinquefoil	*	
	Other Perennial Forbs	*	
Shrubs and Trees (0% of Total)			None

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	2500 to 2850
Average	2150 to 2500
Unfavorable	1800 to 2150

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.72 to 0.96
Good	0.48 to 0.72
Fair	0.24 to 0.48
Poor	0.05 to 0.24

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Sands Range Site

Plant Community			
Characteristic vegetation	Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Prairie Sandreed		25
	Little Bluestem		10
	Needleandthread		10
	Sand Bluestem		10
	Blue Grama		5
	Sideoats Grama		5
	Canada Wildrye	*	
	Green Needlegrass	*	
	Porcupinegrass	*	
	Prairie Junegrass	*	10
	Sand Dropseed	*	
	Western Wheatgrass	*	
	Wilcox Panicum	*	
	Other Perennial Grasses	*	
	Sun Sedge	*	
	Threadleaf Sedge	*	10
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Bracted Spiderwort	*	
	Fringed Sagewort	*	
	Green Sagewort	*	
	Hairy Goldaster	*	10
	Penstemon Species	*	
	Purple Coneflower	*	
	Silky Prairie-Clover	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 10% of Total)	Leadplant Amorpha	*	
	Prairie Rose	*	5
	Western Snowberry	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	2150 to 2500
Average	1800 to 2150
Unfavorable	1450 to 1800

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.60 to 0.80
Good	0.40 to 0.60
Fair	0.20 to 0.40
Poor	0.05 to 0.20

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Sandy Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (75% to 90% of Total)	Prairie Sandreed		20
	Blue Grama		10
	Needleandthread		10
	Western Wheatgrass		10
	Green Needlegrass		5
	Prairie Junegrass		5
	Little Bluestem	*	10
	Porcupinegrass	*	
	Big Bluestem	*	
	Hairy Grama	*	
	Red Threeawn	*	5
	Sand Dropseed	*	
	Other Perennial Grasses	*	
	Sun Sedge	*	
	Threadleaf Sedge	*	10
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Bracted Spiderwort	*	
	Cudweed Sagewort	*	
	Fringed Sagewort	*	10
	Green Sagewort	*	
	Pestemon Species	*	
	Silverleaf Scurfpea	*	
	Western Yarrow	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 10% of Total)	Leadplant Amorpha	*	
	Prairie Rose	*	5
	Western Snowberry	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	2000 to 2300
Average	1700 to 2000
Unfavorable	1400 to 1700

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.58 to 0.77
Good	0.38 to 0.58
Fair	0.19 to 0.38
Poor	0.05 to 0.19

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Sandy Claypan Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Western Wheatgrass		30
	Blue Grama		15
	Needleandthread		10
	Green Needlegrass		5
	Thickspike Wheatgrass		5
	Little Bluestem	*	
	Red Threeawn	*	5
	Sand Dropseed	*	
	Plains Reedgrass	*	
	Prairie Junegrass	*	5
	Sandberg Bluegrass	*	
	Other Perennial Grasses	*	
	Sun Sedge	*	10
	Threadleaf Sedge	*	
Forbs (5% to 15% of Total)	Fringed Sagewort	*	
	Rush Skeletonplant	*	5
	Scarlet Globemallow	*	
	Other Perennial Forbs	*	
Shrubs and Trees (0% to 10% of Total)	Prairie Rose	*	
	Silver Sagebrush	*	10
	Winterfat	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	2000 to 2500
Average	1500 to 2000
Unfavorable	1000 to 1500

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.57 to 0.77
Good	0.38 to 0.57
Fair	0.19 to 0.38
Poor	0.09 to 0.19

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Shallow Range Site

Plant Community			
Characteristic vegetation	Common name		Composition by weight (percent)
Grasses and Grasslikes (75% to 90% of Total)	Little Bluestem		20
	Plains Muhly		15
	Prairie Sandreed		10
	Blue Grama		5
	Needleandthread		5
	Sideoats Grama		5
	Western Wheatgrass		5
	Green Needlegrass	*	
	Inland Saltgrass	*	
	Porcupinegrass	*	
	Prairie Junegrass	*	10
	Red Threeawn	*	
	Slender Wheatgrass	*	
	Other Perennial Grasses	*	
	Threadleaf Sedge	*	10
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Blacksamson	*	
	Dotted Gayfeather	*	
	Fringed Sagewort	*	
	Pasque Flower	*	
	Purple Prairieclover	*	10
	Rush Skeletonplant	*	
	Stiff Sunflower	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 10% of Total)	Buffaloberry	*	
	Prairie Rose	*	
	Winterfat	*	5
	Western Snowberry	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	1400 to 1650
Average	1250 to 1400
Unfavorable	1000 to 1250

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.40 to 0.54
Good	0.28 to 0.40
Fair	0.14 to 0.28
Poor	0.06 to 0.14

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Shallow Clayey Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Western Wheatgrass		50
	Blue Grama		5
	Green Needlegrass		5
	Plains Muhly		5
	Sandberg Bluegrass		5
	Plains Reedgrass	*	
	Sideoats Grama	*	5
	Thickspike Wheatgrass	*	
	Inland Saltgrass	*	
	Little Bluestem	*	
	Needleandthread	*	5
	Prairie Junegrass	*	
	Other Perennial Grasses	*	
	Needleleaf Sedge	*	Trace
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Eriogonom Species	*	
	Fringed Sagewort	*	
	Poverty Weed	*	10
	Prairie Thermopsis	*	
	Rush Skeletonplant	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 15% of Total)	Broom Snakeweed	*	
	Greenplume Rabbitbrush	*	
	Nuttall Saltbush	*	10
	Silver Sagebrush	*	
	Winterfat	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	1000 to 1200
Average	800 to 1000
Unfavorable	600 to 800

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.28 to 0.38
Good	0.19 to 0.28
Fair	0.09 to 0.19
Poor	0.06 to 0.09

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Shallow to Gravel Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Needleandthread		20
	Blue Grama		10
	Prairie Sandreed		10
	Western Wheatgrass		10
	Plains Muhly		5
	Prairie Junegrass		5
	Red Threeawn		5
	Sandberg Bluegrass		5
	Green Needlegrass	*	
	Inland Saltgrass	*	
	Plains Reedgrass	*	5
	Porcupinegrass	*	
	Sand Dropseed	*	
	Other Perennial Grasses	*	
	Needleleaf Sedge	*	
	Sun Sedge	*	10
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Cutleaf Goldenweed	*	
	Dotted Gayfeather	*	
	Fringed Sagewort	*	
	Hoods Phlox	*	10
	Rush Skeletonplant	*	
	Scarlet Globemallow	*	
	Wooly Goldenrod	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 15% of Total)	Prairie Rose	*	
	Western Snowberry	*	5
	Yucca	*	
	Other Perennial Shrubs	*	

Total Annual Production Climatic condition	(Excellent Condition) Pounds per acre (dry)
Favorable	1300 to 1600
Average	1000 to 1300
Unfavorable	700 to 1000

Stocking Rates Condition class	**AUM per acre per year
Excellent	0.36 to 0.49
Good	0.24 to 0.36
Fair	0.12 to 0.24
Poor	0.05 to 0.12

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Silty Range Site

Characteristic vegetation	Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Western Wheatgrass		25
	Green Needlegrass		15
	Blue Grama		10
	Big Bluestem		5
	Needleandthread		5
	Porcupinegrass		5
	Plains Reedgrass	*	5
	Prairie Junegrass	*	
	Bearded Wheatgrass	*	
	Prairie Dropseed	*	
	Sandberg Bluegrass	*	5
	Sideoats Grama	*	
	Other Perennial Grasses	*	
	Needleleaf Sedge	*	
	Threadleaf Sedge	*	10
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	American Vetch	*	
	Cudweed Sagewort	*	
	Fringed Sagewort	*	
	Heath Aster	*	10
	Purple Prairieclover	*	
	Scarlet Globemallow	*	
	Western Yarrow	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 15% of Total)	Silver Sage	*	
	Western Snowberry	*	5
	Winterfat	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	1950 to 2250
Average	1650 to 1950
Unfavorable	1350 to 1650

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.56 to 0.75
Good	0.37 to 0.56
Fair	0.18 to 0.37
Poor	0.05 to 0.18

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Subirrigated Range Site

Characteristic vegetation	Plant Community Common name		Composition by weight (percent)
Grasses and Grasslikes (75% to 95% of Total)	Big Bluestem		40
	Switchgrass		15
	Little Bluestem		5
	Prairie Cordgrass		5
	Indiangrass	*	
	Northern Reedgrass	*	5
	Slender Wheatgrass	*	
	Mat Muhly	*	5
	Western Wheatgrass	*	
	Fowl Bluegrass	*	
	Mat Muhly	*	5
	Other Perennial Grasses	*	
	Baltic Rush	*	
	Common Spikerush	*	
	Fescue Sedge	*	10
	Slim Sedge	*	
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Common Wild Mint	*	
	Maximillian Sunflower	*	
	Rydberg's Sunflower	*	10
	Tall Goldenrod	*	
	Tall White Aster	*	
	Other Perennial Forbs	*	
Shrubs and Trees (0% of Total)			None

Total Annual Production Climatic condition	(Excellent Condition) Pounds per acre (dry)
Favorable	3900 to 4250
Average	3400 to 3900
Unfavorable	3100 to 3400

Stocking Rates Condition class	**AUM per acre per year
Excellent	1.13 to 1.50
Good	0.75 to 1.13
Fair	0.38 to 0.75
Poor	0.10 to 0.38

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Thin Claypan Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (75% to 90% of Total)	Western Wheatgrass		30
	Blue Grama		20
	Buffalograss		5
	Inland Saltgrass		5
	Prairie Junegrass		5
	Sandberg Bluegrass		5
	Little Bluestem	*	
	Needleandthread	*	
	Tumblegrass	*	10
	Other Perennial Grasses	*	
	Other Wheatgrasses	*	
	Needleleaf Sedge	*	5
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Fringed Sagewort		5
	Bladderpod	*	
	Clubmoss	*	
	Mousear Chickweed	*	5
	Rush Skeletonplant	*	
	Scarlet Globemallow	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 10% of Total)	Brittle Pricklypear	*	
	Broom Snakeweed	*	
	Nuttall Saltbush	*	5
	Silver Sagebrush	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	700 to 850
Average	450 to 700
Unfavorable	200 to 450

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.20 to 0.27
Good	0.13 to 0.20
Fair	0.06 to 0.13
Poor	0.03 to 0.06

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Thin Sands Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Prairie Sandreed		20
	Sand Bluestem		15
	Needleandthread		10
	Canada Wildrye		5
	Little Bluestem		5
	Sideoats Grama		5
	Blue Grama	*	
	Hairy Grama	*	
	Prairie Junegrass	*	10
	Sand Dropseed	*	
	Western Wheatgrass	*	
	Other Perennial Grasses	*	
	Sun Sedge	*	
	Threadleaf Sedge	*	10
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Fringed Sagewort	*	
	Green Sagewort	*	
	Hairy Goldaster	*	
	Lemon Scurfpea	*	10
	Prairie Spiderwort	*	
	Shelled-leaf Penstemon *		
	Silky Prairie-Clover *		
	Other Perennial Forbs *		
Shrubs and Trees (5% to 15% of Total)	Creeping Juniper	*	
	Leadplant Amorpha	*	
	Prairie Rose	*	10
	Western Snowberry	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	1500 to 1700
Average	1300 to 1500
Unfavorable	1100 to 1300

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.42 to 0.57
Good	0.28 to 0.42
Fair	0.14 to 0.28
Poor	0.07 to 0.14

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Thin Upland Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Porcupinegrass		20
	Little Bluestem		10
	Needleandthread		10
	Western Wheatgrass		10
	Big Bluestem		5
	Blue Grama		5
	Plains Muhly		5
	Sideoats Grama		5
	Green Needlegrass	*	
	Plains Reedgrass	*	
	Prairie Dropseed	*	
	Prairie Junegrass	*	5
	Prairie Sandreed	*	
	Red Threeawn	*	
	Other Perennial Grasses	*	
	Sun Sedge	*	
	Threadleaf Sedge	*	10
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Dotted Gayfeather	*	
	Fringed Sagewort	*	
	Missouri Goldenrod	*	
	Pasque Flower	*	10
	Purple Coneflower	*	
	Purple Prairieclover	*	
	Stiff Goldenrod	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 15% of Total)	Broom Snakeweed	*	
	Prairie Rose	*	
	Silverberry	*	5
	Western Snowberry	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	1800 to 2100
Average	1500 to 1800
Unfavorable	1300 to 1500

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.51 to 0.68
Good	0.39 to 0.51
Fair	0.25 to 0.39
Poor	0.12 to 0.25

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Very Shallow Range Site

Characteristic vegetation	Plant Community: Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Needleandthread		20
	Blue Grama		15
	Little Bluestem		15
	Western Wheatgrass		10
	Plains Muhly		5
	Prairie Junegrass		5
	Red Threeawn		5
	Sand Dropseed	*	
	Sandberg Bluegrass	*	
	Sideoats Grama	*	5
	Other Perennial Grasses	*	
	Other Wheatgrasses	*	
	Needleleaf Sedge	*	
	Threadleaf Sedge	*	10
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Cutleaf Goldenweed	*	
	Dotted Gayfeather	*	
	Fringed Sagewort	*	
	Green Sagewort	*	10
	Pasque Flower	*	
	Purple Prairieclover	*	
	Rush Skeletonplant	*	
	Other Perennial Forbs	*	
Shrubs and Trees (5% to 15% of Total)	Broom Snakeweed	*	
	Creeping Juniper	*	5
	Skunkbush Sumac	*	
	Other Perennial Shrubs	*	

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	700 to 850
Average	450 to 700
Unfavorable	250 to 450

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	0.20 to 0.27
Good	0.13 to 0.20
Fair	0.06 to 0.13
Poor	0.01 to 0.06

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Wet Meadow Range Site

Characteristic vegetation	Common name		Composition by weight (percent)
Grasses and Grasslikes (70% to 90% of Total)	Prairie Cordgrass		25
	Northern Reedgrass		10
	Fowl Bluegrass		5
	Switchgrass		5
	Mat Muhly		Trace
	Other Perennial Grasses		5
	Sartwell Sedge	*	
	Slim Sedge	*	25
	Wooly Sedge	*	
	Fescue Sedge		10
	Baltic Rush		5
	Common Spikerush		Trace
	Other Sedges/Rushes		5
Forbs (5% to 15% of Total)	Common Wild Mint	*	
	Maximillian Sunflower	*	
	Rydberg's Sunflower	*	5
	Spreading Dogbane	*	
	Tall Goldenrod	*	
	Other Perennial Forbs	*	
Shrubs and Trees (0% of Total)			None

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	4000 to 4500
Average	3500 to 4000
Unfavorable	3000 to 3500

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	1.12 to 1.50
Good	0.75 to 1.12
Fair	0.37 to 0.75
Poor	0.10 to 0.37

*Indicates the composition for species group
**Animal units per month

Table 12.--Range Site Descriptions--Continued

Wetland Range Site

Characteristic vegetation	Common name		Composition by weight (percent)
Grasses and Grasslikes (85% to 95% of Total)	Prairie Cordgrass		20
	Rivergrass		20
	Northern Reedgrass		5
	American Mannagrass	*	
	American Sloughgrass	*	5
	Reed Canarygrass	*	
	Other Perennial Grasses	*	
	Slough Sedge		15
	Common Spikesedge		10
	Slim Sedge		10
	Baltic Rush		5
	Burreed	*	
	River Bulrush	*	5
	Other Sedges/Rushes	*	
Forbs (5% to 15% of Total)	Curled Dock	*	
	False Aster	*	
	Longroot Smartweed	*	5
	Rydberg's Sunflower	*	
	Tall White Aster	*	
	Other Perennial Forbs *		
Shrubs and Trees (0% of Total)			None

Total Annual Production	(Excellent Condition)
Climatic condition	Pounds per acre (dry)
Favorable	5200 to 5700
Average	4700 to 5200
Unfavorable	4200 to 4700

Stocking Rates	
Condition class	**AUM per acre per year
Excellent	1.50 to 2.00
Good	1.00 to 1.50
Fair	0.50 to 1.00
Poor	0.10 to 0.50

*Indicates the composition for species group
**Animal units per month

Recreation

The soils of the survey area are rated in tables 13A and 13B - Recreation according to limitations that affect their suitability for recreational uses. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. **Not limited** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. **Somewhat limited** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. **Very limited** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the tables are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewer lines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation also are important. Soils that are subject to flooding are limited for recreational uses by the duration and intensity of flooding and the season when flooding occurs. In planning recreational facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

The information in tables 13A and 13B can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, sanitary facilities, and water management.

Camp areas require site preparation, such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The ratings are based on the soil properties that affect the ease of developing camp areas and the performance of the areas after development. Slope, stoniness, and depth to bedrock or a cemented pan are the main concerns affecting the development of camp areas. The soil properties that affect the performance of the areas after development are those that influence trafficability and promote the growth of vegetation, especially in heavily used areas. For good trafficability, the surface of camp areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The ratings are based on the soil properties that affect the ease of developing picnic areas and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of picnic areas. For good trafficability, the surface of picnic areas should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Playgrounds require soils that are nearly level, are free of stones, and can withstand intensive foot traffic. The ratings are based on the soil properties that affect the ease of developing playgrounds and that influence trafficability and the growth of vegetation after development. Slope and stoniness are the main concerns affecting the development of playgrounds. For good trafficability, the surface of the playgrounds should absorb rainfall readily, remain firm under heavy foot traffic, and not be dusty when dry. The soil properties that influence trafficability are texture of the surface layer, depth to a water table, ponding, flooding, permeability, and large stones. The soil properties that affect the growth of plants are depth to bedrock or a cemented pan, permeability, and toxic substances in the soil.

Paths and trails for hiking and horseback riding should require little or no slope modification through cutting and filling. The ratings are based on the soil properties that affect trafficability and erodibility. These properties are stoniness, depth to a water table, ponding, flooding, slope, and texture of the surface layer.

Off-road motorcycle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, slope, depth to a water table, ponding, flooding, and texture of the surface layer.

Golf fairways are subject to heavy foot traffic and some light vehicular traffic. Cutting or filling may be required. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer. The suitability of the soil for traps, tees, roughs, and greens is not considered in the ratings.

Table 13A.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Tonka	72	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Restricted permeability	0.96	Restricted permeability	0.96	Restricted permeability	0.96
3:							
Velva	75	Very limited		Not limited		Not limited	
		Flooding	1.00				
4:							
Lallie	94	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Restricted permeability	1.00	Flooding	1.00
		Restricted permeability	1.00	Ponding	1.00	Restricted permeability	1.00
		Ponding	1.00	Flooding	0.40	Ponding	1.00
5:							
Dimmick	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
6:							
Heil	84	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
7:							
Korell	75	Very limited		Not limited		Not limited	
		Flooding	1.00				
8:							
Straw	67	Very limited		Not limited		Not limited	
		Flooding	1.00				
9:							
Channel	40	Not rated		Not rated		Not rated	
Straw	27	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00
Velva	18	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.40	Flooding	1.00

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
10:							
Arnegard------------	68	Not limited		Not limited		Not limited	
10B:							
Arnegard------------	76	Not limited		Not limited		Somewhat limited	
						Slope	0.48
11:							
Amor----------------	58	Not limited		Not limited		Somewhat limited	
						Slope	0.05
Arnegard------------	10	Not limited		Not limited		Not limited	
11B:							
Amor----------------	67	Not limited		Not limited		Somewhat limited	
						Slope	0.77
						Depth to bedrock	0.46
Shambo--------------	15	Not limited		Not limited		Somewhat limited	
						Slope	0.77
12C:							
Amor----------------	39	Not limited		Not limited		Very limited	
						Slope	1.00
						Depth to bedrock	0.46
Cabba---------------	29	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00
13D:							
Amor----------------	42	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
						Depth to bedrock	0.46
Cabba---------------	29	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to bedrock	1.00
15B:							
Chama---------------	47	Not limited		Not limited		Somewhat limited	
						Slope	0.77
						Depth to bedrock	0.46
Cabba---------------	28	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.77
15C:							
Chama---------------	40	Not limited		Not limited		Very limited	
						Slope	1.00
						Depth to bedrock	0.46
Cabba---------------	28	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00
Sen-----------------	17	Not limited		Not limited		Very limited	
						Slope	1.00
						Depth to bedrock	0.46

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15D:							
Cabba---------------	38	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to bedrock	1.00
Chama---------------	26	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
						Depth to bedrock	0.46
Sen-----------------	16	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
						Depth to bedrock	0.46
15F:							
Cabba---------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Chama---------------	22	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Depth to bedrock	0.46
Arnegard------------	10	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
16D:							
Ringling------------	32	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
						Gravel content	0.03
						Content of large stones	0.01
Daglum--------------	15	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Slope	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Sodium content	1.00
		Slope	0.37	Slope	0.37	Restricted permeability	0.44
							0.44
16F:							
Brandenburg---------	26	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Gravel content	0.59	Gravel content	0.59	Gravel content	1.00
Cabba---------------	20	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Savage--------------	13	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
17B:							
Sen-----------------	47	Not limited		Not limited		Somewhat limited	
						Slope	0.77
						Depth to bedrock	0.46
Chama---------------	22	Not limited		Not limited		Somewhat limited	
						Slope	0.77
						Depth to bedrock	0.46

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
18B:							
Reeder--------------	49	Not limited		Not limited		Somewhat limited	
						Slope	0.77
						Depth to bedrock	0.46
Farnuf--------------	16	Not limited		Not limited		Somewhat limited	
						Slope	0.77
19:							
Farland-------------	44	Not limited		Not limited		Not limited	
19B:							
Farland-------------	62	Not limited		Not limited		Somewhat limited	
						Slope	0.48
19C:							
Farland-------------	35	Not limited		Not limited		Very limited	
						Slope	1.00
19D:							
Farland-------------	32	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
20:							
Shambo--------------	48	Not limited		Not limited		Not limited	
20B:							
Shambo--------------	59	Not limited		Not limited		Somewhat limited	
						Slope	0.48
21B:							
Morton--------------	58	Not limited		Not limited		Somewhat limited	
						Slope	0.77
						Depth to bedrock	0.46
Farland-------------	19	Not limited		Not limited		Somewhat limited	
						Slope	0.77
22F:							
Cabba---------------	41	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Rock outcrop--------	28	Not rated		Not rated		Not rated	
Chama---------------	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Depth to bedrock	0.46
23C:							
Morton--------------	40	Not limited		Not limited		Very limited	
						Slope	1.00
						Depth to bedrock	0.46
Cabba---------------	10	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value	Playgrounds: Rating class and limiting features	Playgrounds: Value
26:							
Grail	49	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.05	Restricted permeability	0.05	Restricted permeability	0.05
27:							
Belfield	49	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.41	Restricted permeability	0.41
Grail	26	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.05	Restricted permeability	0.05	Restricted permeability	0.05
27B:							
Grail	33	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.05	Restricted permeability	0.05	Slope	0.48
						Restricted permeability	0.05
Belfield	33	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.41	Slope	0.48
						Restricted permeability	0.41
28:							
Belfield	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.41	Restricted permeability	0.41
Daglum	32	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Restricted permeability	0.44
28B:							
Belfield	43	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.41	Slope	0.48
						Restricted permeability	0.41
Daglum	35	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Slope	0.48
						Restricted permeability	0.44
29:							
Savage	61	Not limited		Not limited		Not limited	
29B:							
Savage	67	Not limited		Not limited		Somewhat limited	
						Slope	0.48
29C:							
Savage	58	Not limited		Not limited		Very limited	
						Slope	1.00

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
30:							
Regent	63	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.41	Restricted permeability	0.41
						Slope	0.05
Savage	16	Not limited		Not limited		Not limited	
30B:							
Regent	71	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.41	Slope	0.77
						Depth to bedrock	0.46
						Restricted permeability	0.41
Savage	15	Not limited		Not limited		Somewhat limited	
						Slope	0.48
30C:							
Regent	49	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.41	Restricted permeability	0.41	Slope	1.00
						Depth to bedrock	0.46
						Restricted permeability	0.41
Savage	15	Not limited		Not limited		Very limited	
						Slope	1.00
31B:							
Regent	38	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.41	Restricted permeability	0.41	Depth to bedrock	0.46
						Restricted permeability	0.41
						Slope	0.21
Janesburg	28	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Depth to bedrock	0.46
						Slope	0.21
31C:							
Regent	32	Somewhat limited		Somewhat limited		Very limited	
		Restricted permeability	0.41	Restricted permeability	0.41	Slope	1.00
						Depth to bedrock	0.46
						Restricted permeability	0.41
Janesburg	31	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Slope	1.00
						Sodium content	1.00
						Depth to bedrock	0.46
35B:							
Moreau	46	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Restricted permeability	0.41	Restricted permeability	0.41	Depth to bedrock	0.46
						Restricted permeability	0.41
						Slope	0.21

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
35C:							
Moreau--------------	46	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Slope	1.00
		Restricted permeability	0.41	Restricted permeability	0.41	Too clayey	0.50
						Depth to bedrock	0.46
						Restricted permeability	0.41
Wayden--------------	17	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	0.50	Too clayey	0.50	Slope	1.00
		Restricted permeability	0.41	Restricted permeability	0.41	Too clayey	0.50
						Restricted permeability	0.41
35D:							
Moreau--------------	42	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Restricted permeability	0.41	Restricted permeability	0.41	Depth to bedrock	0.46
						Restricted permeability	0.41
Wayden--------------	22	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to bedrock	1.00
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Restricted permeability	0.41	Restricted permeability	0.41	Restricted permeability	0.41
36:							
Lawther-------------	77	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	0.50
		Restricted permeability	0.41	Restricted permeability	0.41	Restricted permeability	0.41
38B:							
Searing-------------	60	Not limited		Not limited		Somewhat limited	
						Slope	0.21
Ringling------------	19	Not limited		Not limited		Somewhat limited	
						Slope	0.48
						Gravel content	0.03
						Content of large stones	0.01
40C:							
Rhoades-------------	40	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Slope	0.21
Slickspots----------	21	Not rated		Not rated		Not rated	
Daglum--------------	16	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Restricted permeability	0.44
						Slope	0.21

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
41B:							
Daglum	50	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Restricted permeability	0.44
						Slope	0.21
Rhoades	25	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Slope	0.21
41C:							
Daglum	34	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Slope	1.00
		Restricted permeability	0.43	Restricted permeability	0.43	Sodium content	1.00
						Restricted permeability	0.43
Rhoades	26	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Slope	1.00
42F:							
Dogtooth	33	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Depth to bedrock	0.46
						Restricted permeability	0.44
Janesburg	22	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Depth to bedrock	0.46
Cabba	20	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
43C:							
Rhoades	31	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Slope	0.21
Daglum	28	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Restricted permeability	0.44
						Slope	0.21
44B:							
Ekalaka	50	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Restricted permeability	0.44
						Slope	0.21
Lakota	32	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Slope	0.21

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
45:							
Harriet-------------	80	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Flooding	1.00	Restricted permeability	1.00	Restricted permeability	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00			Flooding	0.60
46C:							
Lakota--------------	45	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Slope	0.77
Ekalaka-------------	40	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Slope	0.77
						Restricted permeability	0.44
47B:							
Dogtooth------------	59	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Depth to bedrock	0.46
						Restricted permeability	0.44
						Slope	0.21
Janesburg-----------	27	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Depth to bedrock	0.46
						Slope	0.21
48B:							
Desart--------------	42	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
						Slope	0.21
Ekalaka-------------	26	Very limited		Very limited		Very limited	
		Sodium content	1.00	Sodium content	1.00	Sodium content	1.00
		Restricted permeability	0.44	Restricted permeability	0.44	Restricted permeability	0.44
						Slope	0.21
Telfer--------------	15	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12	Slope	0.21
						Too sandy	0.12
49B:							
Lefor---------------	78	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
						Slope	0.21
51D:							
Vebar---------------	32	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
						Depth to bedrock	0.46

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
51D:(cont.)							
Flasher----------	16	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to bedrock	1.00
		Too sandy	0.37	Too sandy	0.37	Too sandy	0.37
Tally------------	15	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
51F:							
Flasher----------	32	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.37	Too sandy	0.37	Too sandy	0.37
Vebar------------	22	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Depth to bedrock	0.46
Parshall---------	15	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
52B:							
Vebar------------	46	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
						Slope	0.21
Parshall---------	19	Not limited		Not limited		Somewhat limited	
						Slope	0.21
53B:							
Tally------------	50	Not limited		Not limited		Somewhat limited	
						Slope	0.21
Parshall---------	28	Not limited		Not limited		Somewhat limited	
						Slope	0.21
53C:							
Tally------------	61	Not limited		Not limited		Very limited	
						Slope	1.00
Parshall---------	19	Not limited		Not limited		Very limited	
						Slope	1.00
54C:							
Vebar------------	54	Not limited		Not limited		Very limited	
						Slope	1.00
						Depth to bedrock	0.46
Flasher----------	10	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	1.00
55B:							
Beisigl----------	46	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
						Slope	0.21

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
55B:(cont.)							
Lihen	29	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12	Slope	0.21
						Too sandy	0.12
56:							
Parshall	68	Not limited		Not limited		Not limited	
57D:							
Beisigl	42	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
						Depth to bedrock	0.46
Flasher	28	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.37	Slope	0.37	Slope	1.00
58B:							
Lihen	38	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.37	Too sandy	0.37	Too sandy	0.37
						Slope	0.21
Parshall	15	Not limited		Not limited		Somewhat limited	
						Slope	0.21
59F:							
Flasher	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too sandy	0.37	Too sandy	0.37	Too sandy	0.37
Rock outcrop	22	Not rated		Not rated		Not rated	
Vebar	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Depth to bedrock	0.46
60D:							
Wabek	27	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
Manning	18	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
62B:							
Manning	66	Not limited		Not limited		Somewhat limited	
						Slope	0.21
63B:							
Lehr	37	Not limited		Not limited		Somewhat limited	
						Slope	0.21
Stady	27	Not limited		Not limited		Somewhat limited	
						Slope	0.21
64:							
Stady	41	Not limited		Not limited		Somewhat limited	
						Slope	0.05

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
65:							
Wanagan	76	Not limited		Not limited		Somewhat limited	
						Slope	0.05
66F:							
Wabek	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Cabba	15	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Shambo	13	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
67B:							
Virgelle	33	Somewhat limited		Somewhat limited		Somewhat limited	
		Restricted permeability	0.45	Restricted permeability	0.45	Restricted permeability	0.45
						Slope	0.21
68D:							
Telfer	62	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
		Too sandy	0.12	Too sandy	0.12	Too sandy	0.12
68E:							
Telfer	77	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too sandy	0.12	Too sandy	0.12	Too sandy	0.12
70:							
Bowbells	73	Not limited		Not limited		Somewhat limited	
						Slope	0.05
71:							
Williams	47	Not limited		Not limited		Somewhat limited	
						Slope	0.05
Bowbells	37	Not limited		Not limited		Somewhat limited	
						Slope	0.05
71B:							
Williams	60	Not limited		Not limited		Somewhat limited	
						Slope	0.77
Bowbells	27	Not limited		Not limited		Somewhat limited	
						Slope	0.77
73B:							
Williams	45	Not limited		Not limited		Somewhat limited	
						Slope	0.77
Reeder	23	Not limited		Not limited		Somewhat limited	
						Slope	0.77
						Depth to bedrock	0.46

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
76C:							
Williams------------	35	Not limited		Not limited		Very limited	
						Slope	1.00
Zahl----------------	35	Not limited		Not limited		Very limited	
						Slope	1.00
76D:							
Zahl----------------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
Williams------------	21	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
76F:							
Zahl----------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Williams------------	24	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
77:							
Temvik--------------	51	Not limited		Not limited		Somewhat limited	
						Slope	0.05
Wilton--------------	38	Not limited		Not limited		Somewhat limited	
						Slope	0.05
77B:							
Temvik--------------	50	Not limited		Not limited		Somewhat limited	
						Slope	0.77
Williams------------	16	Not limited		Not limited		Somewhat limited	
						Slope	0.77
80:							
Breien--------------	67	Very limited		Not limited		Not limited	
		Flooding	1.00				
82:							
Mckeen--------------	73	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	0.40	Flooding	1.00
83:							
Mckeen--------------	78	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Ponding	1.00	Flooding	0.40	Ponding	1.00
85B:							
Banks---------------	70	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.12	Flooding	0.60
		Too sandy	0.12			Slope	0.21
						Too sandy	0.12

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas		Picnic areas		Playgrounds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
86:							
Havrelon------------	78	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
87:							
Minnewaukan---------	82	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Ponding	1.00	Flooding	1.00
		Ponding	1.00	Flooding	0.40	Ponding	1.00
88:							
Havrelon------------	73	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
91:							
Lohler--------------	47	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too clayey	0.50	Flooding	0.60
		Too clayey	0.50	Restricted permeability	0.41	Too clayey	0.50
		Restricted permeability	0.41			Restricted permeability	0.41
98:							
Mandan--------------	59	Not limited		Not limited		Somewhat limited	
						Slope	0.05
Linton--------------	15	Not limited		Not limited		Somewhat limited	
						Slope	0.05
98B:							
Linton--------------	50	Not limited		Not limited		Somewhat limited	
						Slope	0.77
Mandan--------------	24	Not limited		Not limited		Somewhat limited	
						Slope	0.77
99F:							
Badland, outcrop----	51	Not rated		Not rated		Not rated	
Cabba---------------	32	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
100:							
Pits----------------	85	Not rated		Not rated		Not rated	
105:							
Dumps and Pits------	90	Not rated		Not rated		Not rated	
110:							
Ustorthents---------	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Slope	0.21
115:							
Riverwash-----------	95	Not rated		Not rated		Not rated	

Table 13A.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value	Playgrounds: Rating class and limiting features	Value
154F:							
Arikara-------------	33	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Content of organic matter	1.00	Content of organic matter	1.00	Content of organic matter	1.00
Shambo--------------	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Cabba---------------	18	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
161F:							
Beisigl-------------	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Depth to bedrock	0.46
Flasher-------------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Arikara-------------	24	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Content of organic matter	1.00	Content of organic matter	1.00	Content of organic matter	1.00
185B:							
Banks, slightly wet-	70	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Too sandy	0.12	Flooding	0.60
		Too sandy	0.12			Slope	0.21
						Too sandy	0.12
186:							
Havrelon, slightly wet----------------	85	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
188:							
Havrelon, slightly wet----------------	92	Very limited		Not limited		Somewhat limited	
		Flooding	1.00			Flooding	0.60
M-W:							
Miscellaneous water-	100	Not rated		Not rated		Not rated	
W:							
Water---------------	95	Not rated		Not rated		Not rated	

Table 13B.--Recreation

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Tonka---------------	72	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
3:							
Velva---------------	75	Not limited		Not limited		Not limited	
4:							
Lallie--------------	94	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Ponding	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Flooding	0.40	Flooding	0.40	Ponding	1.00
5:							
Dimmick-------------	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
6:							
Heil----------------	84	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Sodium content	1.00
		Ponding	1.00	Ponding	1.00	Droughty	1.00
						Depth to saturated zone	1.00
						Ponding	1.00
7:							
Korell--------------	75	Not limited		Not limited		Not limited	
8:							
Straw---------------	67	Not limited		Not limited		Not limited	
9:							
Channel-------------	40	Not rated		Not rated		Not rated	
Straw---------------	27	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
Velva---------------	18	Somewhat limited		Somewhat limited		Very limited	
		Flooding	0.40	Flooding	0.40	Flooding	1.00
10:							
Arnegard------------	68	Not limited		Not limited		Not limited	
10B:							
Arnegard------------	76	Not limited		Not limited		Not limited	

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
11:							
Amor----------------	58	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Arnegard------------	10	Not limited		Not limited		Not limited	
11B:							
Amor----------------	67	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Shambo--------------	15	Not limited		Not limited		Not limited	
12C:							
Amor----------------	39	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Cabba---------------	29	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.88
13D:							
Amor----------------	42	Not limited		Not limited		Somewhat limited	
						Slope	0.63
						Depth to bedrock	0.46
Cabba---------------	29	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.88
						Slope	0.63
15B:							
Chama---------------	47	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Cabba---------------	28	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.88
15C:							
Chama---------------	40	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Cabba---------------	28	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.88
Sen-----------------	17	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
15D:							
Cabba---------------	38	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.88
						Slope	0.63
Chama---------------	26	Not limited		Not limited		Somewhat limited	
						Slope	0.63
						Depth to bedrock	0.46

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Paths and trails: Value	Off-road motorcycle trails: Rating class and limiting features	Off-road motorcycle trails: Value	Golf fairways: Rating class and limiting features	Golf fairways: Value
15D: (cont.)							
Sen-----------------	16	Not limited		Not limited		Somewhat limited	
						Slope	0.63
						Depth to bedrock	0.46
15F:							
Cabba---------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Depth to bedrock	1.00
						Droughty	0.88
Chama---------------	22	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
						Depth to bedrock	0.46
Arnegard------------	10	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Slope	1.00
16D:							
Ringling------------	32	Not limited		Not limited		Very limited	
						Droughty	1.00
						Slope	0.37
						Content of large stones	0.01
Daglum--------------	15	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
						Slope	0.37
16F:							
Brandenburg---------	26	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.96	Droughty	1.00
						Slope	1.00
						Gravel content	0.59
Cabba---------------	20	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.88
Savage--------------	13	Not limited		Not limited		Somewhat limited	
						Slope	0.37
17B:							
Sen-----------------	47	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Chama---------------	22	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
18B:							
Reeder--------------	49	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Farnuf--------------	16	Not limited		Not limited		Not limited	
19:							
Farland-------------	44	Not limited		Not limited		Not limited	

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
19B:							
Farland-------------	62	Not limited		Not limited		Not limited	
19C:							
Farland-------------	35	Not limited		Not limited		Not limited	
19D:							
Farland-------------	32	Not limited		Not limited		Somewhat limited	
						Slope	0.63
20:							
Shambo--------------	48	Not limited		Not limited		Not limited	
20B:							
Shambo--------------	59	Not limited		Not limited		Not limited	
21B:							
Morton--------------	58	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Farland-------------	19	Not limited		Not limited		Not limited	
22F:							
Cabba---------------	41	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Depth to bedrock	1.00
						Droughty	0.88
Rock outcrop--------	28	Not rated		Not rated		Not rated	
Chama---------------	13	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
						Depth to bedrock	0.46
23C:							
Morton--------------	40	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Cabba---------------	10	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	0.88
26:							
Grail---------------	49	Not limited		Not limited		Not limited	
27:							
Belfield------------	49	Not limited		Not limited		Not limited	
Grail---------------	26	Not limited		Not limited		Not limited	
27B:							
Grail---------------	33	Not limited		Not limited		Not limited	
Belfield------------	33	Not limited		Not limited		Not limited	

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
28:							
Belfield------------	45	Not limited		Not limited		Not limited	
Daglum--------------	32	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
28B:							
Belfield------------	43	Not limited		Not limited		Not limited	
Daglum--------------	35	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
29:							
Savage--------------	61	Not limited		Not limited		Not limited	
29B:							
Savage--------------	67	Not limited		Not limited		Not limited	
29C:							
Savage--------------	58	Not limited		Not limited		Not limited	
30:							
Regent--------------	63	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Savage--------------	16	Not limited		Not limited		Not limited	
30B:							
Regent--------------	71	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Savage--------------	15	Not limited		Not limited		Not limited	
30C:							
Regent--------------	49	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Savage--------------	15	Not limited		Not limited		Not limited	
31B:							
Regent--------------	38	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Janesburg-----------	28	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
						Depth to bedrock	0.46
31C:							
Regent--------------	32	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Janesburg-----------	31	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
						Depth to bedrock	0.46

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
35B:							
Moreau--------------	46	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Depth to bedrock	0.46
35C:							
Moreau--------------	46	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Depth to bedrock	0.46
Wayden--------------	17	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Depth to bedrock	1.00
						Too clayey	1.00
						Droughty	0.83
35D:							
Moreau--------------	42	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Slope	0.63
						Depth to bedrock	0.46
Wayden--------------	22	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Depth to bedrock	1.00
						Too clayey	1.00
						Droughty	0.83
						Slope	0.63
36:							
Lawther-------------	77	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
38B:							
Searing-------------	60	Not limited		Not limited		Not limited	
Ringling------------	19	Not limited		Not limited		Very limited	
						Droughty	1.00
						Content of large stones	0.01
40C:							
Rhoades-------------	40	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	1.00
Slickspots----------	21	Not rated		Not rated		Not rated	
Daglum--------------	16	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
41B:							
Daglum--------------	50	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
Rhoades-------------	25	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	1.00

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
41C:							
Daglum--------------	34	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
Rhoades-------------	26	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	1.00
42F:							
Dogtooth------------	33	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Sodium content	1.00
						Droughty	1.00
						Slope	1.00
						Depth to bedrock	0.46
Janesburg-----------	22	Somewhat limited		Not limited		Very limited	
		Slope	0.02			Droughty	1.00
						Slope	1.00
						Sodium content	1.00
						Depth to bedrock	0.46
Cabba---------------	20	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.88
43C:							
Rhoades-------------	31	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	1.00
Daglum--------------	28	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
44B:							
Ekalaka-------------	50	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.99
Lakota--------------	32	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	1.00
45:							
Harriet-------------	80	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Sodium content	1.00
						Droughty	1.00
						Depth to saturated zone	1.00
						Flooding	0.60
46C:							
Lakota--------------	45	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	1.00

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
46C:(cont.)							
Ekalaka	40	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.99
47B:							
Dogtooth	59	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	1.00
						Depth to bedrock	0.46
Janesburg	27	Not limited		Not limited		Very limited	
						Droughty	1.00
						Sodium content	1.00
						Depth to bedrock	0.46
48B:							
Desart	42	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.38
Ekalaka	26	Not limited		Not limited		Very limited	
						Sodium content	1.00
						Droughty	0.99
Telfer	15	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12	Droughty	0.21
49B:							
Lefor	78	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
51D:							
Vebar	32	Not limited		Not limited		Somewhat limited	
						Slope	0.63
						Depth to bedrock	0.46
Flasher	16	Somewhat limited		Somewhat limited		Very limited	
		Too sandy	0.37	Too sandy	0.37	Droughty	1.00
						Depth to bedrock	1.00
						Slope	0.63
Tally	15	Not limited		Not limited		Somewhat limited	
						Slope	0.63
51F:							
Flasher	32	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.82	Too sandy	0.37	Droughty	1.00
		Too sandy	0.37			Depth to bedrock	1.00
						Slope	1.00
Vebar	22	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
						Depth to bedrock	0.46
Parshall	15	Not limited		Not limited		Somewhat limited	
						Slope	0.63

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
52B:							
Vebar	46	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Parshall	19	Not limited		Not limited		Not limited	
53B:							
Tally	50	Not limited		Not limited		Not limited	
Parshall	28	Not limited		Not limited		Not limited	
53C:							
Tally	61	Not limited		Not limited		Not limited	
Parshall	19	Not limited		Not limited		Not limited	
54C:							
Vebar	54	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
Flasher	10	Not limited		Not limited		Very limited	
						Droughty	1.00
						Depth to bedrock	1.00
55B:							
Beisigl	46	Not limited		Not limited		Somewhat limited	
						Droughty	0.88
						Depth to bedrock	0.46
Lihen	29	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12	Too sandy	0.50
56:							
Parshall	68	Not limited		Not limited		Not limited	
57D:							
Beisigl	42	Not limited		Not limited		Somewhat limited	
						Droughty	0.88
						Depth to bedrock	0.46
						Slope	0.37
Flasher	28	Not limited		Not limited		Very limited	
						Droughty	1.00
						Depth to bedrock	1.00
						Slope	0.37
58B:							
Lihen	38	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.37	Too sandy	0.37	Too sandy	0.50
Parshall	15	Not limited		Not limited		Not limited	
59F:							
Flasher	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Droughty	1.00
		Too sandy	0.37	Too sandy	0.37	Depth to bedrock	1.00
						Slope	1.00
Rock outcrop	22	Not rated		Not rated		Not rated	

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
59F:(cont.)							
Vebar---------------	13	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.56	Slope	1.00
						Depth to bedrock	0.46
60D:							
Wabek---------------	27	Not limited		Not limited		Very limited	
						Droughty	1.00
						Slope	0.37
Manning-------------	18	Not limited		Not limited		Somewhat limited	
						Slope	0.16
62B:							
Manning-------------	66	Not limited		Not limited		Not limited	
63B:							
Lehr----------------	37	Not limited		Not limited		Somewhat limited	
						Droughty	0.35
Stady---------------	27	Not limited		Not limited		Not limited	
64:							
Stady---------------	41	Not limited		Not limited		Not limited	
65:							
Wanagan-------------	76	Not limited		Not limited		Not limited	
66F:							
Wabek---------------	30	Somewhat limited		Not limited		Very limited	
		Slope	0.82			Droughty	1.00
						Slope	1.00
Cabba---------------	15	Somewhat limited		Not limited		Very limited	
		Slope	0.82			Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.88
Shambo--------------	13	Not limited		Not limited		Somewhat limited	
						Slope	0.37
67B:							
Virgelle------------	33	Not limited		Not limited		Somewhat limited	
						Droughty	0.02
68D:							
Telfer--------------	62	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12	Slope	0.37
						Droughty	0.21
68E:							
Telfer--------------	77	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.50	Too sandy	0.12	Slope	1.00
		Too sandy	0.12			Droughty	0.21
70:							
Bowbells------------	73	Not limited		Not limited		Not limited	

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails		Off-road motorcycle trails		Golf fairways	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
71:							
Williams------------	47	Not limited		Not limited		Not limited	
Bowbells------------	37	Not limited		Not limited		Not limited	
71B:							
Williams------------	60	Not limited		Not limited		Not limited	
Bowbells------------	27	Not limited		Not limited		Not limited	
73B:							
Williams------------	45	Not limited		Not limited		Not limited	
Reeder--------------	23	Not limited		Not limited		Somewhat limited	
						Depth to bedrock	0.46
76C:							
Williams------------	35	Not limited		Not limited		Not limited	
Zahl----------------	35	Not limited		Not limited		Not limited	
76D:							
Zahl----------------	45	Not limited		Not limited		Somewhat limited	
						Slope	0.63
Williams------------	21	Not limited		Not limited		Somewhat limited	
						Slope	0.63
76F:							
Zahl----------------	50	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.22	Slope	1.00
Williams------------	24	Somewhat limited		Not limited		Very limited	
		Slope	0.50			Slope	1.00
77:							
Temvik--------------	51	Not limited		Not limited		Not limited	
Wilton--------------	38	Not limited		Not limited		Not limited	
77B:							
Temvik--------------	50	Not limited		Not limited		Not limited	
Williams------------	16	Not limited		Not limited		Not limited	
80:							
Breien--------------	67	Not limited		Not limited		Not limited	
82:							
Mckeen--------------	73	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00
83:							
Mckeen--------------	78	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Ponding	1.00	Flooding	1.00
		Flooding	0.40	Flooding	0.40	Depth to saturated zone	1.00

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Value	Off-road motorcycle trails: Rating class and limiting features	Value	Golf fairways: Rating class and limiting features	Value
85B:							
Banks---------------	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12	Flooding	0.60
						Droughty	0.01
86:							
Havrelon------------	78	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
87:							
Minnewaukan---------	82	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Ponding	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Flooding	0.40	Flooding	0.40	Ponding	1.00
						Droughty	0.21
88:							
Havrelon------------	73	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
91:							
Lohler--------------	47	Somewhat limited		Somewhat limited		Very limited	
		Too clayey	0.50	Too clayey	0.50	Too clayey	1.00
						Flooding	0.60
98:							
Mandan--------------	59	Not limited		Not limited		Not limited	
Linton--------------	15	Not limited		Not limited		Not limited	
98B:							
Linton--------------	50	Not limited		Not limited		Not limited	
Mandan--------------	24	Not limited		Not limited		Not limited	
99F:							
Badland, outcrop----	51	Not rated		Not rated		Not rated	
Cabba---------------	32	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.88
100:							
Pits----------------	85	Not rated		Not rated		Not rated	
105:							
Dumps and Pits------	90	Not rated		Not rated		Not rated	
110:							
Ustorthents---------	65	Not limited		Not limited		Very limited	
						Depth to bedrock	1.00
						Droughty	1.00
115:							
Riverwash-----------	95	Not rated		Not rated		Not rated	

Table 13B.--Recreation--Continued

Map symbol and soil name	Pct. of map unit	Paths and trails: Rating class and limiting features	Paths and trails: Value	Off-road motorcycle trails: Rating class and limiting features	Off-road motorcycle trails: Value	Golf fairways: Rating class and limiting features	Golf fairways: Value
154F:							
Arikara	33	Very limited		Very limited		Very limited	
		Content of organic matter	1.00	Content of organic matter	1.00	Slope	1.00
		Slope	1.00	Slope	1.00		
Shambo	13	Very limited		Not limited		Very limited	
		Slope	1.00			Slope	1.00
Cabba	18	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
						Slope	1.00
						Droughty	0.88
161F:							
Beisigl	35	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Slope	0.56	Slope	1.00
						Droughty	0.88
						Depth to bedrock	0.46
Flasher	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
						Droughty	1.00
						Depth to bedrock	1.00
Arikara	24	Very limited		Very limited		Very limited	
		Content of organic matter	1.00	Content of organic matter	1.00	Slope	1.00
		Slope	1.00	Slope	1.00		
185B:							
Banks, slightly wet	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Too sandy	0.12	Too sandy	0.12	Flooding	0.60
						Droughty	0.01
186:							
Havrelon, slightly wet	85	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
188:							
Havrelon, slightly wet	92	Not limited		Not limited		Somewhat limited	
						Flooding	0.60
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	95	Not rated		Not rated		Not rated	

Wildlife Habitat

Soils affect the kind and amount of vegetation that is available to wildlife for food and cover. They also affect the construction of water impoundments. If food, cover, or water is missing, inadequate, or inaccessible, wildlife will be scarce or will not inhabit the area.

If the soils have potential for habitat development, wildlife habitat can be created or improved by planting appropriate vegetation, properly managing existing plant cover, and fostering the natural establishment of desirable plants.

On Table 14 "Wildlife Habitat," soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife. It can also be used for selecting soils suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil for wildlife habitat is rated **good**, **fair**, **poor,** or **very poor**. A rating of **good** indicates the kind of habitat is easily established, improved, or maintained. Few or no limitations affect management and satisfactory results can be expected. A rating of **fair** indicates the kind of wildlife habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of **poor** indicates limitations are severe for the designated kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of **very poor** indicates restrictions for the element or kind of wildlife habitat are very severe and unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat shown on Table 14 are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants used by wildlife. Examples are wheat, rye, oats, corn, sunflowers, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes planted for wildlife food and cover. Examples are smooth bromegrass, intermediate wheatgrass, tall wheatgrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds, that provide food and cover for wildlife. Examples are big bluestem, goldenrod, blue grama, green needlegrass, and western wheatgrass. The major soil properties affecting the growth of grain and forage crops and wild herbaceous plants are depth of the root zone, texture of the surface layer, the amount of water available to plants, wetness, salinity or sodicity, and flooding. The length of the growing season also is important.

Hardwood trees produce nuts or other fruit, buds, catkins, twigs, bark, and foliage that wildlife eat. Examples are oak, poplar, boxelder, green ash, willow, and American elm.

Coniferous plants are cone-bearing trees, shrubs, or ground cover that provide habitat or supply food in the form of browse, seed, or fruitlike cones. Examples are pine, spruce, cedar, and juniper.

The major soil properties affecting the growth of hardwood and coniferous trees and shrubs are depth of root zone, the amount of water available to plants, and wetness.

Shrubs are bushy woody plants that produce fruit, buds, twigs, bark, and foliage. Soil properties and features that affect the growth of shrubs are depth of the rooting zone, available water capacity, salinity, and soil moisture. Examples of shrubs are common chokecherry, buffaloberry, snowberry, juneberry, hawthorn, American plum, and redosier dogwood.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Wetland plants produce food or cover for wetland wildlife. Examples of these plants are smartweed, sedges, bulrushes, white top, common reedgrass, saltgrass, prairie cordgrass, and cattail.

The major soil properties affecting wetland plants are texture of the surface layer, wetness, acidity or alkalinity, and slope.

Shallow water areas have an average depth of less than 5 feet. They are useful as habitat for some wildlife species. They are naturally wet areas or are created by dams, levees, or water-control measures in marshes or streams. Examples are muskrat marshes, waterfowl feeding areas, wildlife watering developments, beaver ponds, and other wildlife ponds.

The major soil properties affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and saturated hydraulic conductivity.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, and shrubs. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include Hungarian partridge, pheasant, sharptail grouse, western meadowlark, cottontail rabbit, and red fox.

Habitat for woodland wildlife consists of areas of hardwoods or conifers or a mixture of these and associated grasses, legumes and wild herbaceous plants. Wildlife attracted to this habitat include thrushes, woodpeckers, owls, tree squirrels, porcupine, raccoon, and deer.

Habitat for wetland wildlife consists of open, marshy or swampy, shallow water areas that support water-tolerant plants. The wildlife attracted to this habitat include ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. The wildlife attracted to rangeland include deer, sharptailed grouse, western meadowlark, and David’s sparrow.

Table 14.--Wildlife Habitat

(Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," "poor." Dashes (--) indicate the map unit componet was not rated.) The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Open-land wild-life	Wood-land wild-life	Wetland wild-life	Range-land wild-life
1:												
Tonka	Poor	Poor	Fair	Fair	Fair	Poor	Good	Good	Poor	Fair	Good	Poor
3:												
Velva	Fair	Good	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor	Fair
4:												
Lallie	Very poor	Very poor	Poor	Very poor	Very poor	Very poor	Good	Good	Very poor	Very poor	Good	Very poor
5:												
Dimmick	Very poor	Poor	Poor	---	---	Poor	Good	Good	Very poor	---	Fair	Poor
6:												
Heil	Poor	Poor	Fair	Poor	Poor	Very poor	Good	Good	Poor	Poor	Good	Poor
7:												
Korell	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
8:												
Straw	Good	Good	Good	---	---	Good	Poor	Poor	Good	---	Poor	Good
9:												
Channel	---	---	---	---	---	---	---	---	---	---	---	---
Straw	Very poor	Very poor	Good	---	---	Good	Good	Good	Poor	---	Good	Good
Velva	Fair	Good	Fair	Good	Good	Good	Poor	Very poor	Fair	Good	Very poor	Fair
10:												
Arnegard	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
10B:												
Arnegard	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
11:												
Amor	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Arnegard	Good	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
11B:												
Amor	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Shambo	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
12C:												
Amor	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Cabba	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
13D:												
Amor	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Cabba	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
15B:												
Chama	Good	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Cabba	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
15C:												
Chama	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Cabba	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba-ceous plants	Hard-wood trees	Conif-erous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Open-land wild-life	Wood-land wild-life	Wetland wild-life	Range-land wild-life
15C:(cont.)												
Sen	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
15D:												
Cabba	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Chama	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Sen	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
15F:												
Cabba	Very poor	Very poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
Chama	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Arnegard	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
16D:												
Ringling	Poor	Poor	Fair	---	---	Poor	Very poor	Very poor	Poor	---	Very poor	Poor
Daglum	Poor	Poor	Very poor	---	---	Very poor	Very poor	Very poor	Poor	---	Very poor	Very poor
16F:												
Brandenburg	Very poor	Very poor	Fair	---	---	Poor	Very poor	Very poor	Poor	---	Very poor	Poor
Cabba	Very poor	Very poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
Savage	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
17B:												
Sen	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
17B:(cont.)												
Chama	Good	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
18B:												
Reeder	Good	Good	Fair	---	---	Fair	Very poor	Very poor	Good	---	Very poor	Fair
Farnuf	Good	Good	Good	Good	Very poor	Fair	Very poor	Very poor	Good	---	Very poor	Fair
19:												
Farland	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
19B:												
Farland	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
19C:												
Farland	Fair	Good	Fair	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
19D:												
Farland	Poor	Good	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
20:												
Shambo	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
20B:												
Shambo	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
21B:												
Morton	Good	Good	Fair	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
Farland	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
22F:												
Cabba	Very poor	Very poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
22F:(cont.)												
Rock outcrop	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
Chama	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
23C:												
Morton	Good	Good	Fair	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
Cabba	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
26:												
Grail	Good	Good	Fair	Good	Poor	Good	Very poor	Very poor	Good	Poor	Very poor	Fair
27:												
Belfield	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Fair
Grail	Good	Good	Fair	Good	Poor	Good	Very poor	Very poor	Good	Poor	Very poor	Fair
27B:												
Grail	Good	Good	Fair	Good	Poor	Good	Very poor	Very poor	Good	Poor	Very poor	Fair
Belfield	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Fair
28:												
Belfield	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Fair
Daglum	Poor	Poor	Very poor	---	---	Very poor	Poor	Very poor	Poor	---	Very poor	Very poor
28B:												
Belfield	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Fair
Daglum	Poor	Poor	Very poor	---	---	Very poor	Poor	Very poor	Poor	---	Very poor	Very poor

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
29:												
Savage	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
29B:												
Savage	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
29C:												
Savage	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
30:												
Regent	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
Savage	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
30B:												
Regent	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
Savage	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
30C:												
Regent	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
Savage	Fair	Good	Fair	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
31B:												
Regent	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
Janesburg	Fair	Good	Fair	---	---	Very poor	Poor	Poor	Fair	---	Poor	Poor
31C:												
Regent	Fair	Good	Fair	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
Janesburg	Fair	Good	Fair	---	---	Very poor	Poor	Poor	Fair	---	Poor	Poor

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
35B:												
Moreau	Fair	Good	Poor	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
35C:												
Moreau	Fair	Good	Poor	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
Wayden	Poor	Fair	Poor	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Poor
35D:												
Moreau	Fair	Good	Poor	---	---	Poor	Poor	Very poor	Fair	---	Very poor	Poor
Wayden	Poor	Fair	Poor	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Poor
36:												
Lawther	Good	Good	Poor	---	---	Poor	Very poor	Very poor	Fair	---	Very poor	Poor
38B:												
Searing	Fair	Fair	Good	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Ringling	Poor	Poor	Fair	---	---	Poor	Very poor	Very poor	Poor	---	Very poor	Poor
40C:												
Rhoades	Poor	Poor	Poor	---	---	Very poor	Poor	Poor	Poor	---	Poor	Very poor
Slickspots	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
Daglum	Poor	Poor	Very poor	---	---	Very poor	Poor	Very poor	Poor	---	Very poor	Very poor
41B:												
Daglum	Poor	Poor	Very poor	---	---	Very poor	Poor	Very poor	Poor	---	Very poor	Very poor
Rhoades	Poor	Poor	Poor	---	---	Very poor	Poor	Poor	Poor	---	Poor	Very poor

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
41C:												
Daglum	Poor	Poor	Very poor	---	---	Very poor	Poor	Very poor	Poor	---	Very poor	Very poor
Rhoades	Poor	Poor	Poor	---	---	Very poor	Poor	Poor	Poor	---	Poor	Very poor
42F:												
Dogtooth	Poor	Poor	Poor	---	---	Very poor	Poor	Poor	Poor	---	Poor	---
Janesburg	Fair	Good	Fair	---	---	Very poor	Poor	Poor	Fair	---	Poor	Poor
Cabba	Very poor	Very poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
43C:												
Rhoades	Poor	Poor	Poor	---	---	Very poor	Poor	Poor	Poor	---	Poor	Very poor
Daglum	Poor	Poor	Very poor	---	---	Very poor	Poor	Very poor	Poor	---	Very poor	Very poor
44B:												
Ekalaka	Fair	Good	Poor	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Poor
Lakota	Poor	Poor	Poor	---	---	Very poor	Very poor	Very poor	Poor	---	Very poor	Very poor
45:												
Harriet	Poor	Poor	Fair	Poor	Poor	Very poor	Good	Good	Poor	Poor	Good	Poor
46C:												
Lakota	Poor	Poor	Poor	---	---	Very poor	Very poor	Very poor	Poor	---	Very poor	Very poor
Ekalaka	Fair	Good	Poor	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Poor
47B:												
Dogtooth	Poor	Poor	Poor	---	---	Very poor	Poor	Poor	Poor	---	Poor	---

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
47B:(cont.)												
Janesburg	Fair	Good	Fair	---	---	Very poor	Poor	Poor	Fair	---	Poor	Poor
48B:												
Desart	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Ekalaka	Fair	Good	Poor	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Poor
Telfer	Fair	Good	Good	---	---	Fair	Very poor	Very poor	Good	---	Very poor	Fair
49B:												
Lefor	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
51D:												
Vebar	Poor	Fair	Good	Very poor	Very poor	Very poor	Very poor	Very poor	Fair	---	Very poor	Good
Flasher	Poor	Fair	Fair	---	---	Poor	Very poor	Very poor	Fair	---	Very poor	Poor
Tally	Fair	Good	Good	Very poor	Very poor	Very poor	Poor	Very poor	Good	Very poor	Very poor	Good
51F:												
Flasher	Very poor	Very poor	Fair	---	---	Poor	Very poor	Very poor	Poor	---	Very poor	Poor
Vebar	Very poor	Poor	Good	Very poor	Very poor	Very poor	Very poor	Very poor	Poor	---	Very poor	Good
Parshall	Poor	Fair	Good	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
52B:												
Vebar	Fair	Good	Good	Very poor	Very poor	Very poor	Poor	Very poor	Good	---	Very poor	Good
Parshall	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herba- ceous plants	Hard- wood trees	Conif- erous plants	Shrubs	Wetland plants	Shallow water areas	Open- land wild- life	Wood- land wild- life	Wetland wild- life	Range- land wild- life
53B:												
Tally	Fair	Good	Good	Very poor	Very poor	Very poor	Poor	Very poor	Good	Very poor	Very poor	Good
Parshall	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
53C:												
Tally	Fair	Good	Good	Very poor	Very poor	Very poor	Poor	Very poor	Good	Very poor	Very poor	Good
Parshall	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
54C:												
Vebar	Poor	Fair	Good	Very poor	Very poor	Very poor	Very poor	Very poor	Fair	---	Very poor	Good
Flasher	Poor	Fair	Fair	---	---	Poor	Very poor	Very poor	Fair	---	Very poor	Poor
55B:												
Beisigl	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Lihen	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
56:												
Parshall	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
57D:												
Beisigl	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Flasher	Poor	Fair	Fair	---	---	Poor	Very poor	Very poor	Fair	---	Very poor	Poor
58B:												
Lihen	Fair	Good	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Parshall	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
59F:												
Flasher	Very poor	Very poor	Fair	---	---	Poor	Very poor	Very poor	Poor	---	Very poor	Poor
Rock outcrop	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
Vebar	Very poor	Poor	Good	Very poor	Very poor	Very poor	Very poor	Very poor	Poor	---	Very poor	Good
60D:												
Wabek	Very poor	Poor	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor
Manning	Fair	Good	Good	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
62B:												
Manning	Fair	Good	Good	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
63B:												
Lehr	Fair	Good	Fair	Fair	Fair	Poor	Very poor	Very poor	Fair	Fair	Very poor	Fair
Stady	Fair	Fair	Good	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
64:												
Stady	Fair	Fair	Good	---	---	Fair	Poor	Very poor	Fair	---	Very poor	Fair
65:												
Wanagan	Good	Good	Good	Good	Good	Fair	Poor	Fair	Good	Good	Poor	Fair
66F:												
Wabek	Very poor	Poor	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor
Cabba	Very poor	Very poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
Shambo	---	---	---	---	---	---	---	---	---	---	---	---

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
67B:												
Virgelle	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
68D:												
Telfer	Poor	Fair	Good	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
68E:												
Telfer	Very poor	Very poor	Fair	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
70:												
Bowbells	Good	Good	Good	---	---	Good	Poor	Poor	Good	---	Poor	Good
71:												
Williams	Good	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Bowbells	Good	Good	Good	---	---	Good	Poor	Poor	Good	---	Poor	Good
71B:												
Williams	Good	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Bowbells	Good	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
73B:												
Williams	Good	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Reeder	Good	Good	Fair	---	---	Fair	Very poor	Very poor	Good	---	Very poor	Fair
76C:												
Williams	Fair	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Zahl	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
76D:												
Zahl	Fair	Good	Good	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Williams	Fair	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
76F:												
Zahl	Very poor	Very poor	Good	---	---	Fair	Very poor	Very poor	Poor	---	Very poor	Fair
Williams	Poor	Fair	Good	Good	Good	Fair	Very poor	Very poor	Fair	Good	Very poor	Fair
77:												
Temvik	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Wilton	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
77B:												
Temvik	Good	Good	Fair	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
Williams	Good	Good	Good	Good	Good	Fair	Poor	Very poor	Good	Good	Very poor	Fair
80:												
Breien	Fair	Good	Fair	---	---	Good	Very poor	Very poor	Fair	---	Very poor	Fair
82:												
Mckeen	Very poor	Poor	Fair	Poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair
83:												
Mckeen	Very poor	Poor	Fair	Poor	Very poor	Fair	Fair	Fair	Very poor	Very poor	Fair	Fair
85B:												
Banks	---	---	---	---	---	---	---	---	---	---	---	---
86:												
Havrelon	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements: Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Potential as habitat for--: Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
87:												
Minnewaukan	Poor	Poor	Fair	---	---	Fair	Fair	Very poor	Poor	---	Poor	Fair
88:												
Havrelon	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
91:												
Lohler	Good	Good	Fair	---	---	Good	Poor	Fair	Good	---	Poor	Fair
98:												
Mandan	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Linton	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
98B:												
Linton	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
Mandan	Good	Good	Fair	---	---	Fair	Poor	Very poor	Good	---	Very poor	Fair
99F:												
Badland, outcrop	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
Cabba	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
100:												
Pits	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
105:												
Dumps and Pits	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor
110:												
Ustorthents	Very poor	Poor	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair

Table 14.--Wildlife Habitat--Continued

Map symbol and soil name	Potential for habitat elements								Potential as habitat for--			
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Shrubs	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife	Rangeland wildlife
115:												
Riverwash	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Very poor	Poor	Very poor	Very poor	Poor	Very poor
154F:												
Arikara	Very poor	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor	---
Shambo	---	---	---	---	---	---	---	---	---	---	---	---
Cabba	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
161F:												
Beisigl	Poor	Fair	Fair	---	---	Fair	Very poor	Very poor	Fair	---	Very poor	Fair
Flasher	Very poor	Very poor	Fair	---	---	Poor	Very poor	Very poor	Poor	---	Very poor	Poor
Arikara	Very poor	Very poor	Fair	Good	Good	Good	Very poor	Very poor	Poor	Good	Very poor	---
185B:												
Banks, slightly wet	---	---	---	---	---	---	---	---	---	---	---	---
186:												
Havrelon, slightly wet	Fair	Good	Good	---	---	Good	Poor	Very poor	Good	---	Very poor	Good
188:												
Havrelon, slightly wet	Good	Good	Fair	---	---	Good	Poor	Very poor	Good	---	Very poor	Fair
M-W:												
Miscellaneous water	---	---	---	---	---	---	---	---	---	---	---	---
W:												
Water	---	---	---	---	---	---	---	---	---	---	---	---

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. Ratings are given for building site development, sanitary facilities, construction materials, and water management. The ratings are based on observed performance of the soils and on the data in the tables described under the heading "Soil Properties."

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil between the surface and a depth of 5 to 7 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations should be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey, can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Soil properties influence the development of building sites, including the selection of the site, the design of the structure, construction, performance after construction, and maintenance. Tables 15A and 15B, "Building Site Development," show the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, shallow excavations, and lawns and landscaping.

The ratings in the tables are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. **Not limited** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. **Somewhat limited** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. **Very limited** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Lawns and landscaping require soils on which turf and ornamental trees and shrubs can be established and maintained. Irrigation is not considered in the ratings. The ratings are based on the soil properties that affect plant growth and trafficability after vegetation is established. The properties that affect plant growth are reaction; depth to a water table; ponding; depth to bedrock or a cemented pan; the available water capacity in the upper 40 inches; the content of salts, sodium, or calcium carbonate; and sulfidic materials. The properties that affect trafficability are flooding, depth to a water table, ponding, slope, stoniness, and the amount of sand, clay, or organic matter in the surface layer.

Sanitary Facilities

Tables 16A and 16B, “Sanitary Facilities,” show the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. **Not limited** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. **Somewhat limited** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. **Very limited** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on the soil properties that affect absorption of the effluent, construction and maintenance of the system, and public health. Permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, permeability, depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Soil permeability is a critical property affecting the suitability for sewage lagoons. Most porous soils eventually become sealed when they are used as sites for sewage lagoons. Until sealing occurs, however, the hazard of pollution is severe. Soils that have a permeability rate of more than 2 inches per hour are too porous for the proper functioning of sewage lagoons. In these soils, seepage of the effluent can result in contamination of the ground water. Ground-water contamination is also a hazard if fractured bedrock is within a depth of 40 inches, if the water table is high enough to raise the level of sewage in the lagoon, or if floodwater overtops the lagoon.

A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor. If the lagoon is to be uniformly deep throughout, the slope must be gentle enough and the soil material must be thick enough over bedrock or a cemented pan to make land smoothing practical.

A **trench sanitary landfill** is an area where solid waste is placed in successive layers in an excavated trench. The waste is spread, compacted, and covered daily with a thin layer of soil excavated at the site. When the trench is full, a final cover of soil material at least 2 feet thick is placed over the landfill. The ratings in the table are based on the soil properties that affect the risk of pollution, the ease of excavation, trafficability, and revegetation. These properties include permeability, depth to bedrock or a cemented pan, depth to a water table, ponding, slope, flooding, texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, onsite investigation may be needed.

Hard, nonrippable bedrock, creviced bedrock, or highly permeable strata in or directly below the proposed trench bottom can affect the ease of excavation and the hazard of ground-water pollution. Slope affects construction of the trenches and the movement of surface water around the landfill. It also affects the construction and performance of roads in areas of the landfill.

Soil texture and consistence affect the ease with which the trench is dug and the ease with which the soil can be used as daily or final cover. They determine the workability of the soil when dry and when wet. Soils that are plastic and sticky when wet are difficult to excavate, grade, or compact and are difficult to place as a uniformly thick cover over a layer of refuse.

The soil material used as the final cover for a trench landfill should be suitable for plants. It should not have excess sodium or salts and should not be too acid. The surface layer generally has the best workability, the highest content of organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

In an **area sanitary landfill**, solid waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site. A final cover of soil material at least 2 feet thick is placed over the completed landfill. The ratings in the table are based on the soil properties that affect trafficability and the risk of pollution. These properties include flooding, permeability, depth to a water table, ponding, slope, and depth to bedrock or a cemented pan.

Flooding is a serious problem because it can result in pollution in areas downstream from the landfill. If permeability is too rapid or if fractured bedrock, a fractured cemented pan, or the water table is close to the surface, the leachate can contaminate the water supply. Slope is a consideration because of the extra grading required to maintain roads in the steeper areas of the landfill. Also, leachate may flow along the surface of the soils in the steeper areas and cause difficult seepage problems.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste. The ratings in the table also apply to the final cover for a landfill. They are based on the soil properties that affect workability, the ease of digging, and the ease of moving and spreading the material over the refuse daily during wet and dry periods. These properties include soil texture, depth to a water table, ponding, rock fragments, slope, depth to bedrock or a cemented pan, reaction, and content of salts, sodium, or lime.

Loamy or silty soils that are free of large stones and excess gravel are the best cover for a landfill. Clayey soils may be sticky and difficult to spread; sandy soils are subject to wind erosion.

Slope affects the ease of excavation and of moving the cover material. Also, it can influence runoff, erosion, and reclamation of the borrow area.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as the final cover for a landfill should be suitable for plants. It should not have excess sodium, salts, or lime and should not be too acid.

Construction Materials

Table 17, “Construction Materials,” gives information about the soils as potential sources of gravel, sand, topsoil, and roadfill. Normal compaction, minor processing, and other standard construction practices are assumed.

Sand and **gravel** are natural aggregates suitable for commercial use with a minimum of processing. They are used in many kinds of construction. Specifications for each use vary widely. In table 17, only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

The soils are rated **good, fair,** or **poor** as potential sources of sand and gravel. A rating of **good** or **fair** means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a poor source. The number 1.00

indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

The soils are rated **good, fair,** or **poor** as potential sources of topsoil, reclamation material, and roadfill. The features that limit the soils as sources of these materials are specified in the tables. The numerical ratings given after the specified features indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area. The ratings are based on the soil properties that affect plant growth; the ease of excavating, loading, and spreading the material; and reclamation of the borrow area. Toxic substances, soil reaction, and the properties that are inferred from soil texture, such as available water capacity and fertility, affect plant growth. The ease of excavating, loading, and spreading is affected by rock fragments, slope, depth to a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, depth to a water table, rock fragments, depth to bedrock or a cemented pan, and toxic material.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the whole soil, from the surface to a depth of about 5 feet. It is assumed that soil layers will be mixed when the soil material is excavated and spread.

The ratings are based on the amount of suitable material and on soil properties that affect the ease of excavation and the performance of the material after it is in place. The thickness of the suitable material is a major consideration. The ease of excavation is affected by large stones, depth to a water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the AASHTO classification of the soil) and linear extensibility (shrink-swell potential).

Water Management

Table 18, Water Management," gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. **Not limited** indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. **Somewhat limited** indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. **Very limited** indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the tables indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, permeability of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

Table 15A.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Tonka	72	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Ponding	1.00	Shrink-swell	1.00
		Ponding	1.00	Shrink-swell	0.50	Ponding	1.00
3:							
Velva	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
4:							
Lallie	94	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
5:							
Dimmick	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
6:							
Heil	84	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Shrink-swell	1.00
		Depth to saturated zone	1.00	Shrink-swell	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
7:							
Korell	75	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
8:							
Straw	67	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Shrink-swell	0.50		
9:							
Channel	40	Not rated		Not rated		Not rated	
Straw	27	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Shrink-swell	0.50		
				Depth to saturated zone	0.47		
Velva	18	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.47		

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
10:							
Arnegard-----------	68	Not limited		Not limited		Not limited	
10B:							
Arnegard-----------	76	Not limited		Not limited		Somewhat limited	
						Slope	0.12
11:							
Amor----------------	58	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.46		
Arnegard-----------	10	Not limited		Not limited		Not limited	
11B:							
Amor----------------	67	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.46	Slope	0.12
Shambo--------------	15	Not limited		Not limited		Somewhat limited	
						Slope	0.12
12C:							
Amor----------------	39	Not limited		Somewhat limited		Very limited	
				Depth to soft bedrock	0.46	Slope	1.00
Cabba---------------	29	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	1.00
13D:							
Amor----------------	42	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
				Depth to soft bedrock	0.46		
Cabba---------------	29	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Slope	1.00
						Depth to soft bedrock	1.00
		Slope	0.63	Slope	0.63		
15B:							
Chama---------------	47	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.46	Slope	0.12
Cabba---------------	28	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	0.12
15C:							
Chama---------------	40	Not limited		Somewhat limited		Very limited	
				Depth to soft bedrock	0.46	Slope	1.00

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
15C:(cont.)							
Cabba	28	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	1.00
Sen	17	Not limited		Somewhat limited		Very limited	
				Depth to soft bedrock	0.46	Slope	1.00
15D:							
Cabba	38	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to soft bedrock	1.00
Chama	26	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
				Depth to soft bedrock	0.46		
Sen	16	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
				Depth to soft bedrock	0.46		
15F:							
Cabba	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
Chama	22	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.46		
Arnegard	10	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
16D:							
Ringling	32	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
Daglum	15	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.37	Slope	0.37	Slope	1.00
16F:							
Brandenburg	26	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Content of large stones	0.50	Content of large stones	0.50	Content of large stones	0.50
Cabba	20	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to soft bedrock	1.00

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
16F:(cont.)							
Savage	13	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	0.37	Slope	0.37	Slope	1.00
17B:							
Sen	47	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.46	Slope	0.12
Chama	22	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.46	Slope	0.12
18B:							
Reeder	49	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to soft bedrock	0.46	Slope	0.12
Farnuf	16	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
19:							
Farland	44	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
19B:							
Farland	62	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
19C:							
Farland	45	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
						Shrink-swell	0.50
19D:							
Farland	32	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
20:							
Shambo	48	Not limited		Not limited		Not limited	
20B:							
Shambo	59	Not limited		Not limited		Not limited	
21B:							
Morton	58	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to soft bedrock	0.46	Slope	0.12
Farland	19	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
22F:							
Cabba----------------	41	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
Rock outcrop--------	28	Not rated		Not rated		Not rated	
Chama----------------	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.46		
23C:							
Morton--------------	40	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
				Depth to soft bedrock	0.46	Shrink-swell	0.50
Cabba----------------	10	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	1.00
26:							
Grail----------------	49	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.47		
27:							
Belfield------------	49	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
Grail----------------	26	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.47		
27B:							
Grail----------------	33	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
Belfield------------	33	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
28:							
Belfield------------	45	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
Daglum--------------	32	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
28B:							
Belfield-----------	43	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
Daglum-------------	35	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
29:							
Savage-------------	61	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
29B:							
Savage-------------	67	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
29C:							
Savage-------------	58	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	1.00
30:							
Regent-------------	63	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46		
Savage-------------	16	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
30B:							
Regent-------------	71	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46	Slope	0.12
Savage-------------	15	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
30C:							
Regent-------------	49	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46	Slope	1.00
Savage-------------	15	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	1.00
31B:							
Regent-------------	38	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46		

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
31B:(cont.)							
Janesburg-----------	28	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46		
31C:							
Regent--------------	32	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46	Slope	1.00
Janesburg-----------	31	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46	Slope	1.00
35B:							
Moreau--------------	46	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46		
35C:							
Moreau--------------	46	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46	Slope	1.00
Wayden--------------	17	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	1.00
35D:							
Moreau--------------	42	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Shrink-swell	1.00
				Depth to soft bedrock	0.46		
Wayden--------------	22	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Shrink-swell	1.00
		Slope	0.63	Slope	0.63	Depth to soft bedrock	1.00
36:							
Lawther-------------	77	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
38B:							
Searing-------------	60	Not limited		Not limited		Not limited	
Ringling------------	19	Not limited		Not limited		Not limited	

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
40C:							
Rhoades-------------	40	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
Slickspots----------	21	Not rated		Not rated		Not rated	
Daglum--------------	16	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
41B:							
Daglum--------------	50	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
Rhoades-------------	25	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
41C:							
Daglum--------------	34	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	1.00
Rhoades-------------	26	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
						Slope	1.00
42F:							
Dogtooth------------	33	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.46		
Janesburg-----------	22	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.46		
Cabba---------------	20	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to soft bedrock	1.00
43C:							
Rhoades-------------	31	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
43C:(cont.)							
Daglum	28	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.16		
44B:							
Ekalaka	50	Not limited		Not limited		Not limited	
Lakota	32	Not limited		Not limited		Not limited	
45:							
Harriet	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
46C:							
Lakota	45	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Ekalaka	40	Not limited		Not limited		Somewhat limited	
						Slope	0.12
47B:							
Dogtooth	59	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46		
Janesburg	27	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to soft bedrock	0.46		
48B:							
Desart	42	Not limited		Not limited		Not limited	
Ekalaka	26	Not limited		Not limited		Not limited	
Telfer	15	Not limited		Not limited		Not limited	
49B:							
Lefor	78	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.46		
51D:							
Vebar	32	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
				Depth to soft bedrock	0.46		
Flasher	16	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Slope	0.63	Slope	0.63	Depth to soft bedrock	1.00

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
51D:(cont.)							
Tally	15	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
51F:							
Flasher	32	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to soft bedrock	1.00
Vebar	22	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.46		
Parshall	15	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
52B:							
Vebar	46	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.46		
Parshall	19	Not limited		Not limited		Not limited	
53B:							
Tally	50	Not limited		Not limited		Not limited	
Parshall	28	Not limited		Not limited		Not limited	
53C:							
Tally	61	Not limited		Not limited		Very limited	
						Slope	1.00
Parshall	19	Not limited		Not limited		Somewhat limited	
						Slope	0.86
54C:							
Vebar	54	Not limited		Somewhat limited		Very limited	
				Depth to soft bedrock	0.46	Slope	1.00
Flasher	10	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
						Slope	1.00
55B:							
Beisigl	46	Not limited		Somewhat limited		Not limited	
				Depth to soft bedrock	0.46		
Lihen	29	Not limited		Not limited		Not limited	
56:							
Parshall	68	Not limited		Not limited		Not limited	

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
57D:							
Beisigl	42	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Depth to soft bedrock	0.46	Slope	1.00
				Slope	0.37		
Flasher	28	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Slope	0.37	Slope	0.37	Depth to soft bedrock	1.00
58B:							
Lihen	38	Not limited		Not limited		Not limited	
Parshall	15	Not limited		Not limited		Not limited	
59F:							
Flasher	35	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to soft bedrock	1.00
Rock outcrop	22	Not rated		Not rated		Not rated	
Vebar	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.46		
60D:							
Wabek	27	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
Manning	18	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.16	Slope	0.16	Slope	1.00
62B:							
Manning	66	Not limited		Not limited		Not limited	
63B:							
Lehr	37	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Stady	27	Not limited		Not limited		Not limited	
64:							
Stady	41	Not limited		Not limited		Not limited	
65:							
Wanagan	76	Not limited		Not limited		Not limited	
66F:							
Wabek	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Cabba	15	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to soft bedrock	1.00

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
66F:(cont.)							
Shambo	13	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
67B:							
Virgelle	33	Not limited		Not limited		Not limited	
68D:							
Telfer	62	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Slope	1.00
68E:							
Telfer	77	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
70:							
Bowbells	73	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.47		
71:							
Williams	47	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Bowbells	37	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.47		
71B:							
Williams	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
Bowbells	27	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.47	Slope	0.12
73B:							
Williams	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
Reeder	23	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to soft bedrock	0.46	Slope	0.12
76C:							
Williams	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	0.86
						Shrink-swell	0.50
Zahl	35	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
						Shrink-swell	0.50

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
76D:							
Zahl----------------	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Williams------------	21	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
76F:							
Zahl----------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Williams------------	24	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
77:							
Temvik--------------	51	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Wilton--------------	38	Not limited		Somewhat limited		Not limited	
				Shrink-swell	0.50		
77B:							
Temvik--------------	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
Williams------------	16	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
						Slope	0.12
80:							
Breien--------------	67	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
82:							
Mckeen--------------	73	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
83:							
Mckeen--------------	78	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
85B:							
Banks---------------	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
86:							
Havrelon	78	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
87:							
Minnewaukan	82	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
88:							
Havrelon	73	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
91:							
Lohler	47	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	1.00	Shrink-swell	1.00	Shrink-swell	1.00
				Depth to saturated zone	0.47		
98:							
Mandan	59	Not limited		Not limited		Not limited	
Linton	15	Not limited		Not limited		Not limited	
98B:							
Linton	50	Not limited		Not limited		Somewhat limited	
						Slope	0.12
Mandan	24	Not limited		Not limited		Somewhat limited	
						Slope	0.12
99F:							
Badland, outcrop	51	Not rated		Not rated		Not rated	
Cabba	32	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to soft bedrock	1.00
100:							
Pits	85	Not rated		Not rated		Not rated	
105:							
Dumps and Pits	90	Not rated		Not rated		Not rated	
110:							
Ustorthents	65	Somewhat limited		Very limited		Somewhat limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
115:							
Riverwash	95	Not rated		Not rated		Not rated	

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
154F:							
Arikara	33	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
Shambo	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Cabba	18	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to soft bedrock	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
161F:							
Beisigl	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.46		
Flasher	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
Arikara	24	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
185B:							
Banks, slightly wet	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
				Depth to saturated zone	0.63		
186:							
Havrelon, slightly wet	85	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Depth to saturated zone	0.63	Shrink-swell	0.50
				Shrink-swell	0.50		
188:							
Havrelon, slightly wet	92	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
				Depth to saturated zone	0.47		

Table 15A.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
M-W:							
Miscellaneous water-	100	Not rated		Not rated		Not rated	
W:							
Water---------------	95	Not rated		Not rated		Not rated	

Table 15B.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Tonka	72	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Ponding	1.00	Ponding	1.00
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Ponding	1.00				
3:							
Velva	75	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
		Flooding	0.40				
4:							
Lallie	94	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	0.80	Ponding	1.00
		Shrink-swell	1.00	Too clayey	0.28		
		Ponding	1.00	Cutbanks cave	0.10		
5:							
Dimmick	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	1.00	Ponding	1.00	Ponding	1.00
		Ponding	1.00	Too clayey	0.50		
		Frost action	0.50	Cutbanks cave	0.10		
6:							
Heil	84	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	1.00	Sodium content	1.00
		Depth to saturated zone	1.00	Cutbanks cave	1.00	Droughty	1.00
		Ponding	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Low strength	1.00	Too clayey	0.72	Ponding	1.00
		Frost action	0.50				
7:							
Korell	75	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
		Flooding	0.40				
8:							
Straw	67	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
		Flooding	0.40				
9:							
Channel	40	Not rated		Not rated		Not rated	
Straw	27	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.80	Flooding	1.00
		Frost action	0.50	Depth to saturated zone	0.47		
				Cutbanks cave	0.10		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
9:(cont.)							
Velva---------------	18	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.80	Flooding	1.00
		Frost action	0.50	Depth to saturated zone	0.47		
				Cutbanks cave	0.10		
10:							
Arnegard-----------	68	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
10B:							
Arnegard-----------	76	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
11:							
Amor----------------	58	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Low strength	0.22				
				Cutbanks cave	0.10		
Arnegard-----------	10	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
11B:							
Amor----------------	67	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Low strength	0.22				
				Cutbanks cave	0.10		
Shambo--------------	15	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
12C:							
Amor----------------	39	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Low strength	0.22				
				Cutbanks cave	0.10		
Cabba---------------	29	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
						Droughty	0.88
		Low strength	0.78	Cutbanks cave	0.10		
		Frost action	0.50				
13D:							
Amor----------------	42	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Frost action	0.50	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Low strength	0.22				
				Cutbanks cave	0.10		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
13D:(cont.)							
Cabba---------------	29	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Low strength	0.78	Slope	0.63	Droughty	0.88
		Slope	0.63	Cutbanks cave	0.10	Slope	0.63
		Frost action	0.50				
15B:							
Chama---------------	47	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50	Cutbanks cave	0.10		
Cabba---------------	28	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Low strength	0.78	Cutbanks cave	0.10	Droughty	0.88
		Frost action	0.50				
15C:							
Chama---------------	40	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50	Cutbanks cave	0.10		
Cabba---------------	28	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Low strength	0.78	Cutbanks cave	0.10	Droughty	0.88
		Frost action	0.50				
Sen-----------------	17	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50	Cutbanks cave	0.10		
15D:							
Cabba---------------	38	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Low strength	0.78	Slope	0.63	Droughty	0.88
		Slope	0.63	Cutbanks cave	0.10	Slope	0.63
		Frost action	0.50				
Chama---------------	26	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50	Cutbanks cave	0.10		
Sen-----------------	16	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50	Cutbanks cave	0.10		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
15F:							
Cabba---------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
						Droughty	0.88
		Low strength	0.78	Cutbanks cave	0.10		
		Frost action	0.50				
Chama---------------	22	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50				
				Cutbanks cave	0.10		
Arnegard------------	10	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
16D:							
Ringling------------	32	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.37	Slope	0.37	Droughty	1.00
				Cutbanks cave	0.10	Slope	0.37
						Content of large stones	0.01
Daglum--------------	15	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Slope	0.37	Droughty	1.00
		Shrink-swell	1.00	Too clayey	0.28	Sodium content	1.00
		Frost action	0.50	Cutbanks cave	0.10	Slope	0.37
		Slope	0.37				
16F:							
Brandenburg---------	26	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Droughty	1.00
		Content of large stones	0.50	Content of large stones	0.50	Slope	1.00
						Gravel content	0.59
				Cutbanks cave	0.10		
Cabba---------------	20	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00			Slope	1.00
				Slope	1.00	Droughty	0.88
		Low strength	0.78	Cutbanks cave	0.10		
		Frost action	0.50				
Savage--------------	13	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.37	Slope	0.37
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Slope	0.37				
17B:							
Sen-----------------	47	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50				
				Cutbanks cave	0.10		
Chama---------------	22	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50				
				Cutbanks cave	0.10		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
18B:							
Reeder--------------	49	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50	Cutbanks cave	0.10		
Farnuf--------------	16	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
19:							
Farland-------------	44	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
19B:							
Farland-------------	62	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
19C:							
Farland-------------	45	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
19D:							
Farland-------------	32	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
20:							
Shambo--------------	48	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
20B:							
Shambo--------------	59	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
21B:							
Morton--------------	58	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50	Too clayey	0.18		
				Cutbanks cave	0.10		
Farland-------------	19	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
22F:							
Cabba---------------	41	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Low strength	0.78	Cutbanks cave	0.10	Droughty	0.88
		Frost action	0.50				

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
22F:(cont.)							
Rock outcrop--------	28	Not rated		Not rated		Not rated	
Chama---------------	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50	Cutbanks cave	0.10		
23C:							
Morton--------------	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50	Too clayey	0.18		
				Cutbanks cave	0.10		
Cabba---------------	10	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Low strength	0.78	Cutbanks cave	0.10	Droughty	0.88
		Frost action	0.50				
26:							
Grail---------------	49	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Depth to saturated zone	0.47		
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
27:							
Belfield------------	49	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Depth to saturated zone	0.16		
		Low strength	1.00	Cutbanks cave	0.10		
Grail---------------	26	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Depth to saturated zone	0.47		
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
27B:							
Grail---------------	33	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Cutbanks cave	0.10		
		Low strength	1.00				
		Frost action	0.50				
Belfield------------	33	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Depth to saturated zone	0.16		
		Low strength	1.00	Cutbanks cave	0.10		
28:							
Belfield------------	45	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Depth to saturated zone	0.16		
		Low strength	1.00	Cutbanks cave	0.10		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
28:(cont.)							
Daglum	32	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Too clayey	0.28	Droughty	1.00
		Shrink-swell	1.00	Depth to saturated zone	0.16	Sodium content	1.00
		Frost action	0.50	Cutbanks cave	0.10		
28B:							
Belfield	43	Very limited		Somewhat limited		Not limited	
		Shrink-swell	1.00	Depth to saturated zone	0.16		
		Low strength	1.00	Cutbanks cave	0.10		
Daglum	35	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Too clayey	0.28	Droughty	1.00
		Shrink-swell	1.00	Depth to saturated zone	0.16	Sodium content	1.00
		Frost action	0.50	Cutbanks cave	0.10		
29:							
Savage	61	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	1.00				
29B:							
Savage	67	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	1.00				
29C:							
Savage	58	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	1.00				
30:							
Regent	63	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Too clayey	0.50	Depth to bedrock	0.46
		Shrink-swell	1.00	Depth to soft bedrock	0.46		
				Cutbanks cave	0.10		
Savage	16	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	1.00				
30B:							
Regent	71	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Too clayey	0.50	Depth to bedrock	0.46
		Shrink-swell	1.00	Depth to soft bedrock	0.46		
				Cutbanks cave	0.10		
Savage	15	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	1.00				

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
30C:							
Regent	49	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Too clayey	0.50	Depth to bedrock	0.46
		Shrink-swell	1.00	Depth to soft bedrock	0.46		
				Cutbanks cave	0.10		
Savage	15	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	1.00				
31B:							
Regent	38	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Too clayey	0.50	Depth to bedrock	0.46
		Shrink-swell	1.00	Depth to soft bedrock	0.46		
				Cutbanks cave	0.10		
Janesburg	28	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.50	Droughty	1.00
		Low strength	1.00	Depth to soft bedrock	0.46	Sodium content	1.00
		Frost action	0.50			Depth to bedrock	0.46
				Cutbanks cave	0.10		
31C:							
Regent	32	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Too clayey	0.50	Depth to bedrock	0.46
		Shrink-swell	1.00	Depth to soft bedrock	0.46		
				Cutbanks cave	0.10		
Janesburg	31	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.50	Droughty	1.00
		Low strength	1.00	Depth to soft bedrock	0.46	Sodium content	1.00
		Frost action	0.50			Depth to bedrock	0.46
				Cutbanks cave	0.10		
35B:							
Moreau	46	Very limited		Very limited		Very limited	
		Low strength	1.00	Too clayey	1.00	Too clayey	1.00
		Shrink-swell	1.00	Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10		
35C:							
Moreau	46	Very limited		Very limited		Very limited	
		Low strength	1.00	Too clayey	1.00	Too clayey	1.00
		Shrink-swell	1.00	Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10		
Wayden	17	Very limited		Very limited		Very limited	
		Low strength	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Shrink-swell	1.00			Too clayey	1.00
		Depth to soft bedrock	1.00	Too clayey	1.00	Droughty	0.83
				Cutbanks cave	0.10		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
35D:							
Moreau	42	Very limited		Very limited		Very limited	
		Low strength	1.00	Too clayey	1.00	Too clayey	1.00
		Shrink-swell	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10		
Wayden	22	Very limited		Very limited		Very limited	
		Low strength	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Shrink-swell	1.00	Too clayey	1.00	Too clayey	1.00
		Depth to soft bedrock	1.00	Slope	0.63	Droughty	0.83
		Slope	0.63	Cutbanks cave	0.10	Slope	0.63
36:							
Lawther	77	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Cutbanks cave	1.00	Too clayey	1.00
				Too clayey	0.28		
38B:							
Searing	60	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Frost action	0.50				
Ringling	19	Not limited		Somewhat limited		Very limited	
				Cutbanks cave	0.10	Droughty	1.00
						Content of large stones	0.01
40C:							
Rhoades	40	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	0.16	Sodium content	1.00
		Low strength	1.00	Cutbanks cave	0.10	Droughty	1.00
				Too clayey	0.03		
Slickspots	21	Not rated		Not rated		Not rated	
Daglum	16	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Too clayey	0.28	Droughty	1.00
		Shrink-swell	1.00	Depth to saturated zone	0.16	Sodium content	1.00
		Frost action	0.50	Cutbanks cave	0.10		
41B:							
Daglum	50	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Too clayey	0.28	Droughty	1.00
		Shrink-swell	1.00	Depth to saturated zone	0.16	Sodium content	1.00
		Frost action	0.50	Cutbanks cave	0.10		
Rhoades	25	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	0.16	Sodium content	1.00
		Low strength	1.00	Cutbanks cave	0.10	Droughty	1.00
				Too clayey	0.03		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
41C:							
Daglum	34	Very limited		Very limited		Very limited	
		Low strength	1.00	Too clayey	1.00	Droughty	1.00
		Shrink-swell	1.00	Cutbanks cave	0.10	Sodium content	1.00
		Frost action	0.50				
Rhoades	26	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Too clayey	1.00	Sodium content	1.00
		Low strength	1.00	Cutbanks cave	0.10	Droughty	1.00
42F:							
Dogtooth	33	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Slope	1.00	Sodium content	1.00
		Slope	1.00	Too clayey	0.50	Droughty	1.00
		Low strength	1.00	Depth to soft bedrock	0.46	Slope	1.00
						Depth to bedrock	0.46
				Cutbanks cave	0.10		
Janesburg	22	Very limited		Very limited		Very limited	
		Shrink-swell	1.00	Slope	1.00	Droughty	1.00
		Slope	1.00	Too clayey	0.50	Slope	1.00
		Low strength	1.00	Depth to soft bedrock	0.46	Sodium content	1.00
		Frost action	0.50			Depth to bedrock	0.46
				Cutbanks cave	0.10		
Cabba	20	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00			Slope	1.00
				Slope	1.00	Droughty	0.88
		Low strength	0.78	Cutbanks cave	0.10		
		Frost action	0.50				
43C:							
Rhoades	31	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Depth to saturated zone	0.16	Sodium content	1.00
		Low strength	1.00			Droughty	1.00
				Cutbanks cave	0.10		
				Too clayey	0.03		
Daglum	28	Very limited		Somewhat limited		Very limited	
		Low strength	1.00	Too clayey	0.28	Droughty	1.00
		Shrink-swell	1.00	Depth to saturated zone	0.16	Sodium content	1.00
		Frost action	0.50				
				Cutbanks cave	0.10		
44B:							
Ekalaka	50	Somewhat limited		Very limited		Very limited	
		Frost action	0.50	Cutbanks cave	1.00	Sodium content	1.00
Lakota	32	Somewhat limited		Very limited		Very limited	
		Frost action	0.50	Cutbanks cave	1.00	Sodium content	1.00
						Droughty	1.00
45:							
Harriet	80	Very limited		Very limited		Very limited	
		Frost action	1.00	Depth to saturated zone	1.00	Sodium content	1.00
		Flooding	1.00			Droughty	1.00
		Depth to saturated zone	1.00	Flooding	0.60	Depth to saturated zone	1.00
				Cutbanks cave	0.10		
		Low strength	1.00	Too clayey	0.03	Flooding	0.60
		Shrink-swell	0.50				

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
46C:							
Lakota--------------	45	Somewhat limited		Very limited		Very limited	
		Frost action	0.50	Cutbanks cave	1.00	Sodium content	1.00
						Droughty	1.00
Ekalaka-------------	40	Somewhat limited		Very limited		Very limited	
		Frost action	0.50	Cutbanks cave	1.00	Sodium content	1.00
						Droughty	0.99
47B:							
Dogtooth------------	59	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.50	Sodium content	1.00
		Low strength	1.00	Depth to soft bedrock	0.46	Droughty	1.00
						Depth to bedrock	0.46
				Cutbanks cave	0.10		
Janesburg-----------	27	Very limited		Somewhat limited		Very limited	
		Shrink-swell	1.00	Too clayey	0.50	Droughty	1.00
		Low strength	1.00	Depth to soft bedrock	0.46	Sodium content	1.00
		Frost action	0.50			Depth to bedrock	0.46
				Cutbanks cave	0.10		
48B:							
Desart--------------	42	Somewhat limited		Very limited		Very limited	
		Frost action	0.50	Cutbanks cave	1.00	Sodium content	1.00
						Droughty	0.38
Ekalaka-------------	26	Somewhat limited		Very limited		Very limited	
		Frost action	0.50	Cutbanks cave	1.00	Sodium content	1.00
						Droughty	0.99
Telfer--------------	15	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.21
49B:							
Lefor---------------	78	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10		
51D:							
Vebar---------------	32	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
				Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10		
Flasher-------------	16	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Droughty	1.00
						Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
				Cutbanks cave	0.10		
Tally---------------	15	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Frost action	0.50	Cutbanks cave	0.10		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
51F:							
Flasher	32	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Droughty	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Depth to bedrock	1.00
				Cutbanks cave	0.10	Slope	1.00
Vebar	22	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10		
Parshall	15	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.63	Cutbanks cave	1.00	Slope	0.63
		Frost action	0.50	Slope	0.63		
52B:							
Vebar	46	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10		
Parshall	19	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
53B:							
Tally	50	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
Parshall	28	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
53C:							
Tally	61	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
Parshall	19	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
54C:							
Vebar	54	Not limited		Somewhat limited		Somewhat limited	
				Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10		
Flasher	10	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Droughty	1.00
				Cutbanks cave	0.10	Depth to bedrock	1.00
55B:							
Beisigl	46	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Droughty	0.88
				Depth to soft bedrock	0.46	Depth to bedrock	0.46
Lihen	29	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Too sandy	0.50

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
56:							
Parshall------------	68	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
57D:							
Beisigl-------------	42	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.37	Cutbanks cave	1.00	Droughty	0.88
				Depth to soft bedrock	0.46	Depth to bedrock	0.46
						Slope	0.37
				Slope	0.37		
Flasher-------------	28	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Droughty	1.00
						Depth to bedrock	1.00
		Slope	0.37	Slope	0.37	Slope	0.37
				Cutbanks cave	0.10		
58B:							
Lihen---------------	38	Not limited		Very limited		Somewhat limited	
				Cutbanks cave	1.00	Too sandy	0.50
Parshall------------	15	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
59F:							
Flasher-------------	35	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Droughty	1.00
		Depth to soft bedrock	1.00			Depth to bedrock	1.00
				Slope	1.00	Slope	1.00
				Cutbanks cave	0.10		
Rock outcrop--------	22	Not rated		Not rated		Not rated	
Vebar---------------	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Depth to soft bedrock	0.46	Depth to bedrock	0.46
				Cutbanks cave	0.10		
60D:							
Wabek---------------	27	Somewhat limited		Very limited		Very limited	
		Slope	0.37	Cutbanks cave	1.00	Droughty	1.00
				Slope	0.37	Slope	0.37
Manning-------------	18	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.16	Slope	0.16	Slope	0.16
				Cutbanks cave	1.00		
62B:							
Manning-------------	66	Not limited		Very limited		Not limited	
				Cutbanks cave	1.00		
63B:							
Lehr----------------	37	Somewhat limited		Very limited		Somewhat limited	
		Shrink-swell	0.50	Cutbanks cave	1.00	Droughty	0.35
Stady---------------	27	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
64:							
Stady---------------	41	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
65:							
Wanagan-------------	76	Somewhat limited		Very limited		Not limited	
		Frost action	0.50	Cutbanks cave	1.00		
66F:							
Wabek---------------	30	Very limited		Very limited		Very limited	
		Slope	1.00	Cutbanks cave	1.00	Droughty	1.00
				Slope	1.00	Slope	1.00
Cabba---------------	15	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Slope	1.00
		Low strength	0.78	Cutbanks cave	0.10	Droughty	0.88
		Frost action	0.50				
Shambo--------------	13	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.37	Slope	0.37	Slope	0.37
				Cutbanks cave	0.10		
67B:							
Virgelle------------	33	Somewhat limited		Very limited		Somewhat limited	
		Frost action	0.50	Cutbanks cave	1.00	Droughty	0.02
				Too clayey	0.50		
68D:							
Telfer--------------	62	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.37	Cutbanks cave	1.00	Slope	0.37
				Slope	0.37	Droughty	0.21
68E:							
Telfer--------------	77	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	1.00	Droughty	0.21
70:							
Bowbells------------	73	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Depth to saturated zone	0.47		
		Shrink-swell	0.50				
		Frost action	0.50	Cutbanks cave	0.10		
71:							
Williams------------	47	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Bowbells------------	37	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Depth to saturated zone	0.47		
		Shrink-swell	0.50				
		Frost action	0.50	Cutbanks cave	0.10		

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
71B:							
Williams------------	60	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Bowbells------------	27	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Depth to saturated zone	0.47		
		Shrink-swell	0.50				
		Frost action	0.50	Cutbanks cave	0.10		
73B:							
Williams------------	45	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Reeder--------------	23	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Depth to soft bedrock	0.46	Depth to bedrock	0.46
		Frost action	0.50				
				Cutbanks cave	0.10		
76C:							
Williams------------	35	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Zahl----------------	35	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
76D:							
Zahl----------------	45	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Williams------------	21	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.63	Slope	0.63
		Slope	0.63	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
76F:							
Zahl----------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
Williams------------	24	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
77:							
Temvik	51	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
Wilton	38	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
77B:							
Temvik	50	Somewhat limited		Somewhat limited		Not limited	
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
Williams	16	Very limited		Somewhat limited		Not limited	
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
80:							
Breien	67	Somewhat limited		Very limited		Not limited	
		Flooding	0.40	Cutbanks cave	1.00		
82:							
Mckeen	73	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Cutbanks cave	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	0.80		
		Shrink-swell	0.50				
83:							
Mckeen	78	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Cutbanks cave	1.00	Depth to saturated zone	1.00
		Flooding	1.00	Flooding	0.80		
		Shrink-swell	0.50				
85B:							
Banks	70	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	0.60
				Flooding	0.60	Droughty	0.01
86:							
Havrelon	78	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Low strength	1.00	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
87:							
Minnewaukan	82	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	1.00	Cutbanks cave	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Frost action	0.50	Flooding	0.80	Droughty	0.21

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Lawns and landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
88:							
Havrelon------------	73	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
91:							
Lohler--------------	47	Very limited		Somewhat limited		Very limited	
		Flooding	1.00	Flooding	0.60	Too clayey	1.00
		Shrink-swell	1.00	Depth to saturated zone	0.47	Flooding	0.60
		Frost action	0.50	Too clayey	0.28		
				Cutbanks cave	0.10		
98:							
Mandan--------------	59	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
Linton--------------	15	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
98B:							
Linton--------------	50	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
Mandan--------------	24	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Cutbanks cave	0.10		
99F:							
Badland, outcrop----	51	Not rated		Not rated		Not rated	
Cabba---------------	32	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Slope	1.00
		Low strength	0.78	Cutbanks cave	0.10	Droughty	0.88
		Frost action	0.50				
100:							
Pits----------------	85	Not rated		Not rated		Not rated	
105:							
Dumps and Pits------	90	Not rated		Not rated		Not rated	
110:							
Ustorthents---------	65	Somewhat limited		Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Frost action	0.50	Too clayey	0.15	Droughty	1.00
				Cutbanks cave	0.10		
115:							
Riverwash-----------	95	Not rated		Not rated		Not rated	
154F:							
Arikara-------------	33	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	0.78	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				

Table 15B.--Building Site Development--Continued

Map symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Lawns and landscaping: Rating class and limiting features	Value
154F:(cont.)							
Shambo	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	0.10		
Cabba	18	Very limited		Very limited		Very limited	
		Slope	1.00	Depth to soft bedrock	1.00	Depth to bedrock	1.00
		Depth to soft bedrock	1.00	Slope	1.00	Slope	1.00
		Low strength	0.78	Cutbanks cave	0.10	Droughty	0.88
		Shrink-swell	0.50				
		Frost action	0.50				
161F:							
Beisigl	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Cutbanks cave	1.00	Droughty	0.88
				Depth to soft bedrock	0.46	Depth to bedrock	0.46
Flasher	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00	Droughty	1.00
				Cutbanks cave	0.10	Depth to bedrock	1.00
Arikara	24	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	0.78	Cutbanks cave	0.10		
		Shrink-swell	0.50				
		Frost action	0.50				
185B:							
Banks, slightly wet	70	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Cutbanks cave	1.00	Flooding	0.60
				Depth to saturated zone	0.63	Droughty	0.01
				Flooding	0.60		
186:							
Havrelon, slightly wet	85	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Depth to saturated zone	0.63	Flooding	0.60
		Low strength	1.00	Flooding	0.60		
		Shrink-swell	0.50	Cutbanks cave	0.10		
		Frost action	0.50				
188:							
Havrelon, slightly wet	92	Very limited		Somewhat limited		Somewhat limited	
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Shrink-swell	0.50	Depth to saturated zone	0.47		
		Frost action	0.50	Cutbanks cave	0.10		
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	95	Not rated		Not rated		Not rated	

Table 16A.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
1:					
Tonka	72	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Seepage	0.53
3:					
Velva	75	Somewhat limited		Very limited	
		Flooding	0.40	Seepage	1.00
				Flooding	0.40
4:					
Lallie	94	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00		
5:					
Dimmick	85	Very limited		Very limited	
		Restricted permeability	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00		
6:					
Heil	84	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
				Seepage	0.18
7:					
Korell	75	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Seepage	0.53
		Flooding	0.40	Flooding	0.40
8:					
Straw	67	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.53
		Flooding	0.40	Flooding	0.40
9:					
Channel	40	Not rated		Not rated	

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
9:(cont.)					
Straw	27	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.94	Seepage	0.53
		Restricted permeability	0.50	Depth to saturated zone	0.39
Velva	18	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.94	Seepage	1.00
				Depth to saturated zone	0.39
10:					
Arnegard	68	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Seepage	0.53
10B:					
Arnegard	76	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Slope	0.67
				Seepage	0.53
11:					
Amor	58	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	0.53
				Slope	0.01
Arnegard	10	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Seepage	0.53
11B:					
Amor	67	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.67
				Seepage	0.53
Shambo	15	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Slope	0.67
				Seepage	0.53
12C:					
Amor	39	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
				Seepage	0.53
Cabba	29	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
				Seepage	0.53

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
13D:					
Amor----------------	42	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	0.63	Depth to soft bedrock	1.00
				Seepage	0.53
Cabba---------------	29	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.63	Slope	1.00
				Seepage	0.53
15B:					
Chama---------------	47	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.67
				Seepage	0.53
Cabba---------------	28	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.67
				Seepage	0.53
15C:					
Chama---------------	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
				Seepage	0.53
Cabba---------------	28	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
				Seepage	0.53
Sen-----------------	17	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
				Seepage	0.53
15D:					
Cabba---------------	38	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.63	Slope	1.00
				Seepage	0.53
Chama---------------	26	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	0.63	Depth to soft bedrock	1.00
				Seepage	0.53

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
15D:(cont.)					
Sen	16	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	0.63	Depth to soft bedrock	1.00
				Seepage	0.53
15F:					
Cabba	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.53
Chama	22	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	0.53
Arnegard	10	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.46	Seepage	0.53
16D:					
Ringling	32	Somewhat limited		Very limited	
		Slope	0.37	Seepage	1.00
				Slope	1.00
				Content of large stones	0.55
Daglum	15	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Somewhat limited			
		Slope	0.37		
16F:					
Brandenburg	26	Very limited		Very limited	
		Filtering capacity	1.00	Content of large stones	1.00
		Slope	1.00	Seepage	1.00
		Content of large stones	0.50	Slope	1.00
Cabba	20	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.53
Savage	13	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Slope	0.37		

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
17B:					
Sen	47	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.67
				Seepage	0.53
Chama	22	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.67
				Seepage	0.53
18B:					
Reeder	49	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.67
				Seepage	0.50
Farnuf	16	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Slope	0.67
				Seepage	0.50
19:					
Farland	44	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
19B:					
Farland	62	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Seepage	0.50
				Slope	0.33
19C:					
Farland	45	Somewhat limited		Very limited	
		Restricted permeability	0.50	Slope	1.00
				Seepage	0.50
19D:					
Farland	32	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
		Restricted permeability	0.50	Seepage	0.50
20:					
Shambo	48	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Seepage	0.53
20B:					
Shambo	59	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Seepage	0.53
				Slope	0.33

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
21B:					
Morton	58	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.67
				Seepage	0.50
Farland	19	Somewhat limited		Somewhat limited	
		Restricted permeability	0.50	Slope	0.67
				Seepage	0.50
22F:					
Cabba	41	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.53
Rock outcrop	28	Not rated		Not rated	
Chama	13	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	0.53
23C:					
Morton	40	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
				Seepage	0.50
Cabba	10	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
				Seepage	0.53
26:					
Grail	49	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to saturated zone	0.39
		Depth to saturated zone	0.94		
27:					
Belfield	49	Very limited		Not limited	
		Restricted permeability	1.00		
		Depth to saturated zone	0.50		
Grail	26	Very limited		Somewhat limited	
		Restricted permeability	1.00	Depth to saturated zone	0.39
		Depth to saturated zone	0.94		

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
27B:					
Grail	33	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.33
Belfield	33	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.33
		Depth to saturated zone	0.50		
28:					
Belfield	45	Very limited		Not limited	
		Restricted permeability	1.00		
		Depth to saturated zone	0.50		
Daglum	32	Somewhat limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.25
		Depth to saturated zone	0.50		
28B:					
Belfield	43	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.33
		Depth to saturated zone	0.50		
Daglum	35	Somewhat limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.33
				Seepage	0.25
		Depth to saturated zone	0.50		
29:					
Savage	61	Very limited		Not limited	
		Restricted permeability	1.00		
29B:					
Savage	67	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.33
29C:					
Savage	58	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
30:					
Regent	63	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	0.01

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
30:(cont.)					
Savage	16	Very limited		Not limited	
		Restricted permeability	1.00		
30B:					
Regent	71	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	0.67
Savage	15	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.33
30C:					
Regent	49	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
Savage	15	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
31B:					
Regent	38	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	0.09
Janesburg	28	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	1.00	Seepage	0.22
				Slope	0.09
31C:					
Regent	32	Very limited		Very limited	
		Restricted permeability	1.00	Depth to soft bedrock	1.00
		Depth to bedrock	1.00	Slope	1.00
Janesburg	31	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	1.00	Slope	1.00
				Seepage	0.22
35B:					
Moreau	46	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.09
35C:					
Moreau	46	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
35C:(cont.)					
Wayden--------------	17	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
35D:					
Moreau--------------	42	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	0.63	Depth to soft bedrock	1.00
Wayden--------------	22	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.63	Slope	1.00
36:					
Lawther-------------	77	Very limited		Not limited	
		Restricted permeability	1.00		
38B:					
Searing-------------	60	Not limited		Very limited	
				Seepage	1.00
				Slope	0.09
Ringling------------	19	Not limited		Very limited	
				Seepage	1.00
				Content of large stones	0.55
				Slope	0.33
40C:					
Rhoades-------------	40	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.09
		Depth to saturated zone	0.50		
Slickspots----------	21	Not rated		Not rated	
Daglum--------------	16	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.25
				Slope	0.09
		Depth to saturated zone	0.50		
41B:					
Daglum--------------	50	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.28
				Slope	0.09
		Depth to saturated zone	0.50		
Rhoades-------------	25	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.09
		Depth to saturated zone	0.50		

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
41C:					
Daglum	34	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Depth to bedrock	0.81	Depth to soft bedrock	0.50
				Seepage	0.25
Rhoades	26	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
		Depth to soft bedrock	0.81	Depth to soft bedrock	0.50
42F:					
Dogtooth	33	Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
		Restricted permeability	1.00		
Janesburg	22	Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
		Restricted permeability	1.00	Seepage	0.22
Cabba	20	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.53
43C:					
Rhoades	31	Very limited		Somewhat limited	
		Depth to saturated zone	0.78	Depth to saturated zone	0.10
		Restricted permeability	1.00	Slope	0.09
Daglum	28	Very limited		Somewhat limited	
		Depth to saturated zone	0.50	Seepage	0.28
		Restricted permeability	1.00	Slope	0.09
44B:					
Ekalaka	50	Not limited		Very limited	
				Seepage	1.00
				Slope	0.09
Lakota	32	Somewhat limited		Very limited	
		Depth to soft bedrock	0.52	Seepage	1.00
				Slope	0.09
				Depth to soft bedrock	0.08

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
45:					
Harriet	80	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Restricted permeability	1.00	Seepage	0.53
46C:					
Lakota	45	Somewhat limited		Very limited	
		Depth to soft bedrock	0.52	Seepage	1.00
				Slope	0.67
				Depth to soft bedrock	0.08
Ekalaka	40	Not limited		Very limited	
				Seepage	1.00
				Slope	0.67
47B:					
Dogtooth	59	Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	1.00	Slope	0.09
Janesburg	27	Very limited		Very limited	
		Depth to soft bedrock	1.00	Depth to soft bedrock	1.00
		Restricted permeability	1.00	Seepage	0.22
				Slope	0.09
48B:					
Desart	42	Not limited		Very limited	
				Seepage	1.00
				Slope	0.09
Ekalaka	26	Not limited		Very limited	
				Seepage	1.00
				Slope	0.09
Telfer	15	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
49B:					
Lefor	78	Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00
		Restricted permeability	0.46	Depth to soft bedrock	1.00
				Slope	0.09
51D:					
Vebar	32	Very limited		Very limited	
		Depth to bedrock	1.00	Slope	1.00
		Slope	0.63	Seepage	1.00
				Depth to soft bedrock	1.00

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
51D:(cont.)					
Flasher	16	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.63	Slope	1.00
				Seepage	0.18
Tally	15	Somewhat limited		Very limited	
		Slope	0.63	Slope	1.00
				Seepage	1.00
51F:					
Flasher	32	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.18
Vebar	22	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Seepage	1.00
				Depth to soft bedrock	1.00
Parshall	15	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Slope	0.63	Seepage	1.00
52B:					
Vebar	46	Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00
				Depth to soft bedrock	1.00
				Slope	0.09
Parshall	19	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
53B:					
Tally	50	Not limited		Very limited	
				Seepage	1.00
				Slope	0.09
Parshall	28	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
53C:					
Tally	61	Not limited		Very limited	
				Seepage	1.00
				Slope	1.00
Parshall	19	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	1.00

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
54C:					
Vebar---------------	54	Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00
				Depth to soft bedrock	1.00
				Slope	1.00
Flasher-------------	10	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	1.00
				Seepage	0.18
55B:					
Beisigl-------------	46	Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to soft bedrock	1.00
				Slope	0.09
Lihen---------------	29	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
56:					
Parshall------------	68	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
57D:					
Beisigl-------------	42	Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to soft bedrock	1.00
		Slope	0.37	Slope	1.00
Flasher-------------	28	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	0.37		
				Slope	1.00
				Seepage	0.18
58B:					
Lihen---------------	38	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
Parshall------------	15	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
59F:					
Flasher-------------	35	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00		
				Slope	1.00
				Seepage	0.18

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
59F:(cont.)					
Rock outcrop	22	Not rated		Not rated	
Vebar	13	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Seepage	1.00
				Depth to soft bedrock	1.00
60D:					
Wabek	27	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Slope	0.37	Slope	1.00
Manning	18	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Slope	0.16	Slope	1.00
62B:					
Manning	66	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
63B:					
Lehr	37	Not limited		Very limited	
				Seepage	1.00
				Slope	0.09
Stady	27	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.46	Slope	0.09
64:					
Stady	41	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Restricted permeability	0.46	Slope	0.01
65:					
Wanagan	76	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.01
66F:					
Wabek	30	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
Cabba	15	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.53

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
66F:(cont.)					
Shambo	13	Somewhat limited		Very limited	
		Restricted permeability	0.46	Slope	1.00
		Slope	0.37	Seepage	0.53
67B:					
Virgelle	33	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
68D:					
Telfer	62	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Slope	0.37	Slope	1.00
68E:					
Telfer	77	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
70:					
Bowbells	73	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.50
		Depth to saturated zone	0.94	Depth to saturated zone	0.39
				Slope	0.01
71:					
Williams	47	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.50
				Slope	0.01
Bowbells	37	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.50
		Depth to saturated zone	0.94	Depth to saturated zone	0.39
				Slope	0.01
71B:					
Williams	60	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.67
				Seepage	0.50
Bowbells	27	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.67
		Depth to saturated zone	0.94	Seepage	0.50
				Depth to saturated zone	0.39
73B:					
Williams	45	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.67
				Seepage	0.50

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
73B:(cont.)					
Reeder	23	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Slope	0.67
				Seepage	0.50
76C:					
Williams	35	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
				Seepage	0.50
Zahl	35	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
				Seepage	0.50
76D:					
Zahl	45	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
				Seepage	0.50
		Slope	0.63		
Williams	21	Very limited		Very limited	
		Restricted permeability	1.00	Slope	1.00
				Seepage	0.50
		Slope	0.63		
76F:					
Zahl	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	1.00	Seepage	0.50
Williams	24	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	1.00	Seepage	0.50
77:					
Temvik	51	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.50
				Slope	0.01
Wilton	38	Very limited		Somewhat limited	
		Restricted permeability	1.00	Seepage	0.50
				Slope	0.01
77B:					
Temvik	50	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.67
				Seepage	0.50
Williams	16	Very limited		Somewhat limited	
		Restricted permeability	1.00	Slope	0.67
				Seepage	0.50

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
80:					
Breien--------------	67	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Flooding	0.40	Flooding	0.40
82:					
Mckeen--------------	73	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Seepage	1.00
83:					
Mckeen--------------	78	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Seepage	1.00
85B:					
Banks---------------	70	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.09
86:					
Havrelon------------	78	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	0.50	Seepage	0.50
87:					
Minnewaukan---------	82	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
88:					
Havrelon------------	73	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	0.50	Seepage	0.50
91:					
Lohler--------------	47	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Restricted permeability	1.00	Depth to saturated zone	0.39
		Depth to saturated zone	0.94		

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
98:					
Mandan	59	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Seepage	0.53
				Slope	0.01
Linton	15	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Seepage	0.53
				Slope	0.01
98B:					
Linton	50	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Slope	0.67
				Seepage	0.53
Mandan	24	Somewhat limited		Somewhat limited	
		Restricted permeability	0.46	Slope	0.67
				Seepage	0.53
99F:					
Badland, outcrop	51	Not rated		Not rated	
Cabba	32	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.53
100:					
Pits	85	Not rated		Not rated	
105:					
Dumps and Pits	90	Not rated		Not rated	
110:					
Ustorthents	65	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
				Seepage	0.18
				Slope	0.09
115:					
Riverwash	95	Not rated		Not rated	
154F:					
Arikara	33	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.46	Content of organic matter	1.00
				Seepage	0.53
Shambo	13	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.46	Seepage	0.53
Cabba	18	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.53

Table 16A.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Septic tank absorption fields		Sewage lagoons	
		Rating class and limiting features	Value	Rating class and limiting features	Value
161F:					
Beisigl-------------	35	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to soft bedrock	1.00
Flasher-------------	30	Very limited		Very limited	
		Depth to bedrock	1.00	Depth to soft bedrock	1.00
		Slope	1.00	Slope	1.00
				Seepage	0.18
Arikara-------------	24	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Restricted permeability	0.46	Content of organic matter	1.00
				Seepage	0.53
185B:					
Banks, slightly wet-	70	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Filtering capacity	1.00	Seepage	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.75
				Slope	0.09
186:					
Havrelon, slightly wet----------------	85	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	0.75
		Restricted permeability	0.50	Seepage	0.50
188:					
Havrelon, slightly wet----------------	92	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	0.94	Seepage	0.50
		Restricted permeability	0.50	Depth to saturated zone	0.39
M-W:					
Miscellaneous water-	100	Not rated		Not rated	
W:					
Water---------------	95	Not rated		Not rated	

Table 16B.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Tonka	72	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00	Hard to compact	1.00
		Too clayey	0.50			Ponding	1.00
						Too clayey	0.50
3:							
Velva	75	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.21
		Flooding	0.40	Flooding	0.40		
4:							
Lallie	94	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Too clayey	1.00	Ponding	1.00	Hard to compact	1.00
		Ponding	1.00			Ponding	1.00
5:							
Dimmick	85	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too clayey	1.00	Ponding	1.00	Too clayey	1.00
		Ponding	1.00			Hard to compact	1.00
						Ponding	1.00
6:							
Heil	84	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Sodium content	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00			Sodium content	1.00
		Too clayey	1.00			Ponding	1.00
						Too clayey	1.00
7:							
Korell	75	Somewhat limited		Somewhat limited		Not limited	
		Flooding	0.40	Flooding	0.40		
8:							
Straw	67	Somewhat limited		Somewhat limited		Somewhat limited	
		Too clayey	0.50	Flooding	0.40	Too clayey	0.50
		Flooding	0.40				
9:							
Channel	40	Not rated		Not rated		Not rated	
Straw	27	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too clayey	0.50				

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
9:(cont.)							
Velva---------------	18	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Seepage	0.21
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Seepage	1.00	Seepage	1.00		
10:							
Arnegard------------	68	Not limited		Not limited		Not limited	
10B:							
Arnegard------------	76	Not limited		Not limited		Not limited	
11:							
Amor----------------	58	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Arnegard------------	10	Not limited		Not limited		Not limited	
11B:							
Amor----------------	67	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Shambo--------------	15	Not limited		Not limited		Not limited	
12C:							
Amor----------------	39	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Cabba---------------	29	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
13D:							
Amor----------------	42	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
Cabba---------------	29	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
15B:							
Chama---------------	47	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Cabba---------------	28	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
15C:							
Chama---------------	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Cabba---------------	28	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Sen-----------------	17	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
15D:							
Cabba	38	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
Chama	26	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
Sen	16	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	0.63
15F:							
Cabba	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
Chama	22	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Arnegard	10	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
16D:							
Ringling	32	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.37	Seepage	1.00	Seepage	0.52
				Slope	0.37	Slope	0.37
						Gravel content	0.31
Daglum	15	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Slope	0.37	Too clayey	1.00
		Sodium content	1.00			Sodium content	1.00
		Slope	0.37			Hard to compact	1.00
						Slope	0.37
16F:							
Brandenburg	26	Very limited		Very limited		Very limited	
		Slope	1.00	Seepage	1.00	Seepage	1.00
		Content of large stones	0.50	Slope	1.00	Slope	1.00
						Content of large stones	0.50
						Gravel content	0.05
Cabba	20	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Savage	13	Very limited		Somewhat limited		Very limited	
		Too clayey	1.00	Slope	0.37	Too clayey	1.00
		Slope	0.37			Hard to compact	1.00
						Slope	0.37
17B:							
Sen	47	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Chama	22	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
18B:							
Reeder	49	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Farnuf	16	Not limited		Not limited		Very limited	
						Hard to compact	1.00
19:							
Farland	44	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
19B:							
Farland	62	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
19C:							
Farland	45	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
19D:							
Farland	32	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
20:							
Shambo	48	Not limited		Not limited		Not limited	
20B:							
Shambo	59	Not limited		Not limited		Not limited	
21B:							
Morton	58	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Farland	19	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
22F:							
Cabba	41	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
Rock outcrop	28	Not rated		Not rated		Not rated	
Chama	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
23C:							
Morton	40	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
Cabba	10	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
26:							
Grail	49	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
27:							
Belfield	49	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
Grail	26	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
27B:							
Grail	33	Somewhat limited		Not limited		Very limited	
		Too clayey	0.50			Hard to compact	1.00
						Too clayey	0.50
Belfield	33	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
28:							
Belfield	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
Daglum	32	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Depth to saturated zone	1.00			Sodium content	1.00
		Sodium content	1.00			Hard to compact	1.00
28B:							
Belfield	43	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
Daglum	35	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Depth to saturated zone	1.00			Sodium content	1.00
		Sodium content	1.00			Hard to compact	1.00
29:							
Savage	61	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
29B:							
Savage	67	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
29C:							
Savage	58	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
30:							
Regent--------------	63	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00			Depth to bedrock	1.00
						Hard to compact	1.00
Savage--------------	16	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
30B:							
Regent--------------	71	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00			Depth to bedrock	1.00
						Hard to compact	1.00
Savage--------------	15	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
30C:							
Regent--------------	49	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00			Depth to bedrock	1.00
						Hard to compact	1.00
Savage--------------	15	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
31B:							
Regent--------------	38	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00			Depth to bedrock	1.00
						Hard to compact	1.00
Janesburg-----------	28	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Sodium content	1.00			Sodium content	1.00
						Hard to compact	1.00
31C:							
Regent--------------	32	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00			Depth to bedrock	1.00
						Hard to compact	1.00
Janesburg-----------	31	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Sodium content	1.00			Sodium content	1.00
						Hard to compact	1.00
35B:							
Moreau--------------	46	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00			Depth to bedrock	1.00
						Hard to compact	1.00

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
35C:							
Moreau--------------	46	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00			Depth to bedrock	1.00
						Hard to compact	1.00
Wayden--------------	17	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
35D:							
Moreau--------------	42	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Too clayey	1.00
		Too clayey	1.00	Slope	0.63	Depth to bedrock	1.00
		Slope	0.63			Hard to compact	1.00
						Slope	0.63
Wayden--------------	22	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Too clayey	1.00	Slope	0.63	Too clayey	1.00
		Slope	0.63			Hard to compact	1.00
						Slope	0.63
36:							
Lawther-------------	77	Very limited		Not limited		Very limited	
		Too clayey	1.00			Too clayey	1.00
						Hard to compact	1.00
38B:							
Searing-------------	60	Not limited		Very limited		Not limited	
				Seepage	1.00		
Ringling------------	19	Not limited		Very limited		Somewhat limited	
				Seepage	1.00	Seepage	0.52
						Gravel content	0.31
40C:							
Rhoades-------------	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Sodium content	1.00
						Hard to compact	1.00
		Sodium content	1.00			Too clayey	1.00
		Too clayey	1.00				
Slickspots----------	21	Not rated		Not rated		Not rated	
Daglum--------------	16	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Depth to saturated zone	1.00			Sodium content	1.00
						Hard to compact	1.00
		Sodium content	1.00				
41B:							
Daglum--------------	50	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Depth to saturated zone	1.00			Sodium content	1.00
						Hard to compact	1.00
		Sodium content	1.00				

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
41B:(cont.)							
Rhoades	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Sodium content	1.00
		Sodium content	1.00			Hard to compact	1.00
		Too clayey	1.00			Too clayey	1.00
41C:							
Daglum	34	Very limited		Somewhat limited		Very limited	
		Depth to soft bedrock	1.00	Depth to bedrock	0.50	Too clayey	1.00
		Sodium content	1.00			Hard to compact	1.00
		Too clayey	1.00			Sodium content	1.00
						Depth to soft bedrock	0.50
Rhoades	26	Very limited		Somewhat limited		Very limited	
		Depth to soft bedrock	1.00	Depth to bedrock	0.50	Sodium content	1.00
		Sodium content	1.00			Hard to compact	1.00
						Depth to soft bedrock	0.50
42F:							
Dogtooth	33	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Sodium content	1.00			Sodium content	1.00
						Hard to compact	1.00
Janesburg	22	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
		Sodium content	1.00			Sodium content	1.00
						Hard to compact	1.00
Cabba	20	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
43C:							
Rhoades	31	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Sodium content	1.00
		Sodium content	1.00			Hard to compact	1.00
		Seepage	1.00			Too clayey	1.00
		Too clayey	1.00			Seepage	0.50
Daglum	28	Very limited		Very limited		Very limited	
		Too clayey	1.00	Depth to saturated zone	1.00	Too clayey	1.00
		Depth to saturated zone	1.00			Sodium content	1.00
		Sodium content	1.00			Hard to compact	1.00
44B:							
Ekalaka	50	Very limited		Very limited		Very limited	
		Sodium content	1.00	Seepage	1.00	Sodium content	1.00
						Seepage	0.52

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44B:(cont.)							
Lakota	32	Very limited		Very limited		Very limited	
		Sodium content	1.00	Seepage	1.00	Sodium content	1.00
						Seepage	0.50
45:							
Harriet	80	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Sodium content	1.00
		Sodium content	1.00			Hard to compact	1.00
		Too clayey	0.50			Too clayey	0.50
46C:							
Lakota	45	Very limited		Very limited		Very limited	
		Sodium content	1.00	Seepage	1.00	Sodium content	1.00
						Seepage	0.50
Ekalaka	40	Very limited		Very limited		Very limited	
		Sodium content	1.00	Seepage	1.00	Sodium content	1.00
						Seepage	0.52
47B:							
Dogtooth	59	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Sodium content	1.00			Sodium content	1.00
						Hard to compact	1.00
Janesburg	27	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Sodium content	1.00			Sodium content	1.00
						Hard to compact	1.00
48B:							
Desart	42	Very limited		Very limited		Very limited	
		Sodium content	1.00	Seepage	1.00	Sodium content	1.00
						Seepage	0.52
Ekalaka	26	Very limited		Very limited		Very limited	
		Sodium content	1.00	Seepage	1.00	Sodium content	1.00
						Seepage	0.52
Telfer	15	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00
49B:							
Lefor	78	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
51D:							
Vebar	32	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to bedrock	1.00
		Slope	0.63	Depth to bedrock	1.00	Slope	0.63
				Slope	0.63	Seepage	0.52
Flasher	16	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.63	Slope	0.63	Slope	0.63

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
51D:(cont.)							
Tally---------------	15	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Slope	0.63
		Slope	0.63	Slope	0.63	Seepage	0.50
51F:							
Flasher-------------	32	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Vebar---------------	22	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Seepage	1.00	Depth to bedrock	1.00
				Depth to bedrock	1.00	Seepage	0.52
Parshall------------	15	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Slope	0.63
		Slope	0.63	Slope	0.63	Seepage	0.52
52B:							
Vebar---------------	46	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to bedrock	1.00
				Depth to bedrock	1.00	Seepage	0.52
Parshall------------	19	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.52
53B:							
Tally---------------	50	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.50
Parshall------------	28	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.52
53C:							
Tally---------------	61	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.50
Parshall------------	19	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.52
54C:							
Vebar---------------	54	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Depth to bedrock	1.00
				Depth to bedrock	1.00	Seepage	0.52
Flasher-------------	10	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
55B:							
Beisigl-------------	46	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Too sandy	0.50
Lihen---------------	29	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
56:							
Parshall	68	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.52
57D:							
Beisigl	42	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.37	Slope	0.37	Too sandy	0.50
						Slope	0.37
Flasher	28	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	0.37	Slope	0.37	Slope	0.37
58B:							
Lihen	38	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00
Parshall	15	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Seepage	1.00	Seepage	0.52
59F:							
Flasher	35	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Rock outcrop	22	Not rated		Not rated		Not rated	
Vebar	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Seepage	1.00	Depth to bedrock	1.00
				Depth to bedrock	1.00	Seepage	0.52
60D:							
Wabek	27	Very limited		Very limited		Very limited	
		Too sandy	1.00	Seepage	1.00	Too sandy	1.00
		Slope	0.37	Slope	0.37	Seepage	1.00
						Slope	0.37
Manning	18	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.16	Seepage	1.00	Seepage	0.52
				Slope	0.16	Slope	0.16
62B:							
Manning	66	Not limited		Very limited		Somewhat limited	
				Seepage	1.00	Seepage	0.52
63B:							
Lehr	37	Not limited		Very limited		Somewhat limited	
				Seepage	1.00	Seepage	0.21
Stady	27	Not limited		Very limited		Not limited	
				Seepage	1.00		
64:							
Stady	41	Not limited		Very limited		Not limited	
				Seepage	1.00		

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
65:							
Wanagan-------------	76	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Seepage	1.00
						Gravel content	0.35
66F:							
Wabek---------------	30	Very limited		Very limited		Very limited	
		Too sandy	1.00	Seepage	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00	Seepage	1.00
						Slope	1.00
Cabba---------------	15	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
Shambo--------------	13	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.37	Slope	0.37	Slope	0.37
67B:							
Virgelle------------	33	Very limited		Very limited		Very limited	
		Too clayey	1.00	Seepage	1.00	Seepage	1.00
						Hard to compact	1.00
						Too sandy	0.50
68D:							
Telfer--------------	62	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	0.37	Seepage	1.00
		Slope	0.37			Slope	0.37
68E:							
Telfer--------------	77	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Seepage	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00			Seepage	1.00
70:							
Bowbells------------	73	Very limited		Very limited		Not limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
71:							
Williams------------	47	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Bowbells------------	37	Very limited		Very limited		Not limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
71B:							
Williams------------	60	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Bowbells------------	27	Very limited		Very limited		Not limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
73B:							
Williams------------	45	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Reeder--------------	23	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
76C:							
Williams------------	35	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Zahl----------------	35	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
76D:							
Zahl----------------	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
Williams------------	21	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.63	Slope	0.63	Slope	0.63
		Too clayey	0.50			Too clayey	0.50
76F:							
Zahl----------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
Williams------------	24	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Too clayey	0.50			Too clayey	0.50
77:							
Temvik--------------	51	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Wilton--------------	38	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
77B:							
Temvik--------------	50	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
Williams------------	16	Somewhat limited		Not limited		Somewhat limited	
		Too clayey	0.50			Too clayey	0.50
80:							
Breien--------------	67	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Too sandy	1.00
		Too sandy	1.00	Flooding	0.40	Seepage	1.00
		Flooding	0.40				
82:							
Mckeen--------------	73	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too sandy	1.00	Seepage	1.00	Too sandy	0.50
		Seepage	1.00			Seepage	0.14

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
83:							
Mckeen--------------	78	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Ponding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too sandy	1.00	Seepage	1.00	Too sandy	0.50
		Seepage	1.00			Seepage	0.14
85B:							
Banks---------------	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Seepage	1.00
		Seepage	1.00	Seepage	1.00	Too sandy	0.50
		Too sandy	1.00				
86:							
Havrelon------------	78	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Too clayey	0.50				
87:							
Minnewaukan---------	82	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Depth to saturated zone	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Seepage	1.00
		Seepage	1.00	Seepage	1.00	Ponding	1.00
		Too sandy	1.00	Ponding	1.00	Too sandy	0.50
		Ponding	1.00				
88:							
Havrelon------------	73	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Too clayey	0.50				
91:							
Lohler--------------	47	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Too clayey	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Hard to compact	1.00
		Too clayey	1.00				
98:							
Mandan--------------	59	Not limited		Not limited		Not limited	
Linton--------------	15	Not limited		Not limited		Not limited	
98B:							
Linton--------------	50	Not limited		Not limited		Not limited	
Mandan--------------	24	Not limited		Not limited		Not limited	
99F:							
Badland, outcrop----	51	Not rated		Not rated		Not rated	
Cabba---------------	32	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill: Rating class and limiting features	Value	Area sanitary landfill: Rating class and limiting features	Value	Daily cover for landfill: Rating class and limiting features	Value
100:							
Pits	85	Not rated		Not rated		Not rated	
105:							
Dumps and Pits	90	Not rated		Not rated		Not rated	
110:							
Ustorthents	65	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
115:							
Riverwash	95	Not rated		Not rated		Not rated	
154F:							
Arikara	33	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Shambo	13	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Cabba	18	Very limited		Very limited		Very limited	
		Depth to bedrock	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
		Slope	1.00	Slope	1.00	Slope	1.00
161F:							
Beisigl	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Depth to bedrock	1.00	Seepage	1.00	Seepage	1.00
		Too sandy	1.00	Depth to bedrock	1.00	Depth to bedrock	1.00
						Too sandy	0.50
Flasher	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Depth to bedrock	1.00
		Depth to bedrock	1.00	Depth to bedrock	1.00	Slope	1.00
Arikara	24	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
185B:							
Banks, slightly wet	70	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Seepage	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Too sandy	0.50
		Seepage	1.00	Seepage	1.00		
		Too sandy	1.00				
186:							
Havrelon, slightly wet	85	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too clayey	0.50				
188:							
Havrelon. slightly wet	92	Very limited		Very limited		Somewhat limited	
		Flooding	1.00	Flooding	1.00	Too clayey	0.50
		Depth to saturated zone	1.00	Depth to saturated zone	1.00		
		Too clayey	0.50				

Table 16B.--Sanitary Facilities--Continued

Map symbol and soil name	Pct. of map unit	Trench sanitary landfill		Area sanitary landfill		Daily cover for landfill	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
M-W:							
Miscellaneous water-	100	Not rated		Not rated		Not rated	
W:							
Water---------------	95	Not rated		Not rated		Not rated	

Table 17.--Construction Materials

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the potential limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
1:								
Tonka	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to saturated zone	0.00	Depth to saturated zone	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Too clayey	0.00	Shrink-swell	0.81
3:								
Velva	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.01				
4:								
Lallie	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to saturated zone	0.00	Depth to saturated zone	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Too clayey	0.00	Low strength	0.00
					Carbonate content	0.92	Shrink-swell	0.12
5:								
Dimmick	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Depth to saturated zone	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to saturated zone	0.00	Shrink-swell	0.12
6:								
Heil	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Depth to saturated zone	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to saturated zone	0.00	Shrink-swell	0.12

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
7:								
Korell	Improbable Gravel Source		Poor		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.00				
8:								
Straw	Improbable Gravel Source		Poor		Good		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00			Shrink-swell	0.97
	Thickest layer not a source	0.00	Thickest layer	0.00				
9:								
Channel	Not rated		Not rated		Not rated		Not rated	
Straw	Improbable Gravel Source		Poor		Good		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00			Shrink-swell	0.97
	Thickest layer not a source	0.00	Thickest layer	0.00				
Velva	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.01				
10:								
Arnegard	Improbable Gravel Source		Poor		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.00				

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
10B:								
Arnegard------------	Improbable Gravel Source		Poor		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.00				
11:								
Amor----------------	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Low strength	0.78
Arnegard------------	Improbable Gravel Source		Poor		Good		Good	
	Bottom layer not a source	0.00	Botom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.00				
11B:								
Amor----------------	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Low strength	0.78
Shambo--------------	Improbable Gravel Source		Poor		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.00				
12C:								
Amor----------------	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Low strength	0.78

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
12C:(cont.)								
Cabba---------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Salinity	0.88	Low strength	0.22
13D:								
Amor----------------	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.37	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Low strength	0.78
Cabba---------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.37	Low strength	0.22
					Salinity	0.88		
15B:								
Chama---------------	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Carbonate content	0.92	Low stength	0.00
Cabba---------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Salinity	0.88	Low strength	0.22
15C:								
Chama---------------	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Carbonate content	0.92	Low strength	0.00

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
15C: (cont.)								
Cabba	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Salinity	0.88	Low strength	0.22
Sen	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Carbonate content	0.92	Low strength	0.00
15D:								
Cabba	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.37	Low strength	0.22
					Salinity	0.88		
Chama	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.37	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Low strength	0.00
					Carbonate content	0.92		
Sen	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.37	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Low strength	0.00
					Carbonate content	0.92		
15F:								
Cabba	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.00	Slope	0.00
					Salinity	0.88	Low strength	0.22

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15F:(cont.)								
Chama	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Slope	0.00
					Carbonate content	0.92	Low strength	0.00
Arnegard	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Slope	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00				
16D:								
Ringling	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Rock fragments	0.00	Cobble content	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.63		
Daglum	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.63	Shrink-swell	0.12
16F:								
Brandenburg	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Rock fragments	0.00	Cobble content	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.00	Slope	0.00
Cabba	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.00	Slope	0.00
					Salinity	0.88	Low strength	0.22

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
16F:(cont.)								
Savage	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.63	Shrink-swell	0.12
17B:								
Sen	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Carbonate content	0.92	Low strength	0.00
Chama	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Carbonate content	0.92	Low strength	0.00
18B:								
Reeder	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
Farnuf	Improbable Gravel Source		Poor		Good		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00			Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
19:								
Farland	Improbable Gravel Source		Poor		Good		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00			Shrink-swell	0.87
	Thickest layer not a source	0.00	Thickest layer	0.00				

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
19B:								
Farland	Improbable Gravel		Poor		Good		Fair	
	Source		Bottom layer	0.00			Shrink-swell	0.87
	Bottom layer not a source	0.00	Thickest layer	0.00				
	Thickest layer not a source	0.00						
19C:								
Farland	Improbable Gravel		Poor		Good		Fair	
	Source		Bottom layer	0.00			Shrink-swell	0.87
	Bottom layer not a source	0.00	Thickest layer	0.00				
	Thickest layer not a source	0.00						
19D:								
Farland	Improbable Gravel		Poor		Fair		Fair	
	Source		Bottom layer	0.00	Slope	0.37	Shrink-swell	0.87
	Bottom layer not a source	0.00	Thickest layer	0.00				
	Thickest layer not a source	0.00						
20:								
Shambo	Improbable Gravel		Poor		Good		Good	
	Source		Bottom layer	0.00				
	Bottom layer not a source	0.00	Thickest layer	0.00				
	Thickest layer not a source	0.00						
20B:								
Shambo	Improbable Gravel		Poor		Good		Good	
	Source		Bottom layer	0.00				
	Bottom layer not a source	0.00	Thickest layer	0.00				
	Thickest layer not a source	0.00						

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
21B:								
Morton	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Botom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
Farland	Improbable Gravel Source		Poor		Good		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00			Shrink-swell	0.87
	Thickest layer not a source	0.00	Thickest layer	0.00				
22F:								
Cabba	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.00	Slope	0.00
					Salinity	0.88	Low strength	0.22
Rock outcrop	Not rated		Not rated		Not rated		Not rated	
Chama	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Slope	0.00
					Carbonate content	0.92	Low strength	0.00
23C:								
Morton	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
Cabba	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Salinity	0.88	Low strength	0.22

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
26:								
Grail	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.30	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.21
27:								
Belfield	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.19	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Sodium content	0.22	Shrink-swell	0.15
Grail	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.30	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.21
27B:								
Grail	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.30	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.21
Belfield	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.19	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Sodium content	0.22	Shrink-swell	0.15
28:								
Belfield	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.19	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Sodium content	0.22	Shrink-swell	0.15

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
28:(cont.)								
Daglum	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
28B:								
Belfield	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.19	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Sodium content	0.22	Shrink-swell	0.15
Daglum	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
29:								
Savage	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
29B:								
Savage	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
29C:								
Savage	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
30:								
Regent	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
							Shrink-swell	0.12
Savage	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
30B:								
Regent	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
							Shrink-swell	0.12
Savage	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
30C:								
Regent	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
							Shrink-swell	0.12
Savage	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
31B:								
Regent--------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
							Shrink-swell	0.12
Janesburg-----------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54		
31C:								
Regent--------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
							Shrink-swell	0.12
Janesburg-----------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54		
35B:								
Moreau--------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Salinity	0.00	Depth to bedrock	0.00
					Depth to bedrock	0.54	Shrink-swell	0.12
35C:								
Moreau--------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Salinity	0.00	Depth to bedrock	0.00
					Depth to bedrock	0.54	Shrink-swell	0.12

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
35C: (cont.)								
Wayden	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Too clayey	0.00	Low strength	0.00
					Salinity	0.00	Shrink-swell	0.12
35D:								
Moreau	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Salinity	0.00	Depth to bedrock	0.00
					Slope	0.37	Shrink-swell	0.12
					Depth to bedrock	0.54		
Wayden	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Too clayey	0.00	Low strength	0.00
					Salinity	0.00	Shrink-swell	0.12
					Slope	0.37		
36:								
Lawther	Improbable Gravel Source		Poor		Poor		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Shrink-swell	0.12
	Thickest layer not a source	0.00	Thickest layer	0.00				
38B:								
Searing	Possible Gravel Source		Poor		Good		Poor	
	Thickest layer not a source	0.00	Bottom layer	0.00			Low strength	0.00
	Bottom layer	0.14	Thickest layer	0.00				
Ringling	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Rock fragments	0.00	Cobble content	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00				

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
40C:								
Rhoades	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
Slickspots	Not rated		Not rated		Not rated		Not rated	
Daglum	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Botom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
41B:								
Daglum	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
Rhoades	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
41C:								
Daglum	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
							Depth to bedrock	0.50
Rhoades	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
							Depth to bedrock	0.50

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
42F:								
Dogtooth	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.00	Shrink-swell	0.12
					Depth to bedrock	0.54	Slope	0.98
Janesburg	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.00	Slope	0.98
					Depth to bedrock	0.54		
Cabba	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.00	Low strength	0.22
					Salinity	0.88	Slope	0.50
43C:								
Rhoades	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
Daglum	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.12
44B:								
Ekalaka	Improbable Gravel Source		Fair		Poor		Good	
	Bottom layer not a source	0.00	Thickest layer	0.00	Sodium content	0.00		
	Thickest layer not a source	0.00	Bottom layer	0.08				

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
44B: (cont.)								
Lakota--------------	Improbable Gravel Source		Poor		Fair		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.22	Depth to bedrock	0.92
	Thickest layer not a source	0.00	Thickest layer	0.00				
45:								
Harriet-------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Depth to saturated zone	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to saturated zone	0.00	Shrink-swell	0.12
46C:								
Lakota--------------	Improbable Gravel Source		Poor		Fair		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.22	Depth to bedrock	0.92
	Thickest layer not a source	0.00	Thickest layer	0.00				
Ekalaka-------------	Improbable Gravel Source		Fair		Poor		Good	
	Bottom layer not a source	0.00	Thickest layer	0.00	Sodium content	0.00		
	Thickest layer not a source	0.00	Bottom layer	0.08				
47B:								
Dogtooth------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54	Shrink-swell	0.12
Janesburg-----------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Sodium content	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.54		

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
48B:								
Desart	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.03				
	Thickest layer not a source	0.00	Thickest layer	0.06				
Ekalaka	Improbable Gravel Source		Fair		Poor		Good	
	Bottom layer not a source	0.00	Thickest layer	0.00	Sodium content	0.00		
	Thickest layer not a source	0.00	Bottom layer	0.08				
Telfer	Improbable Gravel Source		Fair		Fair		Good	
	Bottom layer not a source	0.00	Bottom layer	0.12	Too sandy	0.78		
	Thickest layer not a source	0.00	Thickest layer	0.12				
49B:								
Lefor	Improbable Gravel Source		Fair		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.05				
51D:								
Vebar	Improbable Gravel Source		Fair		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.37	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.09	Depth to bedrock	0.54		
Flasher	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Too sandy	0.36		
					Slope	0.37		

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
51D:(cont.)								
Tally	Improbable Gravel Source		Fair		Fair		Good	
	Bottom layer not a source	0.00	Bottom layer	0.07	Slope	0.37		
	Thickest layer not a source	0.00	Thickest layer	0.07				
51F:								
Flasher	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.00	Slope	0.18
					Too sandy	0.36		
Vebar	Improbable Gravel Source		Fair		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.09	Depth to bedrock	0.54	Slope	0.00
Parshall	Improbable Gravel Source		Fair		Fair		Good	
	Bottom layer not a source	0.00	Thickest layer	0.09	Slope	0.37		
	Thickest layer not a source	0.00	Bottom layer	0.53				
52B:								
Vebar	Improbable Gravel Source		Fair		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.09				
Parshall	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Thickest layer	0.09				
	Thickest layer not a source	0.00	Bottom layer	0.53				

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
53B:								
Tally---------------	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Thickest layer	0.04				
	Thickest layer not a source	0.00	Bottom layer	0.07				
Parshall------------	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.06				
	Thickest layer not a source	0.00	Thickest layer	0.06				
53C:								
Tally---------------	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Thickest layer	0.04				
	Thickest layer not a source	0.00	Bottom layer	0.07				
Parshall------------	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.06				
	Thickest layer not a source	0.00	Thickest layer	0.06				
54C:								
Vebar---------------	Improbable Gravel Source		Fair		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.03				
Flasher-------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00				

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
55B:								
Beisigl	Improbable Gravel Source		Fair		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.11	Too sandy	0.94		
Lihen	Improbable Gravel Source		Fair		Fair		Good	
	Bottom layer not a source	0.00	Bottom layer	0.12	Too sandy	0.78		
	Thickest layer not a source	0.00	Thickest layer	0.12				
56:								
Parshall	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.06				
	Thickest layer not a source	0.00	Thickest layer	0.06				
57D:								
Beisigl	Improbable Gravel Source		Fair		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.11	Slope	0.63		
					Too sandy	0.94		
Flasher	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.63		
58B:								
Lihen	Improbable Gravel Source		Fair		Fair		Good	
	Bottom layer not a source	0.00	Thickest layer	0.20	Too sandy	0.30		
	Thickest layer not a source	0.00	Bottom layer	0.99				

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
58B:(cont.)								
Parshall------------	Improbable Gravel Source		Fair		Good		Good	
	Bottom layer not a source	0.00	Thickest layer	0.09				
	Thickest layer not a source	0.00	Bottom layer	0.53				
59F:								
Flasher-------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thckest layer	0.00	Slope	0.00	Slope	0.00
					Too sandy	0.36		
Rock outcrop--------	Not rated		Not rated		Not rated		Not rated	
Vebar---------------	Improbable Gravel Source		Fair		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.09	Depth to bedrock	0.54	Slope	0.00
60D:								
Wabek---------------	Possible Gravel Source		Poor		Fair		Good	
	Thickest layer not a source	0.00	Bottom layer	0.00	Slope	0.63		
	Bottom layer	0.27	Thickest layer	0.00				
Manning-------------	Possible Gravel Source		Fair		Fair		Good	
	Thickest layer not a source	0.00	Bottom layer	0.00	Slope	0.84		
	Bottom layer	0.38	Thickest layer	0.04				
62B:								
Manning-------------	Possible Gravel Source		Fair		Good		Good	
	Thickest layer not a source	0.00	Bottom layer	0.00				
	Bottom layer	0.38	Thickest layer	0.04				

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
63B:								
Lehr	Possible Gravel Source		Fair		Good		Fair	
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.98
	Bottom layer	0.23	Bottom layer	0.01				
Stady	Possible Gravel Source		Fair		Good		Good	
	Thickest layer not a source	0.00	Thickest layer	0.00				
	Bottom layer	0.23	Bottom layer	0.01				
64:								
Stady	Possible Gravel Source		Fair		Good		Good	
	Thickest layer not a source	0.00	Thickest layer	0.00				
	Bottom layer	0.23	Bottom layer	0.01				
65:								
Wanagan	Improbable Gravel Source		Fair		Poor		Good	
	Bottom layer not a source	0.00	Bottom layer	0.07	Rock fragments	0.00		
	Thickest layer not a source	0.00	Thickest layer	0.07	Hard to reclaim	0.00		
66F:								
Wabek	Possible Gravel Source		Fair		Poor		Fair	
	Thickest layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Slope	0.18
	Bottom layer	0.27	Thickest layer	0.04				
Cabba	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.00	Slope	0.18
					Salinity	0.88	Low strength	0.22

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
66F:(cont.)								
Shambo	Improbable Gravel Source		Poor		Fair		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.63		
	Thickest layer not a source	0.00	Thickest layer	0.00				
67B:								
Virgelle	Improbable Gravel Source		Poor		Fair		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too sandy	0.78		
	Thickest layer not a source	0.00	Thickest layer	0.00				
68D:								
Telfer	Improbable Gravel Source		Fair		Fair		Good	
	Bottom layer not a source	0.00	Bottom layer	0.12	Slope	0.63		
	Thickest layer not a source	0.00	Thickest layer	0.12	Too sandy	0.78		
68E:								
Telfer	Improbable Gravel Source		Fair		Poor		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.12	Slope	0.00	Slope	0.50
	Thickest layer not a source	0.00	Thickest layer	0.12	Too sandy	0.78		
70:								
Bowbells	Improbable Gravel Source		Poor		Good		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00			Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
71:								
Williams-----------	Improbable Gravel Source		Poor		Good		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00			Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
Bowbells-----------	Improbable Gravel Source		Poor		Good		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00			Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
71B:								
Williams-----------	Improbable Gravel Source		Poor		Good		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00			Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
Bowbells-----------	Improbable Gravel Source		Poor		Good		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00			Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
73B:								
Williams-----------	Improbable Gravel Source		Poor		Good		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00			Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
Reeder-------------	Improbable Gravel Source		Poor		Fair		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.54	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
76C:								
Williams------------	Improbable Gravel		Poor		Good		Poor	
	Source		Bottom layer	0.00			Low strength	0.00
	Bottom layer not	0.00	Thickest layer	0.00			Shrink-swell	0.87
	a source							
	Thickest layer	0.00						
	not a source							
Zahl----------------	Improbable Gravel		Poor		Good		Poor	
	Source		Bottom layer	0.00			Low strength	0.00
	Bottom layer not	0.00	Thickest layer	0.00			Shrink-swell	0.87
	a source							
	Thickest layer	0.00						
	not a source							
76D:								
Zahl----------------	Improbable Gravel		Poor		Fair		Poor	
	Source		Bottom layer	0.00	Slope	0.37	Low strength	0.00
	Bottom layer not	0.00	Thickest layer	0.00			Shrink-swell	0.87
	a source							
	Thickest layer	0.00						
	not a source							
Williams------------	Improbable Gravel		Poor		Fair		Poor	
	Source		Bottom layer	0.00	Slope	0.37	Low strength	0.00
	Bottom layer not	0.00	Thickest layer	0.00			Shrink-swell	0.87
	a source							
	Thickest layer	0.00						
	not a source							
76F:								
Zahl----------------	Improbable Gravel		Poor		Poor		Poor	
	Source		Bottom layer	0.00	Slope	0.00	Slope	0.00
	Bottom layer not	0.00	Thickest layer	0.00			Low strength	0.00
	a source						Shrink-swell	0.87
	Thickest layer	0.00						
	not a source							
Williams------------	Improbable Gravel		Poor		Poor		Poor	
	Source		Bottom layer	0.00	Slope	0.00	Low strength	0.00
	Bottom layer not	0.00	Thickest layer	0.00			Slope	0.50
	a source						Shrink-swell	0.87
	Thickest layer	0.00						
	not a source							

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
77:								
Temvik	Improbable Gravel Source		Poor		Good		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00			Shrink-swell	0.98
	Thickest layer not a source	0.00	Thickest layer	0.00				
Wilton	Improbable Gravel Source		Poor		Good		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00			Shrink-swell	0.99
	Thickest layer not a source	0.00	Thickest layer	0.00				
77B:								
Temvik	Improbable Gravel Source		Poor		Good		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00			Shrink-swell	0.98
	Thickest layer not a source	0.00	Thickest layer	0.00				
Williams	Improbable Gravel Source		Poor		Good		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00			Low strength	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.87
80:								
Breien	Improbable Gravel Source		Fair		Fair		Good	
	Bottom layer not a source	0.00	Thickest layer	0.00	Too sandy	0.22		
	Thickest layer not a source	0.00	Bottom layer	0.22				
82:								
Mckeen	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to saturated zone	0.00	Depth to saturated zone	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.89

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
83:								
Mckeen--------------	Improbable Gravel		Poor		Poor		Poor	
	Source		Bottom layer	0.00	Depth to	0.00	Depth to	0.00
	Bottom layer not	0.00	Thickest layer	0.00	saturated zone		saturated zone	
	a source						Shrink-swell	0.89
	Thickest layer	0.00						
	not a source							
85B:								
Banks---------------	Improbable Gravel		Fair		Fair		Good	
	Source		Bottom layer	0.33	Too sandy	0.06		
	Bottom layer not	0.00	Thickest layer	0.33				
	a source							
	Thickest layer	0.00						
	not a source							
86:								
Havrelon------------	Improbable Gravel		Poor		Good		Poor	
	Source		Bottom layer	0.00			Low strength	0.00
	Bottom layer not	0.00	Thickest layer	0.00			Shrink-swell	0.90
	a source							
	Thickest layer	0.00						
	not a source							
87:								
Minnewaukan---------	Improbable Gravel		Fair		Poor		Poor	
	Source		Thickest layer	0.10	Depth to	0.00	Depth to	0.00
	Bottom layer not	0.00	Bottom layer	0.12	saturated zone		saturated zone	
	a source				Too sandy	0.78		
	Thickest layer	0.00			Rock fragments	0.88		
	not a source							
88:								
Havrelon------------	Improbable Gravel		Poor		Good		Fair	
	Source		Bottom layer	0.00			Shrink-swell	0.87
	Bottom layer not	0.00	Thickest layer	0.00				
	a source							
	Thickest layer	0.00						
	not a source							

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
91:								
Lohler	Improbable Gravel Source		Poor		Poor		Fair	
	Bottom layer not a source	0.00	Bottom layer	0.00	Too clayey	0.00	Shrink-swell	0.12
	Thickest layer not a source	0.00	Thickest layer	0.00				
98:								
Mandan	Improbable Gravel Source		Poor		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.00				
Linton	Improbable Gravel Source		Poor		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.00				
98B:								
Linton	Improbable Gravel Source		Poor		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.00				
Mandan	Improbable Gravel Source		Poor		Good		Good	
	Bottom layer not a source	0.00	Bottom layer	0.00				
	Thickest layer not a source	0.00	Thickest layer	0.00				
99F:								
Badland, outcrop	Not rated		Not rated		Not rated		Not rated	

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel: Rating class and limiting features	Value	Potential source of sand: Rating class and limiting features	Value	Potential source of topsoil: Rating class and limiting features	Value	Potential source of roadfill: Rating class and limiting features	Value
99F:(cont.)								
Cabba---------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.00	Slope	0.00
					Salinity	0.88	Low strength	0.22
100:								
Pits----------------	Not rated		Not rated		Not rated		Not rated	
105:								
Dumps and Pits------	Not rated		Not rated		Not rated		Not rated	
110:								
Ustorthents---------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Too clayey	0.00		
115:								
Riverwash-----------	Not rated		Not rated		Not rated		Not rated	
154F:								
Arikara-------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Slope	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00			Low strength	0.22
							Shrink-swell	1.00
Shambo--------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Slope	0.00	Slope	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00				
Cabba---------------	Improbable Gravel Source		Poor		Poor		Poor	
	Bottom layer not a source	0.00	Bottom layer	0.00	Depth to bedrock	0.00	Depth to bedrock	0.00
	Thickest layer not a source	0.00	Thickest layer	0.00	Slope	0.00	Slope	0.00
					Salinity	0.88	Low strength	0.22
							Shrink-swell	0.87

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
161F:								
Beisigl-------------	Improbable Gravel		Fair		Poor		Poor	
	Source		Bottom layer	0.00	Slope	0.00	Depth to bedrock	0.00
	Bottom layer not a source	0.00	Thickest layer	0.11	Depth to bedrock	0.54	Slope	0.00
					Too sandy	0.94		
	Thickest layer not a source	0.00						
Flasher-------------	Improbable Gravel		Poor		Poor		Poor	
	Source		Bottom layer	0.00	Slope	0.00	Depth to bedrock	0.00
	Bottom layer not a source	0.00	Thickest layer	0.00	Depth to bedrock	0.00	Slope	0.00
	Thickest layer not a source	0.00						
Arikara-------------	Improbable Gravel		Poor		Poor		Poor	
	Source		Bottom layer	0.00	Slope	0.00	Slope	0.00
	Bottom layer not a source	0.00	Thickest layer	0.00			Low strength	0.22
							Shrink-swell	1.00
	Thickest layer not a source	0.00						
185B:								
Banks, slightly wet-	Improbable Gravel		Fair		Fair		Good	
	Source		Bottom layer	0.33	Too sandy	0.06		
	Bottom layer not a source	0.00	Thickest layer	0.33				
	Thickest layer not a source	0.00						
186:								
Havrelon, slightly wet----------------	Improbable Gravel		Poor		Good		Poor	
	Source		Bottom layer	0.00			Low strength	0.00
	Bottom layer not a source	0.00	Thickest layer	0.00			Shrink-swell	0.90
	Thickest layer not a source	0.00						
188:								
Havrelon, slightly wet----------------	Improbable Gravel		Poor		Good		Fair	
	Source		Bottom layer	0.00			Shrink-swell	0.87
	Bottom layer not a source	0.00	Thickest layer	0.00				
	Thickest layer not a source	0.00						

Table 17.--Construction Materials--Continued

Map symbol and soil name	Potential source of gravel		Potential source of sand		Potential source of topsoil		Potential source of roadfill	
	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
M-W:								
Miscellaneous water-	Not rated		Not rated		Not rated		Not rated	
W:								
Water---------------	Not rated		Not rated		Not rated		Not rated	

Table 18.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table.)

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
1:							
Tonka	72	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.46	Depth to saturated zone	1.00	Slow refill	0.28
				Ponding	1.00	Cutbanks cave	0.10
3:							
Velva	75	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Deep to water	1.00
				Seepage	0.01		
4:							
Lallie	94	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Slow refill	1.00
				Ponding	1.00	Cutbanks cave	0.10
				Hard to pack	0.96	Salty water	0.01
5:							
Dimmick	85	Not limited		Very limited		Very limited	
				Depth to saturated zone	1.00	Slow refill	1.00
				Ponding	1.00	Cutbanks cave	0.10
				Hard to pack	0.62		
6:							
Heil	84	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.43	Depth to saturated zone	1.00	Slow refill	0.57
				Thin layer	1.00	Salty water	0.50
				Hard to pack	1.00	Cutbanks cave	0.10
				Ponding	1.00		
				Salinity	0.12		
7:							
Korell	75	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Deep to water	1.00
8:							
Straw	67	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.94	Deep to water	1.00
9:							
Channel	40	Not rated		Not rated		Not rated	
Straw	27	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.72	Piping	0.94	Deep to water	0.90
						Slow refill	0.30
						Cutbanks cave	0.10
Velva	18	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Piping	1.00	Deep to water	0.90
				Seepage	0.01	Cutbanks cave	0.10

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
10:							
Arnegard------------	68	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.84	Deep to water	1.00
10B:							
Arnegard------------	76	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.84	Deep to water	1.00
11:							
Amor----------------	58	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.65		
Arnegard------------	10	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.84	Deep to water	1.00
11B:							
Amor----------------	67	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.65		
Shambo--------------	15	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.99	Deep to water	1.00
12C:							
Amor----------------	39	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.65		
Cabba---------------	29	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Seepage	0.02	Piping	1.00		
13D:							
Amor----------------	42	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.65		
		Slope	0.01				
Cabba---------------	29	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Seepage	0.02	Piping	1.00		
		Slope	0.01				
15B:							
Chama---------------	47	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.50		
Cabba---------------	28	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Seepage	0.02	Piping	1.00		
15C:							
Chama---------------	40	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.50		
Cabba---------------	28	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Seepage	0.02	Piping	1.00		

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
15C:(cont.)							
Sen	17	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11				
15D:							
Cabba	38	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Seepage	0.02	Piping	1.00		
		Slope	0.01				
Chama	26	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.50		
		Slope	0.01				
Sen	16	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11				
		Slope	0.01				
15F:							
Cabba	40	Somewhat limited		Very limited		Very limited	
		Slope	0.94	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.66	Piping	1.00		
		Seepage	0.02				
Chama	22	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Slope	0.28	Piping	0.50		
		Depth to bedrock	0.11				
Arnegard	10	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.65	Deep to water	1.00
		Slope	0.12				
16D:							
Ringling	32	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	Deep to water	1.00
		Slope	0.01	Seepage	0.75		
Daglum	15	Somewhat limited		Very limited		Very limited	
		Seepage	0.54	Thin layer	1.00	Deep to water	1.00
		Slope	0.01	Hard to pack	1.00		
				Salinity	0.50		
16F:							
Brandenburg	26	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	Deep to water	1.00
		Slope	0.82	Seepage	0.75		
				Content of large stones	0.50		
Cabba	20	Somewhat limited		Very limited		Very limited	
		Slope	0.88	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.66	Piping	1.00		
		Seepage	0.02				
Savage	13	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.02	Hard to pack	0.72	Deep to water	1.00
		Slope	0.01				

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
17B:							
Sen-----------------	47	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11				
Chama---------------	22	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.50		
18B:							
Reeder--------------	49	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.64		
Farnuf--------------	16	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.03	Deep to water	1.00
19:							
Farland-------------	44	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.34	Deep to water	1.00
19B:							
Farland-------------	62	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.34	Deep to water	1.00
19C:							
Farland-------------	45	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.34	Deep to water	1.00
19D:							
Farland-------------	32	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.34	Deep to water	1.00
		Slope	0.01				
20:							
Shambo--------------	48	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.99	Deep to water	1.00
20B:							
Shambo--------------	59	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.99	Deep to water	1.00
21B:							
Morton--------------	58	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.14		
Farland-------------	19	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.34	Deep to water	1.00
22F:							
Cabba---------------	41	Somewhat limited		Very limited		Very limited	
		Slope	0.94	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.66	Piping	1.00		
		Seepage	0.02				
Rock outcrop--------	28	Not rated		Not rated		Not rated	

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
22F:(cont.)							
Chama	13	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Slope	0.28	Piping	0.50		
		Depth to bedrock	0.11				
23C:							
Morton	40	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.14		
Cabba	10	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Seepage	0.02	Piping	1.00		
26:							
Grail	49	Somewhat limited		Not limited		Somewhat limited	
		Seepage	0.01			Slow refill	0.99
						Deep to water	0.90
						Cutbanks cave	0.10
27:							
Belfield	49	Not limited		Somewhat limited		Very limited	
				Piping	0.98	Deep to water	1.00
				Salinity	0.12		
Grail	26	Somewhat limited		Not limited		Somewhat limited	
		Seepage	0.01			Slow refill	0.99
						Deep to water	0.90
						Cutbanks cave	0.10
27B:							
Grail	33	Somewhat limited		Not limited		Very limited	
		Seepage	0.01			Deep to water	1.00
Belfield	33	Not limited		Somewhat limited		Very limited	
				Piping	0.98	Deep to water	1.00
				Salinity	0.12		
28:							
Belfield	45	Not limited		Somewhat limited		Very limited	
				Piping	0.98	Deep to water	1.00
				Salinity	0.12		
Daglum	32	Somewhat limited		Very limited		Very limited	
		Seepage	0.50	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		
28B:							
Belfield	43	Not limited		Somewhat limited		Very limited	
				Piping	0.98	Deep to water	1.00
				Salinity	0.12		
Daglum	35	Somewhat limited		Very limited		Very limited	
		Seepage	0.50	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
29:							
Savage--------------	61	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.02	Hard to pack	0.72	Deep to water	1.00
29B:							
Savage--------------	67	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.02	Hard to pack	0.72	Deep to water	1.00
29C:							
Savage--------------	58	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.02	Hard to pack	0.72	Deep to water	1.00
30:							
Regent--------------	63	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.11	Hard to pack	0.88	Deep to water	1.00
		Seepage	0.01	Thin layer	0.86		
Savage--------------	16	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.02	Hard to pack	0.72	Deep to water	1.00
30B:							
Regent--------------	71	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.11	Hard to pack	0.88	Deep to water	1.00
		Seepage	0.01	Thin layer	0.86		
Savage--------------	15	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.02	Hard to pack	0.72	Deep to water	1.00
30C:							
Regent--------------	49	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.11	Hard to pack	0.88	Deep to water	1.00
		Seepage	0.01	Thin layer	0.86		
Savage--------------	15	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.02	Hard to pack	0.72	Deep to water	1.00
31B:							
Regent--------------	38	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.11	Hard to pack	0.88	Deep to water	1.00
		Seepage	0.01	Thin layer	0.86		
Janesburg-----------	28	Somewhat limited		Very limited		Very limited	
		Seepage	0.47	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.11	Piping	1.00		
				Salinity	0.50		
31C:							
Regent--------------	32	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.11	Hard to pack	0.88	Deep to water	1.00
		Seepage	0.01	Thin layer	0.86		
Janesburg-----------	31	Somewhat limited		Very limited		Very limited	
		Seepage	0.47	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.11	Piping	1.00		
				Salinity	0.50		
35B:							
Moreau--------------	46	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.11	Hard to pack	0.88	Deep to water	1.00
				Thin layer	0.86		
				Salinity	0.03		

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
35C:							
Moreau--------------	46	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.11	Hard to pack	0.88	Deep to water	1.00
				Thin layer	0.86		
				Salinity	0.03		
Wayden--------------	17	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
				Hard to pack	0.88		
				Salinity	0.03		
35D:							
Moreau--------------	42	Somewhat limited		Somewhat limited		Very limited	
		Depth to bedrock	0.11	Hard to pack	0.88	Deep to water	1.00
		Slope	0.01	Thin layer	0.86		
				Salinity	0.03		
Wayden--------------	22	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Slope	0.01	Hard to pack	0.88		
				Salinity	0.03		
36:							
Lawther-------------	77	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.02	Hard to pack	1.00	Deep to water	1.00
				Salinity	0.50		
38B:							
Searing-------------	60	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.85	Deep to water	1.00
				Piping	0.61		
				Seepage	0.05		
Ringling------------	19	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	Deep to water	1.00
				Seepage	0.75		
40C:							
Rhoades-------------	40	Somewhat limited		Very limited		Very limited	
		Seepage	0.04	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		
Slickspots----------	21	Not rated		Not rated		Not rated	
Daglum--------------	16	Somewhat limited		Very limited		Very limited	
		Seepage	0.50	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		
41B:							
Daglum--------------	50	Somewhat limited		Very limited		Very limited	
		Seepage	0.54	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		
Rhoades-------------	25	Somewhat limited		Very limited		Very limited	
		Seepage	0.04	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
41C:							
Daglum	34	Somewhat limited		Very limited		Very limited	
		Seepage	0.50	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		
Rhoades	26	Somewhat limited		Very limited		Very limited	
		Seepage	0.03	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		
42F:							
Dogtooth	33	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.11	Thin layer	1.00	Deep to water	1.00
		Slope	0.04	Piping	1.00		
		Seepage	0.01	Salinity	0.50		
Janesburg	22	Somewhat limited		Very limited		Very limited	
		Seepage	0.47	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.11	Piping	1.00		
		Slope	0.04	Salinity	0.50		
Cabba	20	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Slope	0.12	Piping	1.00		
		Seepage	0.02				
43C:							
Rhoades	31	Somewhat limited		Very limited		Very limited	
		Seepage	0.04	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		
				Seepage	0.03		
Daglum	28	Somewhat limited		Very limited		Very limited	
		Seepage	0.54	Thin layer	1.00	Deep to water	1.00
				Hard to pack	1.00		
				Salinity	0.50		
				Seepage	0.03		
44B:							
Ekalaka	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Deep to water	1.00
				Thin layer	1.00		
				Salinity	0.50		
				Seepage	0.08		
Lakota	32	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Deep to water	1.00
				Thin layer	1.00		
				Salinity	0.50		
				Seepage	0.03		
45:							
Harriet	80	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.72	Depth to saturated zone	1.00	Salty water	0.78
						Slow refill	0.28
				Thin layer	1.00	Cutbanks cave	0.10
				Hard to pack	1.00		
				Salinity	0.50		

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
46C:							
Lakota	45	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Deep to water	1.00
				Thin layer	1.00		
				Salinity	0.50		
				Seepage	0.03		
Ekalaka	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Deep to water	1.00
				Thin layer	1.00		
				Salinity	0.50		
				Seepage	0.08		
47B:							
Dogtooth	59	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.11	Thin layer	1.00	Deep to water	1.00
		Seepage	0.01	Piping	1.00		
				Salinity	0.50		
Janesburg	27	Somewhat limited		Very limited		Very limited	
		Seepage	0.47	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.11	Piping	1.00		
				Salinity	0.50		
48B:							
Desart	42	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Deep to water	1.00
				Thin layer	0.99		
				Salinity	0.12		
				Seepage	0.06		
Ekalaka	26	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Deep to water	1.00
				Thin layer	1.00		
				Salinity	0.50		
				Seepage	0.08		
Telfer	15	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.12	Deep to water	1.00
49B:							
Lefor	78	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Seepage	0.05		
51D:							
Vebar	32	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Seepage	0.09		
		Slope	0.01				
Flasher	16	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.72	Thin layer	1.00	Deep to water	1.00
		Seepage	0.43	Seepage	0.18		
		Slope	0.01				
Tally	15	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.07	Deep to water	1.00
		Slope	0.01				

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
51F:							
Flasher-------------	32	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.72	Thin layer	1.00	Deep to water	1.00
		Seepage	0.43	Seepage	0.18		
		Slope	0.18				
Vebar---------------	22	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.86	Deep to water	1.00
		Slope	0.28	Seepage	0.09		
		Depth to bedrock	0.11				
Parshall------------	15	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.53	Deep to water	1.00
		Slope	0.01				
52B:							
Vebar---------------	46	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Seepage	0.09		
Parshall------------	19	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.53	Deep to water	1.00
53B:							
Tally---------------	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.07	Deep to water	1.00
Parshall------------	28	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.06	Deep to water	1.00
53C:							
Tally---------------	61	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.07	Deep to water	1.00
Parshall------------	19	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.06	Deep to water	1.00
54C:							
Vebar---------------	54	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Seepage	0.03		
Flasher-------------	10	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.72	Thin layer	1.00	Deep to water	1.00
		Seepage	0.43	Seepage	0.09		
55B:							
Beisigl-------------	46	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Seepage	0.11		
Lihen---------------	29	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.12	Deep to water	1.00
56:							
Parshall------------	68	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.06	Deep to water	1.00

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
57D:							
Beisigl-------------	42	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Seepage	0.11		
		Slope	0.01				
Flasher-------------	28	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.72	Thin layer	1.00	Deep to water	1.00
		Seepage	0.43	Seepage	0.09		
		Slope	0.01				
58B:							
Lihen---------------	38	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.99	Deep to water	1.00
Parshall------------	15	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.53	Deep to water	1.00
59F:							
Flasher-------------	35	Somewhat limited		Very limited		Very limited	
		Slope	0.88	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.72	Seepage	0.18		
		Seepage	0.43				
Rock outcrop--------	22	Not rated		Not rated		Not rated	
Vebar---------------	13	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.86	Deep to water	1.00
		Slope	0.64	Seepage	0.09		
		Depth to bedrock	0.11				
60D:							
Wabek---------------	27	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	Deep to water	1.00
		Slope	0.01				
Manning-------------	18	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.79	Deep to water	1.00
				Seepage	0.09		
62B:							
Manning-------------	66	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.79	Deep to water	1.00
				Seepage	0.09		
63B:							
Lehr----------------	37	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	Deep to water	1.00
				Seepage	0.01		
Stady---------------	27	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Deep to water	1.00
				Thin layer	0.85		
				Seepage	0.01		
64:							
Stady---------------	41	Very limited		Very limited		Very limited	
		Seepage	1.00	Piping	1.00	Deep to water	1.00
				Thin layer	0.85		
				Seepage	0.01		

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
65:							
Wanagan	76	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.07	Deep to water	1.00
66F:							
Wabek	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Thin layer	1.00	Deep to water	1.00
		Slope	0.18				
Cabba	15	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Slope	0.18	Piping	1.00		
		Seepage	0.02				
Shambo	13	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.99	Deep to water	1.00
		Slope	0.01				
67B:							
Virgelle	33	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Piping	0.90	Deep to water	1.00
				Thin layer	0.86		
				Seepage	0.12		
68D:							
Telfer	62	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.12	Deep to water	1.00
		Slope	0.01				
68E:							
Telfer	77	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.12	Deep to water	1.00
		Slope	0.12				
70:							
Bowbells	73	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.70	Piping	0.12	Slow refill	0.95
						Deep to water	0.90
						Cutbanks cave	0.10
71:							
Williams	47	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Deep to water	1.00
Bowbells	37	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.70	Piping	0.12	Slow refill	0.95
						Deep to water	0.90
						Cutbanks cave	0.10
71B:							
Williams	60	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Deep to water	1.00
Bowbells	27	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.70	Piping	0.12	Slow refill	0.95
						Deep to water	0.90
						Cutbanks cave	0.10

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
73B:							
Williams------------	45	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Deep to water	1.00
Reeder--------------	23	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Thin layer	0.86	Deep to water	1.00
		Depth to bedrock	0.11	Piping	0.64		
76C:							
Williams------------	35	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Deep to water	1.00
Zahl----------------	35	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.12	Deep to water	1.00
76D:							
Zahl----------------	45	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.12	Deep to water	1.00
		Slope	0.01				
Williams------------	21	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Deep to water	1.00
		Slope	0.01				
76F:							
Zahl----------------	50	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.12	Deep to water	1.00
		Slope	0.50				
Williams------------	24	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Deep to water	1.00
		Slope	0.12				
77:							
Temvik--------------	51	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.59	Deep to water	1.00
Wilton--------------	38	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.81	Deep to water	1.00
77B:							
Temvik--------------	50	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.59	Deep to water	1.00
Williams------------	16	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Deep to water	1.00
80:							
Breien--------------	67	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.22	Deep to water	1.00
82:							
Mckeen--------------	73	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Piping	0.69		

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
83:							
Mckeen--------------	78	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Cutbanks cave	1.00
				Depth to saturated zone	1.00		
				Piping	0.69		
85B:							
Banks---------------	70	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.33	Deep to water	1.00
86:							
Havrelon------------	78	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.62	Deep to water	1.00
87:							
Minnewaukan---------	82	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Cutbanks cave	1.00
				Ponding	1.00		
				Seepage	0.12		
88:							
Havrelon------------	73	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.70	Piping	0.50	Deep to water	1.00
91:							
Lohler--------------	47	Not limited		Somewhat limited		Very limited	
				Hard to pack	0.97	Slow refill	1.00
						Deep to water	0.90
						Cutbanks cave	0.10
98:							
Mandan--------------	59	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Deep to water	1.00
Linton--------------	15	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Deep to water	1.00
98B:							
Linton--------------	50	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Deep to water	1.00
Mandan--------------	24	Somewhat limited		Very limited		Very limited	
		Seepage	0.72	Piping	1.00	Deep to water	1.00
99F:							
Badland, outcrop----	51	Not rated		Not rated		Not rated	
Cabba---------------	32	Somewhat limited		Very limited		Very limited	
		Slope	0.88	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.66	Piping	1.00		
		Seepage	0.02				
100:							
Pits----------------	85	Not rated		Not rated		Not rated	
105:							
Dumps and Pits------	90	Not rated		Not rated		Not rated	

Table 18.--Water Management--Continued

Map symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
110:							
Ustorthents	65	Somewhat limited		Very limited		Very limited	
		Depth to bedrock	0.66	Thin layer	1.00	Deep to water	1.00
		Seepage	0.43				
115:							
Riverwash	95	Not rated		Not rated		Not rated	
154F:							
Arikara	33	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.94	Piping	0.75	Deep to water	1.00
		Seepage	0.72				
Shambo	13	Somewhat limited		Somewhat limited		Very limited	
		Seepage	0.72	Piping	0.99	Deep to water	1.00
		Slope	0.28				
Cabba	18	Somewhat limited		Very limited		Very limited	
		Slope	0.88	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.66	Piping	1.00		
		Seepage	0.02				
161F:							
Beisigl	35	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Thin layer	0.86	Deep to water	1.00
		Slope	0.64	Seepage	0.11		
		Depth to bedrock	0.11				
Flasher	30	Somewhat limited		Very limited		Very limited	
		Slope	0.94	Thin layer	1.00	Deep to water	1.00
		Depth to bedrock	0.72	Seepage	0.09		
		Seepage	0.43				
Arikara	24	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.94	Piping	0.75	Deep to water	1.00
		Seepage	0.72				
185B:							
Banks, slightly wet	70	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.33	Cutbanks cave	1.00
						Deep to water	0.79
186:							
Havrelon, slightly wet	85	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.70	Piping	0.62	Deep to water	0.79
						Slow refill	0.30
						Cutbanks cave	0.10
188:							
Havrelon, slightly wet	92	Somewhat limited		Somewhat limited		Somewhat limited	
		Seepage	0.70	Piping	0.50	Deep to water	0.90
						Slow refill	0.30
						Cutbanks cave	0.10
M-W:							
Miscellaneous water	100	Not rated		Not rated		Not rated	
W:							
Water	95	Not rated		Not rated		Not rated	

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and estimates of soil and water features listed in tables are explained on the following pages.

Soil properties are determined by or estimated from the field examination of soils and laboratory testing. During the survey, many shallow borings are made and examined to identify and classify soils and delineate them on soil maps. Samples are taken from some typical soils and tested in the laboratory to determine physical and chemical soil properties. Standard laboratory procedures are followed. Information from the laboratory and results from samples from similar soils in nearby areas are used to verify field observations and properties that cannot be estimated accurately in the field. The laboratory analyses also help to characterize key soils.

Estimates of soil properties shown in the tables include the range of soil texture, Atterberg limits, engineering classifications, and other physical and chemical properties of the major layers of each soil. Pertinent soil and water features are also given.

Each soil map unit was documented by at least one pedon description for each soil series identified in its name. Pedons were sampled for engineering properties. The analyses were made by the North Dakota State Department of Transportation.

Engineering Index Properties

Table 19, "Engineering Index Properties," gives estimates of the engineering classification and range of index properties for major layers of each named map unit component in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions of this publication, under the heading "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the "Glossary."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 1993) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1986).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups, from A-1 through A-7, on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6.

Rock fragments larger than 10 inches in diameter and 3 to 10 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. Estimates are based on test data from the survey area or from nearby areas and on field examination.

Estimates of grain-size distribution, liquid limit, and plasticity index are generally rounded to the nearest 5 percent. Thus, if the ranges of gradation and Atterberg limits extend a marginal amount (1 or 2 percentage points) across classification boundaries, the classification in the marginal zone is omitted in the table.

Physical Properties

Table 20, "Physical Properties of the Soils," shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions of this publication, under the heading "Soil Series and Their Morphology."

Clay consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. Clay determines the ability of soil to adsorb cations and retain moisture. Clay influences shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earth-moving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In Table 20, "Physical Properties of the Soils," the estimated range in moist bulk density of each major soil layer is expressed in grams per cubic centimeter of soil material less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. Moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, organic matter content, and soil structure.

Ksat (permeability/saturated hydraulic conductivity) refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems and septic tank absorption fields.

Available water capacity refers to the quantity of water the soil is capable of storing for use by plants. The range in the capacity for water storage is given in inches of water per inch of soil for each major soil layer. The capacity varies, depending on soil properties that affect retention of water and depth of the root zone. The most important soil properties are organic matter content, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain of moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The magnitude of the load on the soil and magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design features are often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are **low**, a change of less than 3 percent; **moderate**, 3 to 6 percent; and **high**, more than 6 percent. **Very high**, more than 9 percent, is sometimes used.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In Table 20, "Physical Properties of the Soils," the estimated range in organic matter content is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter in a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects available water capacity, infiltration rates, and tilth. It is a source of nitrogen and other nutrients for crops.

Erosion factor Kw indicates the susceptibility of a soil to sheet and rill erosion by water. Soil properties that influence erodibility are those that affect the infiltration rate, movement of water though the soil, water storage capacity of the soil, and those that allow the soil to resist dispersion, splashing, abrasion, and the transporting forces of rainfall and runoff. The most important soil properties are the content of silt, sand, and organic matter and soil structure and permeability. The factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are modified by the presence of rock fragments. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion.

Erosion factor Kf is similar to the erosion factor K, except it indicates the erodibility of only the fine-earth fraction, or the material less than 2 millimeters in size.

Soil-loss tolerance factor T is an estimate of the maximum annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is expressed in tons per acre per year. Ratings of 1 to 5 are used depending on soil properties and prior erosion. The criteria used in assigning a T factor to a soil include maintenance of an adequate rooting depth for crop production, potential reduction of crop yields, maintenance of water-control structures affected by sedimentation, prevention of gullying, and the value of nutrients lost through erosion.

Wind erodibility groups (WEG) are made up of soils that have similar properties affecting their resistance to wind erosion in cultivated areas. The groups indicate the susceptibility of soil to wind erosion. Soils are grouped according to the following distinctions:

WEG 1. Coarse sands, sands, fine sands, and very fine sands. These soils generally are not suitable for crops. They are extremely erodible, and vegetation is difficult to establish.

WEG 2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, and sapric soil material. These soils are very highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

WEG 3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

WEG 4L. Calcareous loams, silt loams, clay loams, and silty clay loams. These soils are highly erodible. Crops can be grown if intensive measures to control wind erosion are used.

WEG 4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay. These soils are highly erodible. Crops can be grown if measures to control wind erosion are used.

WEG 5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material. These soils are moderately erodible. Crops can be grown if measures to control wind erosion are used.

WEG 6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay. These soils are slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.

WEG 7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material. These soils are very slightly erodible. Crops can be grown if ordinary measures to control wind erosion are used.

WEG 8. Soils that are not subject to soil blowing because of rock fragments on the surface or because of surface wetness.

Wind erodibility index (I) is a numerical value indicating the potential annual soil loss due to wind erosion for a soil under a well defined set of climatic and management conditions. This factor is expressed as the average annual soil loss in tons per acre per year.

Chemical Properties

Table 21, "Chemical Properties of the Soils," shows estimates of some soil chemical properties that affect soil behavior. These estimates are given for the major layers of each named map unit component in the survey area. The estimates are based on test data for these and similar soils. These features are described in the following paragraphs.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given in the series descriptions of this publication, under the heading "Soil Series and Their Morphology."

Clay consists of mineral soil particles that are less than 0.002 millimeter in diameter. The estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material less than 2 millimeters in diameter.

Cation-exchange capacity is the total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations helps to prevent pollution of ground water.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Calcium carbonate equivalent is the percent of carbonates, by weight, in the soil. The availability of plant nutrients is influenced by the amount of carbonates in the soil. Incorporating nitrogen fertilizer into calcareous soils helps to prevent nitrite accumulation and ammonium-N volatilization. Calcium carbonate also affects susceptibility of a soil to wind erosion.

Gypsum is given as the percent, by weight, of hydrated calcium sulfates in the soil. Gypsum is partially soluble in water and can be dissolved and removed by water. Soils that have a high content of gypsum (more than 10 percent) may collapse if the gypsum is removed by percolating water.

Salinity is a measure of soluble salts in the soil at saturation. It is expressed as the electrical conductivity (EC) of the saturation extract, in millimhos per centimeter at 25 degrees C. Estimates are based on field and laboratory measurements at representative sites of nonirrigated soils. The salinity of irrigated soils is affected by the quality of the irrigation water and by the frequency of water application. Hence, the salinity of soils in individual fields can differ greatly from the value given in the table. Salinity affects the suitability of a soil for crop production, the stability of the soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is the measure of sodium relative to calcium and magnesium in the water extract from a saturated soil paste. Soils having a sodium adsorption ratio of 13 or more may be characterized by an increased dispersion of organic matter and clay particles, reduced permeability and aeration, and a general degradation of soil structure.

Water Features

Table 22, "Water Features," gives estimates of several important water features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Hydrologic soil groups are groups of soils that have the same runoff potential under similar storm and ground cover conditions. Soil properties that affect the runoff potential are those that influence the rate of infiltration in a bare soil after prolonged wetting and when the soil is not frozen. These properties include the depth to a seasonal high water table, the intake rate, permeability after prolonged wetting, and the depth to a very slowly permeable layer. The influences of ground cover and slope are treated independently and are not taken into account in hydrologic soil groups.

In the definitions of the hydrologic soil groups, the infiltration rate is the rate at which water enters the soil at the surface and is controlled by surface conditions. The transmission rate is the rate at which water moves through the soil and is controlled by properties of the soil layers.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of very deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist mainly of moderately deep or deep, moderately well or well drained soils that have moderately fine to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist mainly of soils having a layer that impedes the downward movement of water or soils that have a moderately fine or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist mainly of clayey soils that have a high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

If a soil is assigned to two hydrologic groups, the first letter is for drained areas and the second is for undrained areas.

Water table (seasonal) refers to a zone in the soil that is at saturation in most years. It is at least 6 inches thick, persists in the soil for more than a few weeks, and is within 6 feet of the surface. Estimates of water table depths are based mainly on the evidence of a saturated zone that exists in a soil, namely a combination of grayish colors or redoximorphic features. Water tables may either be apparent or perched. An apparent water table is indicated by the level at which water stands in a freshly dug, unlined borehole after adequate time is allowed for adjustments in the surrounding soil. A perched water table is water standing above an unsaturated zone in the soil. A perched water table may be separated from a lower water table by an unsaturated zone. Water tables usually are perched by textural discontinuities in the soil profile. A perched water table may be confirmed if the water level in a borehole falls when the borehole is extended.

Indicated in Table 22, "Water Features," are the **upper limit** and **lower limit** in the depth of the water table found in the soil in most years. These depth ranges are given to the nearest tenth of a foot and are listed by month. If no water table exists in the soil, no information is given.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Ponding of soils is classified according to the depth, duration, frequency, and the beginning and ending months in which water is observed.

Surface water depth is the maximum depth of surface water that is ponded on the soil.

Ponding duration is the average length of time of the ponding occurrence. Ponding duration classes are **very brief** (less than 2 days), **brief** (2 to 7 days), **long** (7 to 30 days), or **very long** (more than 30 days).

Ponding frequency is the number of times ponding occurs over a period of time. Ponding frequency classes are **none** (no reasonable possibility of ponding), **rare** (ponding unlikely but possible under unusual weather conditions; 0 to 5 percent chance of ponding in any year); **occasional** (ponding is expected infrequently under usual weather conditions; 5 to 50 percent chance of ponding in any year); and **frequent** (ponding is likely to occur under usual weather conditions; more than 50 percent chance in any year).

Flooding, the temporary covering of the soil surface by flowing water, is caused by overflow from streams or by runoff from adjacent slopes. Shallow water standing or flowing for short periods after rainfall or snowmelt is not considered flooding. Standing water in marshes and swamps or in closed depressions is considered to be ponding.

Table 22, "Water Features," gives the **duration** and **frequency** of flooding and the time of year when flooding is most likely to occur. Flooding frequency classes are identical to ponding frequency classes. Flooding duration classes are **extremely brief** (0.1 to 4 hours), **very brief** (4 to 48 hours), **brief** (2 to 7 days), **long** (7 to 30 days), and **very long** (more than 30 days). Frequency, duration, and probable dates of occurrence are estimated.

The information on flooding is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and little or no horizon development.

Also considered in making flooding estimates are local information about the extent and level of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

Soil Features

Table 23, "Soil Features," gives estimates of several important soil features used in land use planning that involves engineering considerations. These features are described in the following paragraphs.

Restrictive layers are nearly continuous soil layers that significantly reduce the movement of water and air through the soil or that otherwise provide an unfavorable root environment. Restriction **kind** is the type of restriction. Examples of restrictions include bedrock, cemented layers, and dense layers. Restriction **thickness** is the distance from the top to the bottom of a restrictive layer. Restriction **hardness** refers to the rupture resistance or strength of the layer.

Potential frost action is the likelihood of upward or lateral expansion of the soil caused by the formation of segregated ice lenses (frost heave) and the subsequent collapse of the soil and loss of strength on thawing. Frost action occurs when moisture moves into the freezing zone of the soil. Temperature, texture, density, permeability, organic matter content, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed the soil is not insulated by vegetation or snow and is not artificially drained. Silty and highly- structured clayey soils that have a high water table in winter are the most susceptible to frost action. Well drained, very gravelly, or very sandy soils are the least susceptible. Frost heave and low soil strength during thawing cause damage to pavements and other rigid structures.

A **low** potential for frost action indicates that the soil is rarely susceptible to the formation of ice lenses; a **moderate** potential indicates that the soil is susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength; and a **high** potential indicates that the soil is highly susceptible to formation of ice lenses, resulting in frost heave and the subsequent loss of soil strength.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil.

Special site examination and design features may be needed if the combination of factors results in a severe hazard of corrosion. Steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For **uncoated steel**, the risk of corrosion, expressed as **low**, **moderate**, or **high**, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For **concrete**, the risk of corrosion is also expressed as **low**, **moderate**, or **high**. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Hydric Soils

Table 24, "Hydric Soils List," shows which map units have components that meet the definition of hydric soils in Morton County. This table can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; USDA-NRCS, 1998.) Map units that are made up of hydric soils may have small areas or inclusions, of nonhydric soils in the higher positions on the landform, and map units made up of nonhydric soils may have inclusions of hydric soils in the lower positions of the landform.

Three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin, et al., 1979; Environmental Laboratory, 1987; National Research Council, 1995; Tiner, 1985). Criteria for each of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria which identify those estimated soil properties unique to hydric soils have been established (Federal Register, 1995.) These criteria are used to identify a phase of a soil series that normally is associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) “Keys to Soil Taxonomy” (Soil Survey Staff, 1998a), and in the "Soil Survey Manual" (Soil Survey Staff, 1993.)

If soils are wet enough for a long enough period to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators that can be used to make onsite determinations of hydric soils in Morton County are specified in "Field Indicators of Hydric Soils in the United States" (USDA-NRCS, 1998).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described as deep as necessary to understand the redoximorphic processes. Then, using the completed soil description, soil scientists can compare soil features required by each hydric soil indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if one (or more) of the approved indicators is present.

This survey can be used to locate probable areas of hydric soils. The hydric soil may have been artificially drained or otherwise altered such that it no longer supports a predominance of hydrophytic vegetation. The soil map does not identify drained areas.

Table 19.-Engineering Index Properties

(The symbol < means less than; > means greater than. Dashes (—) indicate that an assignment has not been made.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
1:												
Tonka-----------	0-13	Silt loam, loam	CL	A-6	0-1	0-2	100	95-100	85-100	60-90	25-35	10-15
	13-19	Loam, silt loam, very fine sandy loam	CL	A-4, A-6	0-1	0-2	100	95-100	85-100	50-90	25-35	8-15
	19-34	Silty clay loam, clay loam, silty clay, clay	MH	A-7-5	0-1	0-2	100	95-100	90-100	70-95	50-60	10-20
	34-50	Clay loam, silty clay loam, clay, silty clay	CH, CL	A-7-6	0-1	0-3	90-100	85-100	60-100	50-90	45-55	20-30
	50-60	Clay loam, silty clay loam, loam, sandy clay loam	CL	A-7-6, A-6	0-1	0-3	90-100	85-100	60-100	50-90	30-50	10-25
3:												
Velva-----------	0-6	Fine sandy loam, sandy loam, very fine sandy loam	CL-ML, CL, SC-SM, SC	A-4	0	0	100	100	60-95	35-65	20-30	4-10
	6-13	Fine sandy loam, very fine sandy loam, loam	SC, CL, SC-SM, CL-ML	A-4	0	0	100	100	60-95	30-65	20-30	4-10
	13-60	Stratified very fine sandy loam to loam	CL-ML, CL, SC-SM, SC	A-4	0	0	100	100	70-95	40-75	20-30	4-10

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
4: Lallie----------	0-2	Silty clay loam, clay loam	CL, CH	A-6, A-7-6	0	0	100	100	85-100	60-95	40-55	20-35
	2-24	Silty clay loam, silty clay	CH, CL	A-7-6, A-6	0	0	100	95-100	90-100	85-100	40-60	20-40
	24-32	Silty clay, silty clay loam	CH, CL	A-7-6, A-6	0	0	100	95-100	90-100	85-100	40-65	20-40
	32-60	Silty clay, silty clay loam	CH, CL	A-7-6, A-6	0	0	100	95-100	90-100	85-100	40-65	20-40
5: Dimmick---------	0-3	Moderately decomposed plant material	PT	A-8	0	0	—	—	—	—	—	—
	3-23	Silty clay, clay	MH	A-7	0	0	100	100	90-100	75-95	55-65	25-30
	23-63	Clay, silty clay	MH	A-7	0	0	100	100	90-100	75-95	55-75	25-40
6: Heil------------	0-3	Silt loam	CL	A-6	0	0	100	100	90-100	70-100	30-40	10-15
	3-24	Silty clay, clay	CH, MH	A-7-6	0	0	100	100	90-100	75-100	55-70	25-40
	24-38	Silty clay, clay, silty clay loam, clay loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	70-95	40-60	15-30
	38-52	Silty clay, clay, silty clay loam, clay loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	70-95	40-60	15-30
	52-60	Silty clay, silty clay loam, loam, clay, clay loam	CH, ML	A-7-6, A-6	0	0	100	100	85-100	60-95	35-60	10-30

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 inches	Fragments 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
7:												
Korell----------	0-8	Loam, silt loam	CL	A-6	0	0	100	100	85-95	60-75	25-35	10-15
	8-15	Loam, silt loam	CL	A-6	0	0	100	100	85-95	65-85	25-35	10-15
	15-48	Loam, silt loam	CL	A-6	0	0	100	100	85-95	65-85	25-35	10-15
	48-60	Stratified fine sandy loam to clay loam	CL	A-6	0	0	100	100	85-95	65-85	23-40	10-15
8:												
Straw-----------	0-5	Loam, silt loam	CL	A-6	0	0	95-100	90-100	85-100	60-90	25-35	10-15
	5-23	Loam, silt loam	CL	A-6	0	0	95-100	90-100	85-100	60-90	25-35	10-15
	23-30	Silty clay loam, clay loam, silt loam, loam	CL	A-6	0	0	95-100	90-100	85-100	60-90	25-40	10-20
	30-36	Loam, clay loam, silt loam	CL	A-6, A-7-6	0	0	95-100	90-100	85-100	60-90	30-45	10-20
	36-40	Silty clay loam, loam, silt loam, clay loam	CL	A-6, A-7-6	0	0	95-100	90-100	85-100	60-90	30-45	10-20
	40-66	Clay loam, silt loam, loam	CL	A-6, A-7-6	0	0	95-100	90-100	85-100	60-90	30-45	10-20
9:												
Channel---------	—	—	—	—	—	—	—	—	—	—	—	—
Straw-----------	0-5	Loam, silt loam	CL	A-6	0	0	95-100	90-100	85-100	60-90	25-35	10-15
	5-23	Loam, silt loam	CL	A-6	0	0	95-100	90-100	85-100	60-90	25-35	10-15
	23-30	Silty clay loam, loam, silt loam, clay loam	CL	A-6	0	0	95-100	90-100	85-100	60-90	25-40	10-20
	30-36	Clay loam, silt loam, loam	CL	A-6, A-7-6	0	0	95-100	90-100	85-100	60-90	30-45	10-20
	36-40	Silty clay loam, loam, silt loam, clay loam	CL	A-7-6, A-6	0	0	95-100	90-100	85-100	60-90	30-45	10-20
	40-66	Clay loam, silt loam, loam	CL	A-6, A-7-6	0	0	95-100	90-100	85-100	60-90	30-45	10-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
9:(cont.)												
Velva-----------	0-6	Fine sandy loam, sandy loam, very fine sandy loam	CL-ML, CL, SC-SM, SC	A-4	0	0	100	100	60-95	35-65	20-30	4-10
	6-13	Fine sandy loam, very fine sandy loam, loam	SC, CL, SC-SM, CL-ML	A-4	0	0	100	100	60-95	30-65	20-30	4-10
	13-60	Stratified fine sandy loam to very fine sandy loam to loam	CL-ML, SC-SM, CL, SC	A-4	0	0	100	100	70-95	40-75	20-30	4-10
10:												
Arnegard--------	0-13	Loam	CL	A-6	0	0	100	100	85-95	60-85	25-35	10-15
	13-36	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-100	50-85	30-40	10-20
	36-60	Loam, clay loam, fine sandy loam	CL, SC	A-4, A-6	0	0	100	100	70-100	40-80	25-40	8-20
10B:												
Arnegard--------	0-13	Loam	CL	A-6	0	0	100	100	85-95	60-85	25-35	10-15
	13-36	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-100	50-85	30-40	10-20
	36-60	Loam, clay loam, fine sandy loam	CL, SC	A-4, A-6	0	0	100	100	70-100	40-80	25-40	8-20
11:												
Amor------------	0-8	Loam	CL	A-4, A-6	0	0	100	95-100	85-90	60-70	25-35	8-15
	8-19	Loam, clay loam	CL	A-6	0	0	100	95-100	90-100	65-85	30-40	10-20
	19-31	Loam, clay loam, fine sandy loam	CL	A-6	0	0	100	95-100	75-100	50-80	30-40	10-20
	31-60	Bedrock			—	—	—	—	—	—	15-45	1-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
11:(cont.)												
Arnegard--------	0-13	Loam	CL	A-6	0	0	100	100	85-95	60-85	25-35	10-15
	13-36	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-100	50-85	30-40	10-20
	36-60	Loam, clay loam, fine sandy loam	CL, SC	A-4, A-6	0	0	100	100	70-100	40-80	25-40	8-20
11B:												
Amor------------	0-8	Loam	CL	A-4, A-6	0	0	100	95-100	85-90	60-70	25-35	8-15
	8-19	Loam, clay loam	CL	A-6	0	0	100	95-100	90-100	65-85	30-40	10-20
	19-31	Loam, clay loam, fine sandy loam	CL	A-6	0	0	100	95-100	75-100	50-80	30-40	10-20
	31-60	Bedrock			—	—	—	—	—	—	15-45	1-20
Shambo----------	0-9	Loam, silt loam	CL	A-6	0	0	100	100	85-95	60-75	25-35	10-15
	9-13	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	13-29	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	29-48	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	48-60	Loam, silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	85-95	60-75	30-45	10-20
12C:												
Amor------------	0-8	Loam	CL	A-4, A-6	0	0	100	95-100	85-90	60-70	25-35	8-15
	8-19	Loam, clay loam	CL	A-6	0	0	100	95-100	90-100	65-85	30-40	10-20
	19-31	Loam, clay loam, fine sandy loam	CL	A-6	0	0	100	95-100	75-100	50-80	30-40	10-20
	31-60	Bedrock			—	—	—	—	—	—	15-45	1-20
Cabba-----------	0-3	Loam, silt loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
13D:												
Amor------------	0-8	Loam	CL	A-4, A-6	0	0	100	95-100	85-90	60-70	25-35	8-15
	8-19	Loam, clay loam	CL	A-6	0	0	100	95-100	90-100	65-85	30-40	10-20
	19-31	Loam, clay loam, fine sandy loam	CL	A-6	0	0	100	95-100	75-100	50-80	30-40	10-20
	31-60	Bedrock			—	—	—	—	—	—	15-45	1-20
Cabba-----------	0-3	Loam, silt loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
15B:												
Chama-----------	0-4	Silt loam, loam	CL	A-4, A-6	0	0	100	100	90-100	70-90	25-35	8-15
	4-8	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-100	30-45	10-20
	8-34	Silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	80-100	30-45	10-20
	34-60	Bedrock			—	—	—	—	—	—	20-45	4-20
Cabba-----------	0-3	Silt loam, loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
15C:												
Chama-----------	0-4	Silt loam, loam	CL	A-4, A-6	0	0	100	100	90-100	70-90	25-35	8-15
	4-8	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-100	30-45	10-20
	8-34	Silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	80-100	30-45	10-20
	34-60	Bedrock			—	—	—	—	—	—	20-45	4-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
15C:(cont.)												
Cabba-----------	0-3	Silt loam, loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
Sen-------------	0-6	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	25-35	10-15
	6-17	Silt loam, silty clay loam, loam	CL	A-6, A-7	0	0	100	100	85-100	60-95	30-45	10-20
	17-34	Silt loam, silty clay loam	CL	A-6	0	0	100	100	85-100	60-95	25-40	10-20
	34-60	Bedrock			—	—	—	—	—	—	—	—
15D:												
Cabba-----------	0-3	Silt loam, loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
Chama-----------	0-4	Silt loam, loam	CL	A-4, A-6	0	0	100	100	90-100	70-90	25-35	8-15
	4-8	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-100	30-45	10-20
	8-34	Silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	80-100	30-45	10-20
	34-60	Bedrock			—	—	—	—	—	—	20-45	4-20
Sen-------------	0-6	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	25-35	10-15
	6-17	Silt loam, silty clay loam, loam	CL	A-6, A-7	0	0	100	100	85-100	60-95	30-45	10-20
	17-34	Silt loam, silty clay loam	CL	A-6	0	0	100	100	85-100	60-95	25-40	10-20
	34-60	Bedrock			—	—	—	—	—	—	—	—

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
15F:												
Cabba-----------	0-3	Silt loam, loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
Chama-----------	0-4	Silt loam, loam	CL	A-4, A-6	0	0	100	100	90-100	70-90	25-35	8-15
	4-8	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-100	30-45	10-20
	8-34	Silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	80-100	30-45	10-20
	34-60	Bedrock			—	—	—	—	—	—	20-45	4-20
Arnegard--------	0-13	Loam	CL	A-6	0	0	100	100	85-95	60-85	25-35	10-15
	13-36	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-100	50-85	30-40	10-20
	36-60	Loam, clay loam, fine sandy loam	CL, SC	A-4, A-6	0	0	100	100	70-100	40-80	25-40	8-20
16D:												
Ringling--------	0-5	Loam	CL	A-6	0	0-10	90-100	75-100	75-90	50-65	25-35	10-15
	5-17	Very channery loam, extremely channery loam	SC-SM, SC, GC, GC-GM	A-2-6	0	10-40	25-60	15-50	15-40	10-35	25-35	10-15
	17-42	Channers	GW	A-1-a	0	80-85	15-25	5-10	0-5	0-5	10-15	NP-1
	42-60	Channers	GW	A-1-a	0	80-85	15-25	5-10	0-5	0-5	10-15	NP-1
Daglum----------	0-7	Loam, silt loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	7-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-18	Clay, silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	18-32	Clay loam, clay, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	32-60	Clay, clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	85-100	65-95	45-70	20-40

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
16F:												
Brandenburg-----	0-4	Channery loam	CL, CL-ML, GC-GM, SC	A-2-4, A-4, A-6, A-2-6	0	0-5	60-100	40-80	35-75	30-65	20-35	4-15
	4-10	Very channery loam, extremely channery loam, very channery sandy loam	CL, GM, ML, SM, CL-ML	A-2-6, A-4, A-6, A-2-4	0	0-5	45-100	40-80	35-75	30-65	15-35	1-15
	10-60	Channers	GW	A-1-a	0	80-85	15-25	5-10	0-5	0	15-20	NP-1
Cabba-----------	0-3	Loam, silt loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Loam, silt loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			---	---	---	---	---	---	20-45	4-20
Savage----------	0-7	Silty clay loam, clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	85-95	40-50	15-25
	7-25	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	100	95-100	85-95	50-65	20-30
	25-51	Silty clay, clay, silty clay loam	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
	51-60	Silty clay loam, silty clay, clay	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
17B:												
Sen-------------	0-6	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	25-35	10-15
	6-17	Silt loam, silty clay loam, loam	CL	A-6, A-7	0	0	100	100	85-100	60-95	30-45	10-20
	17-34	Silt loam, silty clay loam	CL	A-6	0	0	100	100	85-100	60-95	25-40	10-20
	34-60	Bedrock			---	---	---	---	---	---	---	---

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
17B:(cont.)												
Chama-----------	0-4	Silt loam, loam	CL	A-4, A-6	0	0	100	100	90-100	70-90	25-35	8-15
	4-8	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-100	30-45	10-20
	8-34	Silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	80-100	30-45	10-20
	34-60	Bedrock			—	—	—	—	—	—	20-45	4-20
18B:												
Reeder----------	0-8	Loam	CL	A-6	0	0	90-100	85-100	85-90	60-70	25-35	10-15
	8-17	Clay loam, loam, sandy clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	60-80	30-45	10-20
	17-36	Loam, clay loam, sandy loam	CL, SC	A-6, A-7-6	0	0-5	85-100	80-100	65-100	45-80	30-45	10-20
	36-60	Bedrock			—	—	—	—	—	—	—	—
Farnuf----------	0-9	Loam	CL	A-6	0	0	100	100	90-95	70-80	25-35	10-15
	9-23	Loam, clay loam	CL	A-6, A-7-6	0	0	100	100	80-95	55-85	35-45	15-20
	23-34	Loam, clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	80-95	70-95	30-45	10-20
	34-60	Stratified fine sandy loam to silty clay loam	CL	A-6, A-4	0	0	100	100	75-100	70-100	25-30	8-20
19:												
Farland---------	0-4	Silt loam	CL	A-6	0	0	100	100	85-100	70-90	25-35	10-15
	4-18	Silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-95	35-45	15-20
	18-34	Loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	80-90	30-45	10-20
	34-60	Stratified loam to silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-95	30-45	10-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
19B:												
Farland---------	0-4	Silt loam	CL	A-6	0	0	100	100	85-100	70-90	25-35	10-15
	4-18	Silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-95	35-45	15-20
	18-34	Loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	80-90	30-45	10-20
	34-60	Stratified loam to silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-95	30-45	10-20
19C:												
Farland---------	0-4	Silt loam	CL	A-6	0	0	100	100	85-100	70-90	25-35	10-15
	4-18	Silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-95	35-45	15-20
	18-34	Loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	80-90	30-45	10-20
	34-60	Stratified loam to silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-95	30-45	10-20
19D:												
Farland---------	0-4	Silt loam	CL	A-6	0	0	100	100	85-100	70-90	25-35	10-15
	4-18	Silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-95	35-45	15-20
	18-34	Loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	80-90	30-45	10-20
	34-60	Stratified loam to silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-95	30-45	10-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
20:												
Shambo----------	0-9	Loam, silt loam	CL	A-6	0	0	100	100	85-95	60-75	25-35	10-15
	9-13	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	13-29	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	29-48	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	48-60	Loam, silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	85-95	60-75	30-45	10-20
20B:												
Shambo----------	0-9	Loam, silt loam	CL	A-6	0	0	100	100	85-95	60-75	25-35	10-15
	9-13	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	13-29	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	29-48	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	48-60	Loam, silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	85-95	60-75	30-45	10-20
21B:												
Morton----------	0-5	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	25-35	10-15
	5-15	Silty clay loam, silt loam	CL	A-7-6, A-6	0	0	100	100	95-100	70-95	35-45	15-25
	15-33	Loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	85-100	60-95	30-45	10-25
	33-60	Bedrock			—	—	—	—	—	—	20-45	4-25

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
21B:(cont.)												
Farland---------	0-4	Silt loam	CL	A-6	0	0	100	100	85-100	70-90	25-35	10-15
	4-18	Silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-95	35-45	15-20
	18-34	Loam, silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	80-90	30-45	10-20
	34-60	Stratified loam to silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-95	30-45	10-20
22F:												
Cabba-----------	0-3	Silt loam, loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
Rock outcrop----	—	—	—	—	—	—	—	—	—	—	—	—
Chama-----------	0-4	Silt loam, loam	CL	A-4, A-6	0	0	100	100	90-100	70-90	25-35	8-15
	4-8	Silt loam, silty clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	80-100	30-45	10-20
	8-34	Silt loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	80-100	30-45	10-20
	34-60	Bedrock			—	—	—	—	—	—	20-45	4-20
23C:												
Morton----------	0-5	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	25-35	10-15
	5-15	Silty clay loam, silt loam	CL	A-6, A-7-6	0	0	100	100	95-100	70-95	35-45	15-25
	15-33	Loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-95	30-45	10-25
	33-60	Bedrock			—	—	—	—	—	—	20-45	4-25

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
23C:(cont.)												
Cabba-----------	0-3	Silt loam, loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
26:												
Grail-----------	0-10	Silty clay loam	CL, ML	A-6, A-7-6	0	0	100	95-100	95-100	85-95	40-50	15-20
	10-24	Silty clay, silty clay loam, clay	CL, CH	A-7-6	0	0	100	95-100	95-100	70-95	45-55	20-30
	24-52	Silty clay loam, clay loam, silty clay	CL, CH	A-6, A-7-6	0	0	100	95-100	90-100	65-95	40-55	15-30
	52-60	Silty clay loam, loam, clay	CL, CH	A-6, A-7-6	0	0	100	95-100	85-100	60-95	30-55	10-30
27:												
Belfield--------	0-9	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-50	15-20
	9-12	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-50	15-20
	12-17	Silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-100	45-60	20-30
	17-24	Silty clay loam, silty clay, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-100	45-60	20-30
	24-43	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-60	15-30
	43-60	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-60	15-30

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
27: (cont.)												
Grail-----------	0-10	Silty clay loam	CL, ML	A-6, A-7-6	0	0	100	95-100	95-100	85-95	40-50	15-20
	10-24	Silty clay, silty clay loam, clay	CL, CH	A-7-6	0	0	100	95-100	95-100	70-95	45-55	20-30
	24-52	Silty clay loam, clay loam, silty clay	CL, CH	A-6, A-7-6	0	0	100	95-100	90-100	65-95	40-55	15-30
	52-60	Silty clay loam, loam, clay	CL, CH	A-6, A-7-6	0	0	100	95-100	85-100	60-95	30-55	10-30
27B:												
Grail-----------	0-10	Silty clay loam	CL, ML	A-6, A-7-6	0	0	100	95-100	95-100	85-95	40-50	15-20
	10-24	Silty clay, silty clay loam, clay	CL, CH	A-7-6	0	0	100	95-100	95-100	70-95	45-55	20-30
	24-52	Silty clay loam, clay loam, silty clay	CL, CH	A-6, A-7-6	0	0	100	95-100	90-100	65-95	40-55	15-30
	52-60	Silty clay loam, loam, clay	CL, CH	A-6, A-7-6	0	0	100	95-100	85-100	60-95	30-55	10-30
Belfield--------	0-9	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-50	15-20
	9-12	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-50	15-20
	12-17	Silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-100	45-60	20-30
	17-24	Silty clay loam, silty clay, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-100	45-60	20-30
	24-43	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-60	15-30
	43-60	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-60	15-30

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
28:												
Belfield--------	0-9	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	9-12	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-50	15-20
	12-17	Silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-100	45-60	20-30
	17-24	Silty clay loam, silty clay, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-100	45-60	20-30
	24-43	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-60	15-30
	43-60	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-60	15-30
Daglum----------	0-7	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	7-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-18	Clay, silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	18-32	Clay loam, clay, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	32-60	Clay, clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	85-100	65-95	45-70	20-40

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
28B:												
Belfield--------	0-9	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	9-12	Silty clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-50	15-20
	12-17	Silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-100	45-60	20-30
	17-24	Silty clay loam, silty clay, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-100	45-60	20-30
	24-43	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-60	15-30
	43-60	Clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	90-100	70-100	40-60	15-30
Daglum----------	0-7	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	7-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-18	Clay, silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	18-32	Clay loam, clay, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	32-60	Clay, clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	85-100	65-95	45-70	20-40
29:												
Savage----------	0-7	Silty clay loam, clay loam	CL	A-6, A-7-6	0	0	100	95-100	90-100	85-95	40-50	15-25
	7-25	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	100	95-100	85-95	50-65	20-30
	25-51	Silty clay, clay, silty clay loam	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
	51-60	Silty clay loam, silty clay, clay	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
29B:												
Savage----------	0-7	Silty clay loam, clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	85-95	40-50	15-25
	7-25	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	100	95-100	85-95	50-65	20-30
	25-51	Silty clay, clay, silty clay loam	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
	51-60	Silty clay loam, silty clay, clay	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
29C:												
Savage----------	0-7	Silty clay loam, clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	85-95	40-50	15-25
	7-25	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	100	95-100	85-95	50-65	20-30
	25-51	Silty clay, clay, silty clay loam	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
	51-60	Silty clay loam, silty clay, clay	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
30:												
Regent----------	0-10	Silty clay loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	80-100	40-55	15-25
	10-26	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	26-39	Silty clay loam, silty clay, clay	CL, CH	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	39-60	Bedrock			—	—	—	—	—	—	—	—

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
30:(cont.)												
Savage----------	0-7	Silty clay loam, clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	85-95	40-50	15-25
	7-25	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	100	95-100	85-95	50-65	20-30
	25-51	Silty clay, clay, silty clay loam	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
	51-60	Silty clay loam, silty clay, clay	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
30B:												
Regent----------	0-10	Silty clay loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	80-100	40-55	15-25
	10-26	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	26-39	Silty clay loam, silty clay, clay	CL, CH	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	39-60	Bedrock			—	—	—	—	—	—	—	—
Savage----------	0-7	Silty clay loam, clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	85-95	40-50	15-25
	7-25	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	100	95-100	85-95	50-65	20-30
	25-51	Silty clay, clay, silty clay loam	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
	51-60	Silty clay loam, silty clay, clay	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
30C:												
Regent----------	0-10	Silty clay loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	80-100	40-55	15-25
	10-26	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	26-39	Silty clay loam, silty clay, clay	CL, CH	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	39-60	Bedrock			—	—	—	—	—	—	—	—

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
30C:(cont.)												
Savage----------	0-7	Silty clay loam, clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	85-95	40-50	15-25
	7-25	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	100	95-100	85-95	50-65	20-30
	25-51	Silty clay, clay, silty clay loam	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
	51-60	Silty clay loam, silty clay, clay	CH, MH	A-7-6	0	0	100	100	95-100	85-95	50-60	20-30
31B:												
Regent----------	0-10	Silty clay loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	80-100	40-55	15-25
	10-26	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	26-39	Silty clay loam, silty clay, clay	CL, CH	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	39-60	Bedrock			—	—	—	—	—	—	—	—
Janesburg-------	0-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-10	Silt loam, loam, fine sandy loam	CL, CL-ML	A-4, A-6	0	0	100	100	70-100	30-90	25-40	4-15
	10-21	Silty clay, silty clay loam, clay	CH, CL	A-7-6	0	0	100	100	70-100	60-95	45-60	20-30
	21-26	Silt loam, loam, clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	70-100	60-95	30-55	10-30
	26-60	Bedrock			—	—	—	—	—	—	25-100	4-60
31C:												
Regent----------	0-10	Silty clay loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	80-100	40-55	15-25
	10-26	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	26-39	Silty clay loam, silty clay, clay	CL, CH	A-7-6	0	0	100	100	90-100	80-100	45-60	20-30
	39-60	Bedrock			—	—	—	—	—	—	—	—

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
31C:(cont.)												
Janesburg-------	0-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-10	Silt loam, loam, fine sandy loam	CL, CL-ML	A-4, A-6	0	0	100	100	70-100	30-90	25-40	4-15
	10-21	Silty clay, silty clay loam, clay	CH, CL	A-7-6	0	0	100	100	70-100	60-95	45-60	20-30
	21-26	Silt loam, loam, clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	70-100	60-95	30-55	10-30
	26-60	Bedrock			—	—	—	—	—	—	25-100	4-60
35B:												
Moreau----------	0-6	Silty clay, clay	CH	A-7-6	0	0	100	100	90-100	70-100	55-65	30-40
	6-13	Silty clay, silty clay loam, clay	CH	A-7-6	0	0	100	100	90-100	75-100	50-75	30-50
	13-35	Silty clay, silty clay loam, clay	CH	A-7-6	0	0	100	100	90-100	75-100	50-75	30-50
	35-60	Bedrock			—	—	—	—	—	—	45-105	30-75
35C:												
Moreau----------	0-6	Silty clay, clay	CH	A-7-6	0	0	100	100	90-100	70-100	55-65	30-40
	6-13	Silty clay, silty clay loam, clay	CH	A-7-6	0	0	100	100	90-100	75-100	50-75	30-50
	13-35	Silty clay, silty clay loam, clay	CH	A-7-6	0	0	100	100	90-100	75-100	50-75	30-50
	35-60	Bedrock			—	—	—	—	—	—	45-105	30-75
Wayden----------	0-3	Silty clay, clay	CH	A-7	0	0	100	100	90-100	75-95	50-65	25-35
	3-15	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	100	90-100	75-95	50-65	20-30
	15-60	Bedrock			—	—	—	—	—	—	—	—

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
35D:												
Moreau----------	0-6	Silty clay, clay	CH	A-7-6	0	0	100	100	90-100	70-100	55-65	30-40
	6-13	Silty clay, silty clay loam, clay	CH	A-7-6	0	0	100	100	90-100	75-100	50-75	30-50
	13-35	Silty clay, silty clay loam, clay	CH	A-7-6	0	0	100	100	90-100	75-100	50-75	30-50
	35-60	Bedrock			—	—	—	—	—	—	45-105	30-75
Wayden----------	0-3	Silty clay, clay	CH	A-7	0	0	100	100	90-100	75-95	50-65	25-35
	3-15	Silty clay, clay, silty clay loam	MH	A-7	0	0	100	100	90-100	75-95	50-65	20-30
	15-60	Bedrock			—	—	—	—	—	—	—	—
36:												
Lawther---------	0-10	Silty clay, clay	CH	A-7-6	0	0	100	100	90-100	75-95	50-75	30-50
	10-33	Silty clay, clay, silty clay loam	CH	A-7-6	0	0	100	100	90-100	75-95	50-75	30-50
	33-47	Silty clay, clay, silty clay loam	CH	A-7-6	0	0	100	100	90-100	75-95	50-75	30-50
	47-60	Clay loam, silty clay loam, silty clay, clay	CH, CL	A-7-6, A-6	0	0	100	100	90-100	70-95	40-65	25-40
38B:												
Searing---------	0-8	Loam, silt loam	CL	A-6	0	0	100	100	85-95	65-85	25-35	10-15
	8-23	Loam, clay loam, silt loam	CL	A-6	0	0	100	100	85-100	65-85	25-35	10-15
	23-33	Very channery loam, channery loam	CL, SC	A-6	0	0-5	60-100	40-80	35-75	30-65	25-35	10-15
	33-60	Channers	GP, SP	A-1-a	—	25-35	45-55	5-10	0-5	0	10-15	NP-1

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
38B:(cont.)												
Ringling--------	0-5	Loam	CL	A-6	0	0-10	90-100	75-100	75-90	50-65	25-35	10-15
	5-17	Very channery loam, extremely channery loam	SC-SM, GC, GC-GM, SC	A-2-6	0	10-40	25-60	15-50	15-40	10-35	25-35	10-15
	17-42	Channers	GW	A-1-a	0	80-85	15-25	5-10	0-5	0-5	10-15	NP-1
	42-60	Channers	GW	A-1-a	0	80-85	15-25	5-10	0-5	0-5	10-15	NP-1
40C:												
Rhoades---------	0-3	Silt loam, loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-95	30-45	10-15
	3-8	Silty clay, clay loam, clay, silty clay loam	CH	A-7-6	0	0	100	100	90-100	80-95	50-65	25-35
	8-14	Silty clay, clay, clay loam, silty clay loam	CH	A-7-6	0	0	100	100	90-100	75-95	50-65	25-35
	14-46	Silty clay, clay, silty clay loam, clay loam, loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	70-95	35-60	10-30
	46-60	Silty clay loam, silt loam, loam, clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	85-100	75-95	35-60	10-30
Slickspots------	0-2	Silty clay	CH	A-7-6	0	0	100	100	90-100	80-100	50-70	25-40
	2-60	Stratified loam to silty clay	CH	A-7-6	0	0	100	100	90-100	60-100	30-60	10-30
Daglum----------	0-7	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	7-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-18	Clay, silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	18-32	Clay loam, clay, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	32-60	Clay, clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	85-100	65-95	45-70	20-40

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
41B:												
Daglum----------	0-7	Loam, silt loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	7-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-18	Clay, silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	18-32	Clay loam, clay, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	32-60	Clay, clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	85-100	65-95	45-70	20-40
Rhoades---------	0-3	Silt loam, loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-95	30-45	10-15
	3-8	Silty clay, clay loam, clay, silty clay loam	CH	A-7-6	0	0	100	100	90-100	80-95	50-65	25-35
	8-14	Silty clay, clay, clay loam, silty clay loam	CH	A-7-6	0	0	100	100	90-100	75-95	50-65	25-35
	14-46	Silty clay, clay, silty clay loam, clay loam, loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	70-95	35-60	10-30
	46-60	Silty clay loam, silt loam, loam, clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	85-100	75-95	35-60	10-30

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
41C:												
Daglum----------	0-5	Loam, silt loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	5-8	Clay loam, loam, silt loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-90	30-45	10-20
	8-18	Clay, silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	18-26	Silty clay, clay loam, clay	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	26-45	Silty clay, clay loam, silty clay loam, clay	CL, CH	A-7-6	0	0	100	100	85-100	65-95	45-70	20-40
	45-60	Bedrock			—	—	—	—	—	—	25-100	4-60
Rhoades---------	0-4	Silt loam, loam	CL	A-6, A-7-6	0	0	100	100	85-100	60-95	30-45	10-15
	4-11	Clay loam, silty clay, clay, silty clay loam	CH	A-7-6	0	0	100	100	90-100	80-95	50-65	25-35
	11-49	Clay loam, silty clay loam, clay, silty clay, loam	CH, CL	A-7-6, A-6	0	0	100	100	90-100	70-95	35-60	10-30
	49-60	Bedrock			—	—	—	—	—	—	—	—
42F:												
Dogtooth--------	0-2	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	2-8	Silty clay, silty clay loam, clay loam	CH	A-7-6	0	0	100	100	70-100	60-95	50-60	20-30
	8-13	Silty clay, silty clay loam, clay loam	CH	A-7-6	0	0	100	100	70-100	60-95	50-60	20-30
	13-21	Silty clay, silty clay loam, loam	CH, CL	A-6, A-7-6	0	0	100	100	70-100	60-95	30-60	10-30
	21-60	Bedrock			—	—	—	—	—	—	25-100	4-60

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
42F:(cont.)												
Janesburg-------	0-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-10	Silt loam, loam, fine sandy loam	CL, CL-ML	A-4, A-6	0	0	100	100	70-100	30-90	25-40	4-15
	10-21	Silty clay, silty clay loam, clay	CH, CL	A-7-6	0	0	100	100	70-100	60-95	45-60	20-30
	21-26	Silt loam, loam, clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	70-100	60-95	30-55	10-30
	26-60	Bedrock			—	—	—	—	—	—	25-100	4-60
Cabba-----------	0-3	Loam, silt loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Loam, silt loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
43C:												
Rhoades---------	0-3	Fine sandy loam	ML, SC-SM, SM	A-4, A-2-4	0	0	100	100	70-85	30-60	20-35	4-10
	3-8	Silty clay, clay loam, clay, silty clay loam	CH	A-7-6	0	0	100	100	90-100	80-95	50-65	25-35
	8-14	Silty clay, clay, clay loam, silty clay loam	CH	A-7-6	0	0	100	100	90-100	75-95	50-65	25-35
	14-46	Silty clay, clay, silty clay loam, clay loam, loam	CL, CH	A-7-6, A-6	0	0	100	100	90-100	70-95	35-60	10-30
	46-60	Silty clay loam, silt loam, loam, clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	85-100	75-95	35-60	10-30

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
43C: (cont.)												
Daglum----------	0-7	Fine sandy loam	SC-SM, CL-ML, CL	A-4, A-2	0	0	100	100	70-85	30-60	25-30	4-10
	7-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-18	Clay, silty clay, silty clay loam, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	18-32	Clay loam, clay, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	70-95	45-70	20-40
	32-60	Clay, clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	85-100	65-95	45-70	20-40
44B:												
Ekalaka---------	0-6	Fine sandy loam, sandy loam	CL-ML, CL, SC-SM, SC	A-2-4, A-4	0	0	100	100	60-95	30-65	20-30	4-10
	6-12	Fine sandy loam, very fine sandy loam, loamy fine sand	SM, ML, CL-ML, SC-SM, SC, CL	A-4, A-2-4	0	0	100	100	65-95	30-65	15-30	1-10
	12-17	Fine sandy loam, sandy loam, loam	CL-ML, CL, SC-SM, SC	A-4, A-2-4	0	0	100	100	70-100	30-70	20-30	4-10
	17-33	Fine sandy loam, loamy fine sand, fine sand, sandy loam	SC-SM, ML, SM, SC, CL-ML, CL	A-2-4, A-4	0	0	100	100	60-85	15-55	15-30	1-10
	33-60	Stratified sand to fine sandy loam	ML, SC-SM, SM, SC, CL-ML, CL	A-2-4, A-4	0	0	100	100	60-85	15-55	15-30	1-10

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
44B:(cont.)												
Lakota----------	0-4	Fine sandy loam, sandy loam	SC-SM, SC	A-4	0	0	100	100	60-85	30-60	20-30	4-10
	4-8	Loamy fine sand, fine sandy loam, sandy loam, loamy sand, fine sand	SC-SM, SM	A-2-4	0	0	100	100	50-85	20-50	15-30	1-10
	8-14	Fine sandy loam, sandy loam, loam	SC-SM, SC	A-4	0	0	100	100	60-95	30-60	20-30	4-10
	14-34	Fine sandy loam, loamy fine sand, loamy sand, sandy loam	SC-SM, SM	A-4	0	0	100	100	60-85	15-60	15-30	1-10
	34-50	Loamy fine sand, loamy sand, fine sand, fine sandy loam	SM, SC-SM	A-2-4	0	0	100	100	50-85	15-55	15-30	1-10
	50-60	Bedrock			—	—	—	—	—	—	10-29	NP-4
45:												
Harriet---------	0-2	Silt loam	CL, CL-ML	A-4, A-6	0	0	100	100	90-100	70-90	25-40	5-15
	2-18	Clay loam, silty clay loam, silty clay, clay	CH, CL, ML, MH	A-7	0	0	100	100	90-100	70-100	45-65	20-30
	18-28	Loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	60-100	30-50	10-25
	28-38	Very fine sandy loam	CL-ML, CL	A-4	0	0	100	100	85-95	50-65	25-30	4-10
	38-40	Clay loam	CL, ML	A-6, A-7-6	0	0	100	100	90-100	70-80	35-45	10-20
	40-60	Stratified very fine sandy loam to silty clay	CL, ML, CH	A-4, A-7-6	0	—	100	100	90-100	60-100	30-55	7-30

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
46C:												
Lakota----------	0-4	Fine sandy loam, sandy loam	SC, SC-SM	A-4	0	0	100	100	60-85	30-60	20-30	4-10
	4-8	Loamy fine sand, fine sandy loam, sandy loam, loamy sand, fine sand	SC-SM, SM	A-2-4	0	0	100	100	50-85	20-50	15-30	1-10
	8-14	Fine sandy loam, sandy loam, loam	SC-SM, SC	A-4	0	0	100	100	60-95	30-60	20-30	4-10
	14-34	Fine sandy loam, loamy fine sand, loamy sand, sandy loam	SC-SM, SM	A-4	0	0	100	100	60-85	15-60	15-30	1-10
	34-50	Loamy fine sand, loamy sand, fine sand, fine sandy loam	SC-SM, SM	A-2-4	0	0	100	100	50-85	15-55	15-30	1-10
	50-60	Bedrock			—	—	—	—	—	—	10-29	NP-4
Ekalaka---------	0-6	Fine sandy loam, sandy loam	CL-ML, SC-SM, SC, CL	A-2-4, A-4	0	0	100	100	60-95	30-65	20-30	4-10
	6-12	Fine sandy loam, very fine sandy loam, loamy fine sand	SM, ML, CL-ML, SC-SM, SC, CL	A-4, A-2-4	0	0	100	100	65-95	30-65	15-30	1-10
	12-17	Fine sandy loam, sandy loam, loam	SC, CL-ML, CL, SC-SM	A-4, A-2-4	0	0	100	100	70-100	30-70	20-30	4-10
	17-33	Fine sandy loam, loamy fine sand, fine sand, sandy loam	SC-SM, ML, SM, SC, CL-ML, CL	A-2-4, A-4	0	0	100	100	60-85	15-55	15-30	1-10
	33-60	Stratified sand to fine sandy loam	ML, SC-SM, SM, SC, CL-ML, CL	A-2-4, A-4	0	0	100	100	60-85	15-55	15-30	1-10

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
47B:												
Dogtooth--------	0-2	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	2-8	Silty clay, silty clay loam, clay loam	CH	A-7-6	0	0	100	100	70-100	60-95	50-60	20-30
	8-13	Silty clay, silty clay loam, clay loam	CH	A-7-6	0	0	100	100	70-100	60-95	50-60	20-30
	13-21	Silty clay, silty clay loam, loam	CH, CL	A-6, A-7-6	0	0	100	100	70-100	60-95	30-60	10-30
	21-60	Bedrock			---	---	---	---	---	---	25-100	4-60
Janesburg-------	0-8	Silt loam, loam	CL	A-6	0	0	100	100	85-100	60-90	30-40	10-15
	8-10	Silt loam, loam, fine sandy loam	CL, CL-ML	A-4, A-6	0	0	100	100	70-100	30-90	25-40	4-15
	10-21	Silty clay, silty clay loam, clay	CH, CL	A-7-6	0	0	100	100	70-100	60-95	45-60	20-30
	21-26	Silt loam, loam, clay loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	70-100	60-95	30-55	10-30
	26-60	Bedrock			---	---	---	---	---	---	25-100	4-60

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
48B:												
Desart----------	0-20	Fine sandy loam, sandy loam, very fine sandy loam	SC-SM, SC, CL-ML, CL	A-2-4, A-4	0	0	100	100	60-85	30-50	20-30	4-10
	20-24	Loamy fine sand, very fine sandy loam, fine sandy loam, sandy loam, loamy sand, fine sand	SC, SC-SM, CL-ML, CL, SM, ML	A-2-4, A-4	0	0	100	100	50-70	15-50	15-25	1-8
	24-31	Fine sandy loam, very fine sandy loam, sandy loam, loam	CL-ML, SC-SM, SC, CL	A-2-4, A-4	0	0	100	100	70-100	30-65	20-30	4-10
	31-60	Loamy fine sand, sandy loam, loam	SM, SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0	100	100	50-100	25-65	15-30	1-10
Ekalaka---------	0-6	Fine sandy loam, sandy loam	CL-ML, SC, SC-SM, CL	A-2-4, A-4	0	0	100	100	60-95	30-65	20-30	4-10
	6-12	Fine sandy loam, very fine sandy loam, loamy fine sand	SM, ML, CL-ML, CL, SC, SC-SM	A-4, A-2-4	0	0	100	100	65-95	30-65	15-30	1-10
	12-17	Fine sandy loam, sandy loam, loam	CL, SC, SC-SM, CL-ML	A-4, A-2-4	0	0	100	100	70-100	30-70	20-30	4-10
	17-33	Fine sandy loam, loamy fine sand, fine sand, sandy loam	SC-SM, ML, SM, SC, CL-ML, CL	A-2-4, A-4	0	0	100	100	60-85	15-55	15-30	1-10
	33-60	Stratified sand to fine sandy loam	ML, SC-SM, SC, CL-ML, CL	A-2-4, A-4	0	0	100	100	60-85	15-55	15-30	1-10

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
48B:(cont.)												
Telfer----------	0-6	Loamy fine sand, loamy sand	SM	A-2	0	0	100	100	50-80	15-35	10-20	NP-4
	6-60	Fine sand, loamy fine sand, loamy sand	SM	A-2	0	0	100	100	50-80	15-35	10-20	NP-4
49B:												
Lefor-----------	0-7	Fine sandy loam, sandy loam, loam	CL-ML, ML, SC, SM	A-4	0	0	100	100	70-85	40-55	15-30	3-10
	7-15	Fine sandy loam, loam, sandy loam	SC, CL-ML, SM	A-4	0	0	100	100	70-85	40-55	15-30	3-10
	15-30	Sandy clay loam, loam	CL-ML, SC	A-4	0	0	100	100	80-100	35-55	20-30	7-10
	30-36	Fine sandy loam, sandy loam, loam	SC, SC-SM, SM	A-4	0	0	100	100	70-85	30-55	15-30	3-10
	36-60	Bedrock			—	—	—	—	—	—	8-15	NP-3
51D:												
Vebar-----------	0-5	Fine sandy loam, sandy loam	SC, SC-SM, CL-ML, CL	A-2-4, A-4	—	0	95-100	90-100	60-100	30-55	20-30	4-10
	5-26	Fine sandy loam, sandy loam	SC, SC-SM, CL-ML, CL	A-2-4, A-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	26-32	Fine sandy loam, loamy fine sand, sandy loam	SC-SM, SC, CL-ML, CL	A-4, A-2-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	32-60	Bedrock			—	—	—	—	—	—	0-0	NP
Flasher---------	0-6	Loamy fine sand, loamy sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	15-20	NP-4
	6-10	Loamy fine sand, loamy sand, fine sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	10-20	NP-4
	10-60	Bedrock			—	—	—	—	—	—	10-20	NP-4

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
51D: (cont.)												
Tally-----------	0-6	Fine sandy loam, sandy loam	SC, SC-SM, CL, CL-ML	A-2, A-4	0	0	90-100	80-100	55-100	25-55	20-30	4-10
	6-32	Fine sandy loam, sandy loam	SC, SC-SM, CL, CL-ML	A-2, A-4	0	0	90-100	80-100	60-100	25-50	20-30	4-10
	32-60	Fine sandy loam, sandy loam, loamy fine sand	SC, SC-SM, CL, CL-ML	A-2, A-4	0	0	90-100	80-100	60-100	15-50	15-30	1-10
51F:												
Flasher---------	0-6	Loamy fine sand, loamy sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	15-20	NP-4
	6-10	Loamy fine sand, loamy sand, fine sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	10-20	NP-4
	10-60	Bedrock			—	—	—	—	—	—	10-20	NP-4
Vebar-----------	0-5	Fine sandy loam, sandy loam	CL-ML, SC-SM, SC, CL	A-2-4, A-4	—	0	95-100	90-100	60-100	30-55	20-30	4-10
	5-26	Fine sandy loam, sandy loam	CL-ML, SC-SM, SC, CL	A-2-4, A-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	26-32	Fine sandy loam, loamy fine sand, sandy loam	SC-SM, CL-ML, SC, CL	A-4, A-2-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	32-60	Bedrock			—	—	—	—	—	—	0-0	NP

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
51F:(cont.)												
Parshall--------	0-12	Fine sandy loam, sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	12-29	Fine sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	29-48	Fine sandy loam, loamy sand, sandy loam	SC, CL-ML, ML, CL, SC-SM	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
	48-60	Loamy fine sand, fine sandy loam, sandy loam, loamy sand	CL-ML, ML, SC, CL, SC-SM	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
52B:												
Vebar-----------	0-5	Fine sandy loam, sandy loam	SC-SM, CL, SC, CL-ML	A-2-4, A-4	—	0	95-100	90-100	60-100	30-55	20-30	4-10
	5-26	Fine sandy loam, sandy loam	CL-ML, SC-SM, SC, CL	A-2-4, A-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	26-32	Fine sandy loam, loamy fine sand, sandy loam	SC, CL, SC-SM, CL-ML	A-4, A-2-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	32-60	Bedrock			—	—	—	—	—	—	0-0	NP
Parshall--------	0-12	Fine sandy loam, sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	12-29	Fine sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	29-48	Fine sandy loam, loamy sand, sandy loam	CL-ML, ML, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
	48-60	Loamy fine sand, fine sandy loam, sandy loam, loamy sand	CL-ML, ML, SC, CL, SC-SM	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
53B:												
Tally-----------	0-6	Fine sandy loam, sandy loam	SC, SC-SM, CL, CL-ML	A-2, A-4	0	0	90-100	80-100	55-100	25-55	20-30	4-10
	6-32	Fine sandy loam, sandy loam	SC, SC-SM, CL-ML, CL	A-2, A-4	0	0	90-100	80-100	60-100	25-50	20-30	4-10
	32-60	Fine sandy loam, sandy loam, loamy fine sand	SC, SC-SM, CL-ML, CL	A-2, A-4	0	0	90-100	80-100	60-100	15-50	15-30	1-10
Parshall--------	0-12	Fine sandy loam, sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	12-29	Fine sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	29-48	Fine sandy loam, loamy sand, sandy loam	CL-ML, ML, SC, SM, SC-SM, CL	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
	48-60	Loamy fine sand, fine sandy loam, sandy loam, loamy sand	CL-ML, ML, SC, SC-SM, CL	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
53C:												
Tally-----------	0-6	Fine sandy loam, sandy loam	SC, SC-SM, CL, CL-ML	A-2, A-4	0	0	90-100	80-100	55-100	25-55	20-30	4-10
	6-32	Fine sandy loam, sandy loam	SC, SC-SM, CL-ML, CL	A-4, A-2	0	0	90-100	80-100	60-100	25-50	20-30	4-10
	32-60	Fine sandy loam, sandy loam, loamy fine sand	SC, SC-SM, CL-ML, CL	A-2, A-4	0	0	90-100	80-100	60-100	15-50	15-30	1-10

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
53C: (cont.)												
Parshall--------	0-12	Fine sandy loam, sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	12-29	Fine sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	29-48	Fine sandy loam, loamy sand, sandy loam	CL-ML, ML, SC, SC-SM, CL	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
	48-60	Loamy fine sand, fine sandy loam, sandy loam, loamy sand	CL-ML, ML, SC, SC-SM, CL	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
54C:												
Vebar-----------	0-5	Fine sandy loam, sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	—	0	95-100	90-100	60-100	30-55	20-30	4-10
	5-26	Fine sandy loam, sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	26-32	Fine sandy loam, loamy fine sand, sandy loam	CL-ML, CL, SC-SM, SC	A-4, A-2-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	32-60	Bedrock			—	—	—	—	—	—	0-0	NP
Flasher---------	0-6	Loamy fine sand, loamy sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	15-20	NP-4
	6-10	Loamy fine sand, loamy sand, fine sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	10-20	NP-4
	10-60	Bedrock			—	—	—	—	—	—	10-20	NP-4
55B:												
Beisigl---------	0-5	Loamy fine sand, loamy sand	SM	A-2-4, A-4	0	0	95-100	85-100	75-95	20-40	15-20	NP-4
	5-27	Loamy fine sand, loamy sand, fine sand	SM	A-2-4	0	0	95-100	85-100	50-100	15-35	15-20	NP-4
	27-60	Bedrock			—	—	—	—	—	—	15-20	NP-4

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
55B:(cont.)												
Lihen-----------	0-9	Loamy fine sand, loamy sand, sand	SM	A-2-4	0	0	100	100	50-90	15-35	10-20	NP-4
	9-24	Loamy sand, loamy fine sand, sand	SM	A-2-4	0	0	100	100	50-90	15-35	10-20	NP-4
	24-32	Sand, fine sand, loamy sand, loamy fine sand	SM	A-2-4	0	0	100	100	50-90	15-35	10-20	NP-4
	32-60	Sand, fine sand, loamy fine sand, loamy sand	SM	A-2-4	0	0	100	100	50-90	15-35	10-20	NP-4
56:												
Parshall--------	0-12	Fine sandy loam, sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	12-29	Fine sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	29-48	Fine sandy loam, loamy sand, sandy loam	CL-ML, ML, SC, SC-SM, CL	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
	48-60	Loamy fine sand, fine sandy loam, sandy loam, loamy sand	CL-ML, ML, SC, SC-SM, CL	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
57D:												
Beisigl---------	0-5	Loamy fine sand, loamy sand	SM	A-2-4, A-4	0	0	95-100	85-100	75-95	20-40	15-20	NP-4
	5-27	Loamy fine sand, loamy sand, fine sand	SM	A-2-4	0	0	95-100	85-100	50-100	15-35	15-20	NP-4
	27-60	Bedrock			—	—	—	—	—	—	15-20	NP-4
Flasher---------	0-6	Loamy fine sand, loamy sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	15-20	NP-4
	6-10	Loamy fine sand, loamy sand, fine sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	10-20	NP-4
	10-60	Bedrock			—	—	—	—	—	—	10-20	NP-4

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
58B:												
Lihen-----------	0-9	Loamy fine sand, loamy sand, sand	SM	A-2-4	0	0	100	100	50-90	15-35	10-20	NP-4
	9-24	Loamy sand, loamy fine sand, sand	SM	A-2-4	0	0	100	100	50-90	15-35	10-20	NP-4
	24-32	Sand, fine sand, loamy sand, loamy fine sand	SM	A-2-4	0	0	100	100	50-90	15-35	10-20	NP-4
	32-60	Sand, fine sand, loamy fine sand, loamy sand	SM	A-2-4	0	0	100	100	50-90	15-35	10-20	NP-4
Parshall--------	0-12	Fine sandy loam, sandy loam	CL-ML, CL, SC, SC-SM	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	12-29	Fine sandy loam	CL, SC-SM, CL-ML, SC	A-2-4, A-4	0	0	100	100	60-85	30-55	20-30	4-10
	29-48	Fine sandy loam, loamy sand, sandy loam	CL-ML, ML, SC, CL, SC-SM	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
	48-60	Loamy fine sand, fine sandy loam, sandy loam, loamy sand	CL-ML, ML, SC, CL, SC-SM	A-2-4, A-4	0	0	100	100	60-85	25-55	15-30	1-10
59F:												
Flasher---------	0-6	Loamy fine sand, loamy sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	15-20	NP-4
	6-10	Loamy fine sand, loamy sand, fine sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	10-20	NP-4
	10-60	Bedrock			—	—	—	—	—	—	10-20	NP-4
Rock outcrop----	--	—	—	—	—	—	—	—	—	—	—	—

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
59F:(cont.)												
Vebar-----------	0-5	Fine sandy loam, sandy loam	CL, SC, CL-ML, SC-SM	A-2-4, A-4	—	0	95-100	90-100	60-100	30-55	20-30	4-10
	5-26	Fine sandy loam, sandy loam	SC, CL, CL-ML, SC-SM	A-2-4, A-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	26-32	Fine sandy loam, loamy fine sand, sandy loam	SC, CL, SC-SM, CL-ML	A-4, A-2-4	0	0	95-100	90-100	60-100	30-55	20-30	4-10
	32-60	Bedrock			—	—	—	—	—	—	0-0	NP
60D:												
Wabek-----------	0-5	Loam	CL	A-6, A-4	0	0-1	90-100	90-100	75-90	50-70	25-35	8-15
	5-9	Gravelly sandy loam, gravelly loam, gravelly coarse sandy loam	SC-SM, SC	A-1-b, A-2-4, A-4	0	0-1	50-80	50-80	30-60	20-40	20-30	4-10
	9-60	Very gravelly coarse sand	GM, SM, SP, SW	A-1-b	0	0-1	25-90	10-65	5-35	0-25	15-20	NP-4
Manning---------	0-5	Fine sandy loam	CL, CL-ML	A-4	0	0	95-100	95-100	85-95	55-70	20-30	4-10
	5-18	Fine sandy loam, loam	CL-ML, CL	A-4	0	0	90-100	80-100	80-90	50-65	20-30	4-10
	18-25	Fine sandy loam, gravelly fine sandy loam, loam	SC, SC-SM	A-4	0	0-3	55-85	50-80	30-80	25-50	20-30	4-10
	25-60	Stratified loamy sand to extremely gravelly loamy coarse sand	GM, SM, SP-SM	A-1-a	0	0-5	25-75	15-65	10-40	5-35	10-20	NP-4

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plasticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
62B:												
Manning---------	0-5	Fine sandy loam	CL, CL-ML	A-4	0	0	95-100	95-100	85-95	55-70	20-30	4-10
	5-18	Fine sandy loam, loam	CL, CL-ML	A-4	0	0	90-100	80-100	80-90	50-65	20-30	4-10
	18-25	Fine sandy loam, gravelly fine sandy loam, loam	SC, SC-SM	A-4	0	0-3	55-85	50-80	30-80	25-50	20-30	4-10
	25-60	Stratified loamy sand to extremely gravelly loamy coarse sand	GM, SM, SP-SM	A-1-a	0	0-5	25-75	15-65	10-40	5-35	10-20	NP-4
63B:												
Lehr------------	0-6	Loam	CL	A-6	0	0	95-100	95-100	85-95	60-80	25-35	10-15
	6-11	Loam, clay loam, gravelly loam	CL	A-6	0-2	0-5	90-100	80-100	75-95	40-75	25-35	10-20
	11-15	Loam, gravelly loam	CL	A-6	0-2	0-5	90-100	80-100	75-95	40-75	25-35	10-15
	15-22	Gravelly loamy coarse sand, gravelly coarse sandy loam, very gravelly coarse sandy loam, very gravelly loamy coarse sand	SM, SC-SM	A-2-4	0-2	0-5	65-90	50-75	30-50	5-15	15-30	1-10
	22-60	Very gravelly coarse sand, gravelly loamy sand, gravelly sand	GM, GC-GM	A-1-a	0-2	0-5	40-80	25-60	10-35	2-15	10-20	NP-4

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number: 4	Percentage passing sieve number: 10	Percentage passing sieve number: 40	Percentage passing sieve number: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
63B: (cont.)												
Stady	0-6	Loam	CL	A-6	0	0-1	95-100	95-100	85-95	60-75	25-35	10-15
	6-15	Loam	CL	A-6	0	0-1	95-100	95-100	85-95	60-75	25-35	10-15
	15-29	Loam, gravelly loam	CL	A-6	0	0-1	80-100	80-100	75-95	55-75	25-35	10-15
	29-60	Very gravelly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand, extremely gravelly loamy sand, very gravelly sand, extremely gravelly sand	GM, SM, SP, SC-SM, GC-GM	A-1-b	0	0-1	40-80	25-60	10-30	2-15	10-20	NP-4
64:												
Stady	0-6	Loam	CL	A-6	0	0-1	95-100	95-100	85-95	60-75	25-35	10-15
	6-15	Loam	CL	A-6	0	0-1	95-100	95-100	85-95	60-75	25-35	10-15
	15-29	Loam, gravelly loam	CL	A-6	0	0-1	80-100	80-100	75-95	55-75	25-35	10-15
	29-60	Very gravelly coarse sand, extremely gravelly coarse sand, very gravelly loamy sand, extremely gravelly loamy sand, very gravelly sand, extremely gravelly sand	GC-GM, SC-SM, GM, SM, SP	A-1	0	0-1	40-80	25-60	10-30	2-15	10-20	NP-4

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
65:												
Wanagan---------	0-7	Loam	CL	A-6	0	0	100	100	85-95	60-75	25-35	10-15
	7-14	Loam	CL	A-6	0	0	85-100	80-95	75-90	50-85	25-35	10-15
	14-18	Loam	CL	A-6	0	0	85-100	80-95	75-90	50-85	25-35	10-15
	18-26	Very gravelly sandy clay loam, very gravelly loam, gravelly sandy clay loam, gravelly loam	SC-SM, SC	A-2-4, A-2-6	0	0-15	70-85	30-65	25-50	5-25	25-35	8-15
	26-60	Very gravelly fine sandy loam, extremely gravelly loam	SC-SM, SC	A-1-b, A-2-6, A-2-4	0	0-15	70-85	30-65	25-50	5-25	20-35	4-15
66F:												
Wabek-----------	0-5	Loam	CL	A-6, A-4	0	0-1	90-100	90-100	75-90	50-70	25-35	8-15
	5-9	Gravelly sandy loam, gravelly loam, gravelly coarse sandy loam	SC-SM, SC	A-1-b, A-2-4, A-4	0	0-1	50-80	50-80	30-60	20-40	20-30	4-10
	9-60	Very gravelly coarse sand	SM, GM, SP, SW	A-1-b	0	0-1	25-90	10-65	5-35	0-25	15-20	NP-4
Cabba-----------	0-3	Loam, silt loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
Shambo----------	0-9	Loam, silt loam	CL	A-6	0	0	100	100	85-95	60-75	25-35	10-15
	9-13	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	13-29	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	29-48	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	48-60	Loam, silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	85-95	60-75	30-45	10-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
67B:												
Virgelle--------	0-9	Fine sandy loam	SC, CL, ML, SM	A-4, A-2	0	0	90-100	80-100	55-100	25-55	10-25	NP-8
	9-17	Loamy fine sand, loamy sand	SM	A-2	0	0	100	100	55-80	15-35	15-20	1-4
	17-27	Loamy fine sand, loamy sand	SM	A-2	0	0	100	100	55-80	15-35	15-20	1-4
	27-35	Silty clay, clay	MH	A-7	0	0	100	100	90-100	75-95	55-75	25-40
	35-60	Clay, silty clay loam	CH, MH	A-7-6	0	0	100	100	90-100	75-95	50-70	20-40
68D:												
Telfer----------	0-6	Loamy fine sand, loamy sand	SM	A-2-4	0	0	100	100	50-80	15-35	10-20	NP-4
	6-60	Fine sand, loamy fine sand, loamy sand	SM	A-2-4	0	0	100	100	50-80	15-35	10-20	NP-4
68E:												
Telfer----------	0-6	Loamy fine sand, loamy sand	SM	A-2-4	0	0	100	100	50-80	15-35	10-20	NP-4
	6-60	Fine sand, loamy fine sand, loamy sand	SM	A-2-4	0	0	100	100	50-80	15-35	10-20	NP-4
70:												
Bowbells--------	0-6	Loam	CL	A-6	0	0-5	95-100	90-100	85-95	60-90	25-35	10-15
	6-14	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
	14-23	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
	23-36	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
	36-60	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
71:												
Williams--------	0-6	Loam	CL	A-4, A-6	0-2	0-5	95-100	95-100	85-95	60-90	25-35	8-15
	6-10	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	10-15	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	15-24	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	24-36	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
	36-60	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
71:(cont.)												
Bowbells--------	0-6	Loam	CL	A-6	0	0-5	95-100	90-100	85-95	60-90	25-35	10-15
	6-14	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
	14-23	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
	23-36	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
	36-60	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
71B:												
Williams--------	0-6	Loam	CL	A-4, A-6	0-2	0-5	95-100	95-100	85-95	60-90	25-35	8-15
	6-10	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	10-15	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	15-24	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	24-36	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
	36-60	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
Bowbells--------	0-6	Loam	CL	A-6	0	0-5	95-100	90-100	85-95	60-90	25-35	10-15
	6-14	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
	14-23	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
	23-36	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
	36-60	Loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	80-95	60-80	30-45	10-20
73B:												
Williams--------	0-6	Loam	CL	A-4, A-6	0-2	0-5	95-100	95-100	85-95	60-90	25-35	8-15
	6-10	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	10-15	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	15-24	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	24-36	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
	36-60	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
Reeder----------	0-8	Loam	CL	A-6	0	0	90-100	85-100	85-90	60-70	25-35	10-15
	8-17	Clay loam, loam, sandy clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	60-80	30-45	10-20
	17-36	Loam, clay loam, sandy loam	CL, SC	A-6, A-7-6	0	0-5	85-100	80-100	65-100	45-80	30-45	10-20
	36-60	Bedrock			—	—	—	—	—	—	—	—
76C:												
Williams--------	0-6	Loam	CL	A-4, A-6	0-2	0-5	95-100	95-100	85-95	60-90	25-35	8-15
	6-10	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	10-15	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	15-24	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	24-36	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
	36-60	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
76C: (cont.)												
Zahl------------	0-5	Loam	CL	A-6	0	0-1	95-100	95-100	80-95	55-75	25-35	10-15
	5-20	Loam, clay loam	CL	A-6	0	0-1	90-100	85-100	80-95	55-80	30-40	10-20
	20-60	Clay loam, loam	CL	A-6	0	0-1	90-100	85-100	80-95	55-80	30-40	10-20
76D:												
Zahl------------	0-5	Loam	CL	A-6	0	0-1	95-100	95-100	80-95	55-75	25-35	10-15
	5-20	Loam, clay loam	CL	A-6	0	0-1	90-100	85-100	80-95	55-80	30-40	10-20
	20-60	Clay loam, loam	CL	A-6	0	0-1	90-100	85-100	80-95	55-80	30-40	10-20
Williams--------	0-6	Loam	CL	A-4, A-6	0-2	0-5	95-100	95-100	85-95	60-90	25-35	8-15
	6-10	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	10-15	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	15-24	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	24-36	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
	36-60	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
76F:												
Zahl------------	0-5	Loam	CL	A-6	0	0-1	95-100	95-100	80-95	55-75	25-35	10-15
	5-20	Loam, clay loam	CL	A-6	0	0-1	90-100	85-100	80-95	55-80	30-40	10-20
	20-60	Clay loam, loam	CL	A-6	0	0-1	90-100	85-100	80-95	55-80	30-40	10-20
Williams--------	0-6	Loam	CL	A-4, A-6	0-2	0-5	95-100	95-100	85-95	60-90	25-35	8-15
	6-10	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	10-15	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	15-24	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	24-36	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
	36-60	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
77:												
Temvik----------	0-7	Silt loam, loam	CL	A-6	0	0	100	100	90-100	60-90	25-35	10-15
	7-24	Silt loam, silty clay loam, clay loam	CL	A-6	0	0	100	100	90-100	80-90	30-40	10-20
	24-44	Clay loam, loam	CL	A-7-6, A-6	0	0-5	95-100	95-100	80-100	55-80	30-45	10-20
	44-60	Clay loam, loam	CL	A-7-6, A-6	0	0-5	95-100	95-100	80-100	55-80	30-45	10-20
Wilton----------	0-8	Silt loam	CL	A-6	0	0	100	100	90-100	70-90	25-35	10-15
	8-27	Silt loam	CL	A-6	0	0	100	100	90-100	70-90	25-35	10-15
	27-60	Clay loam, loam	CL	A-7-6, A-6	0	0-5	90-100	85-100	80-95	60-80	30-45	10-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
77B:												
Temvik----------	0-7	Silt loam, loam	CL	A-6	0	0	100	100	90-100	60-90	25-35	10-15
	7-24	Silt loam, silty clay loam, clay loam	CL	A-6	0	0	100	100	90-100	80-90	30-40	10-20
	24-44	Clay loam, loam	CL	A-6, A-7-6	0	0-5	95-100	95-100	80-100	55-80	30-45	10-20
	44-60	Clay loam, loam	CL	A-6, A-7-6	0	0-5	95-100	95-100	80-100	55-80	30-45	10-20
Williams--------	0-6	Silt loam	CL	A-6	0-2	0-5	95-100	95-100	85-95	60-80	25-35	10-15
	6-10	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	10-15	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	15-24	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	35-45	15-25
	24-36	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
	36-60	Clay loam, loam	CL	A-6, A-7-6	0-2	0-5	95-100	95-100	80-100	60-80	30-45	10-20
80:												
Breien----------	0-6	Fine sandy loam	CL-ML, SC-SM	A-4	0	0	90-100	90-100	70-95	35-65	20-30	4-10
	6-15	Fine sandy loam, stratified sand to loam	SC, CL-ML	A-4	0	0	90-100	90-100	70-95	35-75	20-30	4-10
	15-60	Stratified sand to loamy fine sand	SM, SW-SM	A-2-4, A-3	0	0	90-100	90-100	65-85	5-25	15-20	NP-4
82:												
Mckeen----------	0-2	Loam, silt loam	CL	A-6	0	0	100	100	85-100	60-95	25-35	10-15
	2-12	Loam, silt loam	CL	A-6	0	0	100	100	85-100	60-95	25-35	10-15
	12-15	Loam, silt loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6, A-5	0	0	100	100	90-100	70-100	30-60	10-35
	15-60	Stratified loamy fine sand to silty clay	CH, CL, ML	A-6, A-4, A-7-6	0	0	100	100	60-100	25-100	15-60	1-30

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
83:												
Mckeen----------	0-2	Loam, silt loam	CL	A-6	0	0	100	100	85-100	60-95	25-35	10-15
	2-12	Loam, silt loam	CL	A-6	0	0	100	100	85-100	60-95	25-35	10-15
	12-15	Loam, silt loam, silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	90-100	70-100	30-60	10-35
	15-60	Stratified loamy fine sand to silty clay	CH, CL, ML	A-6, A-4	0	0	100	100	60-100	25-100	15-60	1-30
85B:												
Banks-----------	0-4	Loamy fine sand, loamy sand	SW-SM, SM	A-4, A-2-4	0	0	100	100	60-80	10-40	15-20	NP-4
	4-30	Sand, loamy fine sand, fine sand	SW-SM, SM	A-2-4	0	0	100	100	50-70	10-25	15-20	NP-4
	30-60	Loamy fine sand, fine sand, sand	SM, SW-SM	A-2-4	0	0	100	100	50-70	10-25	15-20	NP-4
86:												
Havrelon--------	0-13	Fine sandy loam	CL, CL-ML	A-4	0	0	100	100	85-100	60-95	20-30	4-10
	13-60	Stratified very fine sandy loam to silty clay loam	CL, CL-ML	A-4, A-6, A-7-6	0	0	100	100	85-100	60-80	25-45	7-20
87:												
Minnewaukan-----	0-3	Fine sandy loam, sandy loam, coarse sandy loam	SC-SM, SM, SC	A-1-b, A-2-4	0	0	90-100	90-100	40-55	15-35	20-30	NP-10
	3-5	Loamy coarse sand, loamy sand, loamy fine sand	SC-SM, SM	A-2-4	0	0	90-100	70-100	50-85	15-30	10-20	NP-4
	5-60	Stratified fine sand to loamy sand, sand	SM, SP-SM	A-2-4	0	0	90-100	70-100	60-100	5-35	10-20	NP-4

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
88:												
Havrelon--------	0-13	Silt loam	CL	A-6	0	0	100	100	85-100	60-95	25-35	10-15
	13-60	Stratified very fine sandy loam to silty clay loam	CL, CL-ML	A-4, A-6, A-7-6	0	0	100	100	85-100	60-80	25-45	7-20
91:												
Lohler----------	0-8	Silty clay	CH	A-7-6	0	0	100	100	95-100	80-95	55-75	30-50
	8-60	Silty clay, stratified silty clay loam to silty clay	CH	A-7-6	0	0	100	100	95-100	80-95	50-75	30-50
98:												
Mandan----------	0-20	Silt loam	CL, CL-ML	A-4	0	0	100	100	90-100	80-100	20-30	NP-10
	20-29	Silt loam, very fine sandy loam	CL-ML, CL	A-4	0	0	100	100	90-100	80-100	20-30	NP-10
	29-47	Silt loam	CL-ML, CL	A-4	0	0	100	100	90-100	80-100	20-30	NP-10
	47-60	Loam, fine sandy loam	CL, CL-ML, ML, SM	A-4	0	0	100	100	70-95	40-75	20-30	NP-10
Linton----------	0-7	Silt loam	CL, CL-ML	A-4	0	0	100	100	90-100	70-90	20-30	4-10
	7-17	Silt loam	CL-ML, CL	A-4	0	0	100	100	90-100	70-90	20-30	4-10
	17-29	Silt loam	CL-ML, CL	A-4	0	0	100	100	90-100	80-90	20-30	4-10
	29-60	Silt loam	CL, CL-ML	A-4	0	0	100	100	90-100	80-90	20-30	4-10
98B:												
Linton----------	0-7	Silt loam	CL-ML, CL	A-4	0	0	100	100	90-100	70-90	20-30	4-10
	7-17	Silt loam	CL-ML, CL	A-4	0	0	100	100	90-100	70-90	20-30	4-10
	17-29	Silt loam	CL-ML, CL	A-4	0	0	100	100	90-100	80-90	20-30	4-10
	29-60	Silt loam	CL, CL-ML	A-4	0	0	100	100	90-100	80-90	20-30	4-10
Mandan----------	0-20	Silt loam	CL, CL-ML	A-4	0	0	100	100	90-100	80-100	20-30	NP-10
	20-29	Silt loam, very fine sandy loam	CL, CL-ML	A-4	0	0	100	100	90-100	80-100	20-30	NP-10
	29-47	Silt loam	CL, CL-ML	A-4	0	0	100	100	90-100	80-100	20-30	NP-10
	47-60	Loam, fine sandy loam	CL, ML, CL-ML, SM	A-4	0	0	100	100	70-95	40-75	20-30	NP-10

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number—: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
99F:												
Badland, outcrop	0-60	Bedrock	CL, CH, CL-ML, SC, SC-SM	A-4, A-6, A-7	0	0	90-100	85-100	75-100	35-95	15-75	5-50
Cabba-----------	0-3	Silt loam, loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Loam, silt loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
100:												
Pits------------	0-6	Extremely gravelly sand	GW-GM, SW-SM, GM, SW	A-2-4	0	0-5	25-90	10-65	5-55	0-25	10-20	NP-4
	6-60	Extremely gravelly sand, extremely gravelly coarse sand, gravelly coarse sandy loam	GW-GM, SW-SM, SM, GM	A-2-4	0	0-10	25-90	10-65	5-55	0-25	15-25	NP-8
105:												
Dumps and Pits--	0-4	Clay loam	CL	A-6, A-7-6	0-1	0-10	95-100	95-100	85-95	60-90	35-45	15-20
	4-60	Loam, clay loam	CL	A-6, A-7-6	0-10	0-10	95-100	95-100	80-100	60-80	30-45	10-20
110:												
Ustorthents-----	0-4	Silty clay loam	CL	A-7-6, A-6	0	0-5	95-100	95-100	85-95	60-90	40-55	15-25
	4-60	Bedrock			—	—	—	—	—	—	0-0	NP
115:												
Riverwash-------	0-6	Gravelly sand	SP, SP-SM, SW, SW-SM	A-3, A-2-4, A-1-b	—	0-5	80-100	75-100	30-60	0-10	10-15	NP-1
	6-60	Stratified gravelly coarse sand to gravelly sandy loam	SM, SP, SP-SM	A-2-4, A-1-b, A-3	—	0-5	80-100	75-100	40-70	0-20	10-20	NP-4

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number—				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10 inches	3-10 inches	4	10	40	200		
	In				Pct	Pct					Pct	
154F:												
Arikara---------	0-1	Slightly decomposed plant material	PT	A-8	—	—	—	—	—	—	—	—
	1-2	Loam, clay loam	CL	A-6, A-7-6, A-5	0	0	100	100	85-100	70-80	30-45	10-20
	2-14	Loam, clay loam, silt loam, silty clay loam	CL	A-7-6, A-6, A-5	0	0	85-100	80-100	70-100	50-85	30-45	10-20
	14-39	Loam, fine sandy loam, silty clay loam, clay loam	SC-SM, CL	A-6, A-4, A-7-6, A-5	0	0	85-100	80-100	70-100	50-90	25-45	8-20
	39-60	Loam, clay loam, fine sandy loam, silt loam	CL, SC, SC-SM	A-4, A-6, A-7-6, A-5	0	0	85-100	80-100	70-100	40-90	25-45	8-20
Cabba-----------	0-3	Loam, silt loam	CL	A-6	0	0-5	90-100	85-100	70-90	60-80	25-35	10-15
	3-15	Silt loam, loam, silty clay loam, clay loam	CL	A-6, A-7-6	0	0-5	95-100	90-100	85-100	80-95	30-45	10-20
	15-60	Bedrock			—	—	—	—	—	—	20-45	4-20
Shambo----------	0-9	Loam, silt loam	CL	A-6	0	0	100	100	85-95	60-75	25-35	10-15
	9-13	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	13-29	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	29-48	Loam, silt loam, clay loam	CL	A-6	0	0	100	100	85-95	60-75	25-40	10-20
	48-60	Loam, silty clay loam, clay loam	CL	A-7-6, A-6	0	0	100	100	85-95	60-75	30-45	10-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
161F:												
Beisigl---------	0-5	Loamy fine sand, loamy sand	SM	A-2-4, A-4	0	0	95-100	85-100	75-95	20-40	15-20	NP-4
	5-27	Loamy fine sand, loamy sand, fine sand	SM	A-2-4	0	0	95-100	85-100	50-100	15-35	15-20	NP-4
	27-60	Bedrock			—	—	—	—	—	—	15-20	NP-4
Flasher---------	0-6	Loamy fine sand, loamy sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	15-20	NP-4
	6-10	Loamy fine sand, loamy sand, fine sand	SM	A-2-4	0	0-5	85-100	85-100	50-100	15-35	10-20	NP-4
	10-60	Bedrock			—	—	—	—	—	—	10-20	NP-4
Arikara---------	0-1	Slightly decomposed plant material	PT	A-8	—	—	—	—	—	—	—	—
	1-2	Loam, clay loam	CL	A-6, A-5, A-7-6	0	0	100	100	85-100	70-80	30-45	10-20
	2-14	Loam, clay loam, silt loam, silty clay loam	CL	A-7-6, A-6, A-5	0	0	85-100	80-100	70-100	40-85	30-45	10-20
	14-39	Loam, fine sandy loam, silty clay loam, clay loam	CL, SC-SM	A-6, A-4, A-5, A-7-6	0	0	85-100	80-100	70-100	50-90	25-45	8-20
	39-60	Loam, clay loam, fine sandy loam, silt loam	CL, SC, SC-SM	A-4, A-6, A-5, A-7-6	0	0	85-100	80-100	70-100	40-90	25-45	8-20

Table 19.-Engineering Index Properties--Continued

Map symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 inches	Fragments: 3-10 inches	Percentage passing sieve number— 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
185B:												
Banks, slightly wet------------	0-4	Loamy fine sand, loamy sand	SW-SM, SM	A-4, A-2-4	0	0	100	100	60-80	10-40	15-20	NP-4
	4-30	Fine sand, loamy fine sand, sand	SW-SM, SM	A-2-4	0	0	100	100	50-70	10-25	15-20	NP-4
	30-60	Loamy fine sand, fine sand, sand	SM, SW-SM	A-2-4	0	0	100	100	50-70	10-25	15-20	NP-4
186:												
Havrelon, slightly wet---	0-13	Fine sandy loam	CL, CL-ML	A-4	0	0	100	100	85-100	60-95	20-30	4-10
	13-60	Stratified very fine sandy loam to silty clay loam	CL, CL-ML	A-4, A-6, A-7-6	0	0	100	100	85-100	60-80	25-45	7-20
188:												
Havrelon, slightly wet---	0-13	Silt loam	CL	A-6	0	0	100	100	85-100	60-95	25-35	10-15
	13-60	Stratified very fine sandy loam to silty clay loam	CL, CL-ML	A-4, A-6, A-7-6	0	0	100	100	85-100	60-80	25-45	7-20
M-W:												
Miscellaneous water----------	—	—	—	—	—	—	—	—	—	—	—	—
W:												
Water-----------	—	—	—	—	—	—	—	—	—	—	—	—

Table 20.--Physical Properties of the Soils

(The symbol < means less than; > means greater than. Entries under "Erosion factors—T" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer. Dashes (—) indicate that data were not available or were not estimated.)

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
1:												
Tonka-----------------	0-13	18-27	1.00-1.50	0.6-2	0.20-0.24	0.0-2.9	5.0-10	.37	.37	5	6	48
	13-19	15-25	1.00-1.50	0.6-2	0.17-0.22	0.0-2.9	2.0-5.0	.37	.37			
	19-34	35-45	1.40-1.65	0.06-0.2	0.14-0.18	6.0-8.9	0.0-2.0	.43	.43			
	34-50	35-45	1.40-1.65	0.06-0.2	0.13-0.16	3.0-5.9	0.0-1.0	.37	.37			
	50-60	18-40	1.40-1.65	0.06-2	0.14-0.20	3.0-5.9	0.0-1.0	.28	.28			
3:												
Velva-----------------	0-6	10-18	1.20-1.50	0.6-6	0.13-0.18	0.0-2.9	4.0-8.0	.20	.20	5	3	86
	6-13	10-20	1.20-1.50	0.6-6	0.12-0.17	0.0-2.9	2.0-4.0	.20	.20			
	13-60	10-20	1.30-1.60	0.6-6	0.11-0.15	0.0-2.9	0.0-2.0	.20	.20			
4:												
Lallie----------------	0-2	27-40	1.10-1.30	0.06-0.2	0.17-0.23	6.0-8.9	6.0-12	.37	.37	5	4L	86
	2-24	27-45	1.20-1.40	0.06-0.2	0.14-0.23	6.0-8.9	1.0-3.0	.43	.43			
	24-32	27-50	1.20-1.30	0.01-0.06	0.14-0.23	6.0-8.9	2.0-4.0	.43	.43			
	32-60	27-50	1.20-1.50	0.01-0.06	0.13-0.23	6.0-8.9	0.0-1.0	.28	.28			
5:												
Dimmick---------------	0-3	—	0.20-0.35	—	0.55-0.65	—	75-95	—	—	5	4	86
	3-23	40-50	1.00-1.40	0.001-0.2	0.14-0.23	6.0-8.9	3.0-8.0	.28	.28			
	23-63	40-60	1.30-1.60	0.001-0.06	0.13-0.20	6.0-8.9	0.0-2.0	.28	.28			
6:												
Heil------------------	0-3	18-27	1.20-1.40	0.6-2	0.15-0.24	0.0-2.9	3.0-6.0	.37	.37	2	6	48
	3-24	45-60	1.20-1.55	0.001-0.06	0.13-0.19	6.0-8.9	0.0-1.0	.37	.37			
	24-38	27-50	1.30-1.60	0.001-0.2	0.13-0.19	6.0-8.9	0.0-0.5	.37	.37			
	38-52	27-50	1.30-1.60	0.001-0.2	0.13-0.19	6.0-8.9	0.0-0.5	.37	.37			
	52-60	20-50	1.30-1.60	0.001-2	0.13-0.19	6.0-8.9	0.0-0.5	.32	.32			
7:												
Korell----------------	0-8	18-27	1.15-1.35	0.6-2	0.15-0.19	0.0-2.9	2.0-4.0	.32	.32	5	6	48
	8-15	18-27	1.20-1.40	0.6-2	0.15-0.19	0.0-2.9	1.0-2.0	.37	.37			
	15-48	18-27	1.25-1.45	0.6-2	0.15-0.19	0.0-2.9	1.0-2.0	.37	.37			
	48-60	18-30	1.30-1.50	0.6-2	0.13-0.19	0.0-2.9	1.0-2.0	.37	.37			
8:												
Straw-----------------	0-5	18-27	1.10-1.30	0.6-2	0.16-0.18	0.0-2.9	3.0-5.0	.32	.32	5	6	48
	5-23	18-27	1.10-1.30	0.6-2	0.16-0.18	0.0-2.9	1.0-4.0	.32	.32			
	23-30	18-30	1.15-1.40	0.6-2	0.15-0.19	3.0-5.9	1.0-3.0	.32	.32			
	30-36	18-35	1.20-1.40	0.6-2	0.13-0.19	3.0-5.9	0.5-2.0	.32	.32			
	36-40	18-35	1.10-1.30	0.6-2	0.15-0.19	3.0-5.9	1.0-3.0	.32	.32			
	40-66	18-35	1.20-1.40	0.6-2	0.13-0.19	3.0-5.9	0.5-1.0	.32	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
9:												
Channel	---	---	---	---	---	---	---	---	---	-	---	---
Straw	0-5	18-27	1.10-1.30	0.6-2	0.16-0.18	0.0-2.9	3.0-5.0	.32	.32	5	6	48
	5-23	18-27	1.10-1.30	0.6-2	0.16-0.18	0.0-2.9	1.0-4.0	.32	.32			
	23-30	18-30	1.15-1.40	0.6-2	0.15-0.19	3.0-5.9	1.0-3.0	.32	.32			
	30-36	18-35	1.20-1.40	0.6-2	0.13-0.19	3.0-5.9	0.5-2.0	.32	.32			
	36-40	18-35	1.10-1.30	0.6-2	0.15-0.19	3.0-5.9	1.0-3.0	.32	.32			
	40-66	18-35	1.20-1.40	0.6-2	0.13-0.19	3.0-5.9	0.5-1.0	.32	.32			
Velva	0-6	10-18	1.20-1.50	0.6-6	0.13-0.18	0.0-2.9	4.0-8.0	.20	.20	5	3	86
	6-13	10-20	1.20-1.50	0.6-6	0.12-0.17	0.0-2.9	2.0-4.0	.20	.20			
	13-60	10-20	1.30-1.60	0.6-6	0.11-0.15	0.0-2.9	0.0-2.0	.20	.20			
10:												
Arnegard	0-13	18-27	1.00-1.40	0.6-2	0.18-0.20	0.0-2.9	3.0-6.0	.24	.24	5	6	48
	13-36	18-30	1.20-1.60	0.6-2	0.16-0.22	0.0-2.9	1.0-4.0	.28	.28			
	36-60	15-30	1.20-1.60	0.6-2	0.14-0.18	0.0-2.9	0.0-1.0	.28	.28			
10B:												
Arnegard	0-13	18-27	1.00-1.40	0.6-2	0.18-0.20	0.0-2.9	3.0-6.0	.24	.24	5	6	48
	13-36	18-30	1.20-1.60	0.6-2	0.16-0.22	0.0-2.9	1.0-4.0	.28	.28			
	36-60	15-30	1.20-1.60	0.6-2	0.14-0.18	0.0-2.9	0.0-1.0	.28	.28			
11:												
Amor	0-8	15-25	1.20-1.35	0.6-2	0.18-0.20	0.0-2.9	2.0-4.0	.24	.24	3	6	48
	8-19	18-30	1.20-1.40	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.32	.32			
	19-31	18-30	1.20-1.60	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
	31-60	5-35	1.40-1.65	0.06-0.6	0.04-0.10	---	0.0-0.5	.43	.43			
Arnegard	0-13	18-27	1.00-1.40	0.6-2	0.18-0.20	0.0-2.9	3.0-6.0	.24	.24	5	6	48
	13-36	18-30	1.20-1.60	0.6-2	0.16-0.22	0.0-2.9	1.0-4.0	.28	.28			
	36-60	15-30	1.20-1.60	0.6-2	0.14-0.18	0.0-2.9	0.0-1.0	.28	.28			
11B:												
Amor	0-8	15-25	1.20-1.35	0.6-2	0.18-0.20	0.0-2.9	2.0-4.0	.24	.24	3	6	48
	8-19	18-30	1.20-1.40	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.32	.32			
	19-31	18-30	1.20-1.60	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
	31-60	5-35	1.40-1.65	0.06-0.6	0.04-0.10	---	0.0-0.5	.43	.43			
Shambo	0-9	18-27	1.10-1.30	0.6-2	0.20-0.22	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	9-13	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.28	.28			
	13-29	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-2.0	.28	.28			
	29-48	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
	48-60	18-35	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.0-1.0	.32	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
12C:												
Amor------------------	0-8	15-25	1.20-1.35	0.6-2	0.18-0.20	0.0-2.9	2.0-4.0	.24	.24	3	6	48
	8-19	18-30	1.20-1.40	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.32	.32			
	19-31	18-30	1.20-1.60	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
	31-60	5-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.2	.43	.43			
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.2	.43	.43			
13D:												
Amor------------------	0-8	15-25	1.20-1.35	0.6-2	0.18-0.20	0.0-2.9	2.0-4.0	.24	.24	3	6	48
	8-19	18-30	1.20-1.40	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.32	.32			
	19-31	18-30	1.20-1.60	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
	31-60	5-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.2	.43	.43			
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.2	.43	.43			
15B:												
Chama-----------------	0-4	15-27	1.10-1.35	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.32	.32	3	4L	86
	4-8	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	1.0-3.0	.32	.32			
	8-34	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	0.5-1.0	.43	.43			
	34-60	10-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.5	.49	.49			
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.5	.49	.49			
15C:												
Chama-----------------	0-4	15-27	1.10-1.35	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.32	.32	3	4L	86
	4-8	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	1.0-3.0	.32	.32			
	8-34	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	0.5-1.0	.43	.43			
	34-60	10-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.5	.49	.49			
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.5	.49	.49			
Sen-------------------	0-6	18-27	1.10-1.30	0.6-2	0.20-0.24	0.0-2.9	2.0-4.0	.32	.32	3	6	48
	6-17	18-35	1.20-1.50	0.6-2	0.16-0.22	0.0-5.9	1.0-3.0	.43	.43			
	17-34	18-30	1.30-1.50	0.6-2	0.16-0.22	0.0-5.9	1.0-2.0	.43	.43			
	34-60	15-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.5	.49	.49			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
15D:												
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.5	.49	.49			
Chama-----------------	0-4	15-27	1.10-1.35	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.32	.32	3	4L	86
	4-8	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	1.0-3.0	.32	.32			
	8-34	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	0.5-1.0	.43	.43			
	34-60	10-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.5	.49	.49			
Sen-------------------	0-6	18-27	1.10-1.30	0.6-2	0.20-0.24	0.0-2.9	2.0-4.0	.32	.32	3	6	48
	6-17	18-35	1.20-1.50	0.6-2	0.16-0.22	0.0-5.9	1.0-3.0	.43	.43			
	17-34	18-30	1.30-1.50	0.6-2	0.16-0.22	0.0-5.9	1.0-2.0	.43	.43			
	34-60	15-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.5	.49	.49			
15F:												
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.5	.49	.49			
Chama-----------------	0-4	15-27	1.10-1.35	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.32	.32	3	4L	86
	4-8	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	1.0-3.0	.32	.32			
	8-34	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	0.5-1.0	.43	.43			
	34-60	10-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.5	.49	.49			
Arnegard--------------	0-13	18-27	1.00-1.40	0.6-2	0.18-0.20	0.0-2.9	3.0-6.0	.24	.24	5	6	48
	13-36	18-30	1.20-1.60	0.6-2	0.16-0.22	0.0-2.9	1.0-4.0	.28	.28			
	36-60	15-30	1.20-1.60	0.6-2	0.14-0.18	0.0-2.9	0.0-1.0	.28	.28			
16D:												
Ringling--------------	0-5	18-27	1.10-1.30	0.6-2	0.16-0.20	0.0-2.9	2.0-5.0	.17	.17	2	5	56
	5-17	18-25	1.25-1.50	2-6	0.06-0.07	0.0-2.9	1.0-2.0	.10	.32			
	17-42	1-5	1.30-1.50	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.32			
	42-60	1-5	1.30-1.50	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.32			
Daglum----------------	0-7	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32	2	6	48
	7-8	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32			
	8-18	35-60	1.30-1.60	0.001-0.2	0.12-0.14	6.0-8.9	1.0-2.0	.32	.32			
	18-32	35-60	1.20-1.60	0.001-0.2	0.12-0.14	6.0-8.9	0.5-1.0	.32	.32			
	32-60	35-60	1.20-1.60	0.001-0.2	0.12-0.14	6.0-8.9	0.0-1.0	.32	.32			
16F:												
Brandenburg-----------	0-4	10-25	1.20-1.40	0.6-2	0.12-0.16	0.0-2.9	2.0-5.0	.24	.49	2	8	0
	4-10	5-25	1.20-1.40	0.6-2	0.13-0.20	0.0-2.9	0.0-1.0	.24	.49			
	10-60	1-5	1.00-1.30	20-60	0.01-0.03	0.0-2.9	0.0-0.5	.10	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
16F:(cont.)												
Cabba------------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.5	.43	.43			
Savage-----------------	0-7	27-40	1.15-1.35	0.2-0.6	0.18-0.23	3.0-5.9	1.0-5.0	.32	.32	5	7	38
	7-25	35-50	1.25-1.50	0.06-0.6	0.17-0.20	6.0-8.9	1.0-2.0	.37	.37			
	25-51	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	51-60	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.0-0.5	.43	.43			
17B:												
Sen--------------------	0-6	18-27	1.10-1.30	0.6-2	0.20-0.24	0.0-2.9	2.0-4.0	.32	.32	3	6	48
	6-17	18-35	1.20-1.50	0.6-2	0.16-0.22	0.0-5.9	1.0-3.0	.43	.43			
	17-34	18-30	1.30-1.50	0.6-2	0.16-0.22	0.0-5.9	1.0-2.0	.43	.43			
	34-60	15-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.5	.49	.49			
Chama------------------	0-4	15-27	1.10-1.35	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.32	.32	3	4L	86
	4-8	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	1.0-3.0	.32	.32			
	8-34	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	0.5-1.0	.43	.43			
	34-60	10-35	1.40-1.65	0.06-0.6	0.04-0.10	—	0.0-0.5	.49	.49			
18B:												
Reeder-----------------	0-8	18-27	1.20-1.35	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	3	6	48
	8-17	18-35	1.20-1.40	0.6-2	0.15-0.19	3.0-5.9	1.0-3.0	.28	.28			
	17-36	18-35	1.20-1.50	0.6-2	0.14-0.19	3.0-5.9	0.5-2.0	.32	.32			
	36-60	5-35	1.40-1.70	0.06-2	0.02-0.10	—	0.0-0.2	.43	.43			
Farnuf-----------------	0-9	18-27	1.20-1.40	0.6-2	0.18-0.20	0.0-2.9	2.0-4.0	.28	.28	5	6	48
	9-23	25-35	1.20-1.40	0.6-2	0.15-0.20	3.0-5.9	1.0-2.0	.28	.28			
	23-34	18-35	1.20-1.50	0.6-2	0.15-0.20	3.0-5.9	0.5-1.0	.32	.32			
	34-60	15-30	1.20-1.50	0.6-2	0.15-0.20	3.0-5.9	0.0-0.5	.32	.32			
19:												
Farland----------------	0-4	18-27	1.10-1.25	0.6-2	0.19-0.22	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	4-18	27-35	1.20-1.50	0.6-2	0.16-0.20	3.0-5.9	1.0-3.0	.32	.32			
	18-34	18-35	1.20-1.50	0.6-2	0.17-0.20	3.0-5.9	0.5-2.0	.32	.32			
	34-60	18-35	1.20-1.50	0.6-2	0.16-0.18	3.0-5.9	0.0-0.5	.32	.32			
19B:												
Farland----------------	0-4	18-27	1.10-1.25	0.6-2	0.19-0.22	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	4-18	27-35	1.20-1.50	0.6-2	0.16-0.20	3.0-5.9	1.0-3.0	.32	.32			
	18-34	18-35	1.20-1.50	0.6-2	0.17-0.20	3.0-5.9	0.5-2.0	.32	.32			
	34-60	18-35	1.20-1.50	0.6-2	0.16-0.18	3.0-5.9	0.0-0.5	.32	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
19C:												
Farland---------------	0-4	18-27	1.10-1.25	0.6-2	0.19-0.22	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	4-18	27-35	1.20-1.50	0.6-2	0.16-0.20	3.0-5.9	1.0-3.0	.32	.32			
	18-34	18-35	1.20-1.50	0.6-2	0.17-0.20	3.0-5.9	0.5-2.0	.32	.32			
	34-60	18-35	1.20-1.50	0.6-2	0.16-0.18	3.0-5.9	0.0-0.5	.32	.32			
19D:												
Farland---------------	0-4	18-27	1.10-1.25	0.6-2	0.19-0.22	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	4-18	27-35	1.20-1.50	0.6-2	0.16-0.20	3.0-5.9	1.0-3.0	.32	.32			
	18-34	18-35	1.20-1.50	0.6-2	0.17-0.20	3.0-5.9	0.5-2.0	.32	.32			
	34-60	18-35	1.20-1.50	0.6-2	0.16-0.18	3.0-5.9	0.0-0.5	.32	.32			
20:												
Shambo----------------	0-9	18-27	1.10-1.30	0.6-2	0.20-0.22	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	9-13	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.28	.28			
	13-29	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-2.0	.28	.28			
	29-48	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
	48-60	18-35	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.0-1.0	.32	.32			
20B:												
Shambo----------------	0-9	18-27	1.10-1.30	0.6-2	0.20-0.22	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	9-13	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.28	.28			
	13-29	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-2.0	.28	.28			
	29-48	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
	48-60	18-35	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.0-1.0	.32	.32			
21B:												
Morton----------------	0-5	18-27	1.20-1.40	0.6-2	0.20-0.24	0.0-2.9	4.0-8.0	.28	.28	3	6	48
	5-15	25-35	1.20-1.50	0.6-2	0.16-0.20	3.0-5.9	1.0-3.0	.32	.32			
	15-33	20-35	1.20-1.50	0.6-2	0.16-0.20	3.0-5.9	0.0-1.0	.43	.43			
	33-60	10-35	1.40-1.70	0.06-0.6	0.02-0.10	—	0.0-0.5	.49	.49			
Farland---------------	0-4	18-27	1.10-1.25	0.6-2	0.19-0.22	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	4-18	27-35	1.20-1.50	0.6-2	0.16-0.20	3.0-5.9	1.0-3.0	.32	.32			
	18-34	18-35	1.20-1.50	0.6-2	0.17-0.20	3.0-5.9	0.5-2.0	.32	.32			
	34-60	18-35	1.20-1.50	0.6-2	0.16-0.18	3.0-5.9	0.0-0.5	.32	.32			
22F:												
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.5	.43	.43			
Rock outcrop----------	—	—	—	—	—	—	—	—	—	1	8	0

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
22F:(cont.)												
Chama-----------------	0-4	15-27	1.10-1.35	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.32	.32	3	4L	86
	4-8	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	1.0-3.0	.32	.32			
	8-34	18-35	1.20-1.50	0.6-2	0.18-0.20	0.0-5.9	0.5-1.0	.43	.43			
	34-60	10-35	1.40-1.65	0.06-0.6	0.04-0.10	---	0.0-0.5	.49	.49			
23C:												
Morton----------------	0-5	18-27	1.20-1.40	0.6-2	0.20-0.24	0.0-2.9	4.0-8.0	.28	.28	3	6	48
	5-15	25-35	1.20-1.50	0.6-2	0.16-0.20	3.0-5.9	1.0-3.0	.32	.32			
	15-33	20-35	1.20-1.50	0.6-2	0.16-0.20	3.0-5.9	0.0-1.0	.43	.43			
	33-60	10-35	1.40-1.70	0.06-0.6	0.02-0.10	---	0.0-0.5	.49	.49			
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	---	0.0-0.5	.49	.49			
26:												
Grail-----------------	0-10	27-35	1.10-1.40	0.2-0.6	0.20-0.23	3.0-5.9	4.0-6.0	.37	.37	5	7	38
	10-24	35-45	1.20-1.50	0.06-0.6	0.14-0.20	6.0-8.9	2.0-4.0	.37	.37			
	24-52	27-45	1.20-1.50	0.06-0.6	0.14-0.20	6.0-8.9	0.1-2.0	.37	.37			
	52-60	18-45	1.20-1.50	0.06-0.6	0.13-0.22	3.0-5.9	0.1-1.0	.37	.37			
27:												
Belfield--------------	0-9	27-35	0.90-1.25	0.2-2	0.17-0.22	3.0-6.0	2.0-6.0	.37	.37	5	7	38
	9-12	27-35	0.90-1.25	0.2-2	0.17-0.22	3.0-6.0	2.0-6.0	.37	.37			
	12-17	35-45	1.20-1.60	0.06-0.2	0.14-0.18	6.0-8.9	1.0-2.0	.37	.37			
	17-24	35-45	1.20-1.60	0.06-0.2	0.14-0.18	6.0-8.9	1.0-2.0	.37	.37			
	24-43	27-45	1.30-1.60	0.06-0.2	0.13-0.16	6.0-8.9	0.0-0.5	.43	.43			
	43-60	27-45	1.30-1.60	0.06-0.2	0.13-0.16	6.0-8.9	0.0-0.5	.43	.43			
Grail-----------------	0-10	27-35	1.10-1.40	0.2-0.6	0.20-0.23	3.0-5.9	4.0-6.0	.37	.37	5	7	38
	10-24	35-45	1.20-1.50	0.06-0.6	0.14-0.20	6.0-8.9	2.0-4.0	.37	.37			
	24-52	27-45	1.20-1.50	0.06-0.6	0.14-0.20	6.0-8.9	0.1-2.0	.37	.37			
	52-60	18-45	1.20-1.50	0.06-0.6	0.13-0.22	3.0-5.9	0.1-1.0	.37	.37			
27B:												
Grail-----------------	0-10	27-35	1.10-1.40	0.2-0.6	0.20-0.23	3.0-5.9	4.0-6.0	.37	.37	5	7	38
	10-24	35-45	1.20-1.50	0.06-0.6	0.14-0.20	6.0-8.9	2.0-4.0	.37	.37			
	24-52	27-45	1.20-1.50	0.06-0.6	0.14-0.20	6.0-8.9	0.1-2.0	.37	.37			
	52-60	18-45	1.20-1.50	0.06-0.6	0.13-0.22	3.0-5.9	0.1-1.0	.37	.37			
Belfield--------------	0-9	27-35	0.90-1.25	0.2-2	0.17-0.22	3.0-6.0	2.0-6.0	.37	.37	5	7	38
	9-12	27-35	0.90-1.25	0.2-2	0.17-0.22	3.0-6.0	2.0-6.0	.37	.37			
	12-17	35-45	1.20-1.60	0.06-0.2	0.14-0.18	6.0-8.9	1.0-2.0	.37	.37			
	17-24	35-45	1.20-1.60	0.06-0.2	0.14-0.18	6.0-8.9	1.0-2.0	.37	.37			
	24-43	27-45	1.30-1.60	0.06-0.2	0.13-0.16	6.0-8.9	0.0-0.5	.43	.43			
	43-60	27-45	1.30-1.60	0.06-0.2	0.13-0.16	6.0-8.9	0.0-0.5	.43	.43			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
28:												
Belfield---------------	0-9	18-27	0.90-1.25	0.6-2	0.20-0.23	3.0-6.0	2.0-6.0	.32	.32	5	6	48
	9-12	27-35	0.90-1.25	0.2-2	0.17-0.22	3.0-6.0	2.0-6.0	.37	.37			
	12-17	35-45	1.20-1.60	0.06-0.2	0.14-0.18	6.0-8.9	1.0-2.0	.37	.37			
	17-24	35-45	1.20-1.60	0.06-0.2	0.14-0.18	6.0-8.9	1.0-2.0	.37	.37			
	24-43	27-45	1.30-1.60	0.06-0.2	0.13-0.16	6.0-8.9	0.0-0.5	.43	.43			
	43-60	27-45	1.30-1.60	0.06-0.2	0.13-0.16	6.0-8.9	0.0-0.5	.43	.43			
Daglum-----------------	0-7	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32	2	6	48
	7-8	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32			
	8-18	35-60	1.30-1.60	0.001-0.2	0.12-0.14	6.0-8.9	1.0-2.0	.32	.32			
	18-32	35-60	1.20-1.60	0.001-0.2	0.12-0.14	6.0-8.9	0.5-1.0	.32	.32			
	32-60	35-60	1.20-1.60	0.2-2	0.12-0.14	6.0-8.9	0.0-1.0	.32	.32			
28B:												
Belfield---------------	0-9	18-27	0.90-1.25	0.6-2	0.20-0.23	3.0-6.0	2.0-6.0	.32	.32	5	6	48
	9-12	27-35	0.90-1.25	0.2-2	0.17-0.22	3.0-6.0	2.0-6.0	.37	.37			
	12-17	35-45	1.20-1.60	0.06-0.2	0.14-0.18	6.0-8.9	1.0-2.0	.37	.37			
	17-24	35-45	1.20-1.60	0.06-0.2	0.14-0.18	6.0-8.9	1.0-2.0	.37	.37			
	24-43	27-45	1.30-1.60	0.06-0.2	0.13-0.16	6.0-8.9	0.0-0.5	.43	.43			
	43-60	27-45	1.30-1.60	0.06-0.2	0.13-0.16	6.0-8.9	0.0-0.5	.43	.43			
Daglum-----------------	0-7	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32	2	6	48
	7-8	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32			
	8-18	35-60	1.30-1.60	0.001-0.2	0.12-0.14	6.0-8.9	1.0-2.0	.32	.32			
	18-32	35-60	1.20-1.60	0.001-0.2	0.12-0.14	6.0-8.9	0.5-1.0	.32	.32			
	32-60	35-60	1.20-1.60	0.2-2	0.12-0.14	6.0-8.9	0.0-1.0	.32	.32			
29:												
Savage-----------------	0-7	27-40	1.15-1.35	0.2-0.6	0.18-0.23	3.0-5.9	1.0-5.0	.32	.32	5	7	38
	7-25	35-50	1.25-1.50	0.06-0.6	0.17-0.20	6.0-8.9	1.0-2.0	.37	.37			
	25-51	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	51-60	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.0-0.5	.43	.43			
29B:												
Savage-----------------	0-7	27-40	1.15-1.35	0.2-0.6	0.18-0.23	3.0-5.9	1.0-5.0	.32	.32	5	7	38
	7-25	35-50	1.25-1.50	0.06-0.6	0.17-0.20	6.0-8.9	1.0-2.0	.37	.37			
	25-51	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	51-60	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.0-0.5	.43	.43			
29C:												
Savage-----------------	0-7	27-40	1.15-1.35	0.2-0.6	0.18-0.23	3.0-5.9	1.0-5.0	.32	.32	5	7	38
	7-25	35-50	1.25-1.50	0.06-0.6	0.17-0.20	6.0-8.9	1.0-2.0	.37	.37			
	25-51	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	51-60	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.0-0.5	.43	.43			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
30:												
Regent----------------	0-10	27-40	1.10-1.30	0.2-0.6	0.17-0.20	3.0-5.9	1.0-5.0	.32	.32	3	7	38
	10-26	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.32	.32			
	26-39	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	39-60	10-90	1.40-1.65	0.001-0.6	0.06-0.12	—	0.0-0.5	.43	.43			
Savage----------------	0-7	27-40	1.15-1.35	0.2-0.6	0.18-0.23	3.0-5.9	1.0-5.0	.32	.32	5	7	38
	7-25	35-50	1.25-1.50	0.06-0.6	0.17-0.20	6.0-8.9	1.0-2.0	.37	.37			
	25-51	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	51-60	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.0-0.5	.43	.43			
30B:												
Regent----------------	0-10	27-40	1.10-1.30	0.2-0.6	0.17-0.20	3.0-5.9	1.0-5.0	.32	.32	3	7	38
	10-26	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.32	.32			
	26-39	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	39-60	10-90	1.40-1.65	0.001-0.6	0.06-0.12	—	0.0-0.5	.43	.43			
Savage----------------	0-7	27-40	1.15-1.35	0.2-0.6	0.18-0.23	3.0-5.9	1.0-5.0	.32	.32	5	7	38
	7-25	35-50	1.25-1.50	0.06-0.6	0.17-0.20	6.0-8.9	1.0-2.0	.37	.37			
	25-51	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	51-60	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.0-0.5	.43	.43			
30C:												
Regent----------------	0-10	27-40	1.10-1.30	0.2-0.6	0.17-0.20	3.0-5.9	1.0-5.0	.32	.32	3	7	38
	10-26	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.32	.32			
	26-39	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	39-60	10-90	1.40-1.65	0.001-0.6	0.06-0.12	—	0.0-0.5	.43	.43			
Savage----------------	0-7	27-40	1.15-1.35	0.2-0.6	0.18-0.23	3.0-5.9	1.0-5.0	.32	.32	5	7	38
	7-25	35-50	1.25-1.50	0.06-0.6	0.17-0.20	6.0-8.9	1.0-2.0	.37	.37			
	25-51	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	51-60	35-45	1.30-1.50	0.06-0.6	0.17-0.20	6.0-8.9	0.0-0.5	.43	.43			
31B:												
Regent----------------	0-10	27-40	1.10-1.30	0.2-0.6	0.17-0.20	3.0-5.9	1.0-5.0	.32	.32	3	7	38
	10-26	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.32	.32			
	26-39	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	39-60	10-90	1.40-1.65	0.001-0.6	0.06-0.12	—	0.0-0.5	.43	.43			
Janesburg-------------	0-8	18-27	1.20-1.50	0.2-0.6	0.20-0.24	0.0-2.9	2.0-4.0	.28	.28	2	6	48
	8-10	10-27	1.20-1.50	0.6-6	0.16-0.24	0.0-2.9	2.0-3.0	.32	.32			
	10-21	35-50	1.30-1.60	0.001-0.2	0.10-0.16	6.0-8.9	1.0-2.0	.32	.32			
	21-26	18-45	1.30-1.60	0.06-2	0.10-0.16	6.0-8.9	0.5-1.0	.43	.43			
	26-60	10-90	1.40-1.65	0.001-0.6	0.04-0.10	—	0.0-0.5	.43	.43			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
31C:												
Regent----------------	0-10	27-40	1.10-1.30	0.2-0.6	0.17-0.20	3.0-5.9	1.0-5.0	.32	.32	3	7	38
	10-26	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.32	.32			
	26-39	35-50	1.30-1.50	0.06-0.2	0.17-0.20	6.0-8.9	0.5-1.0	.43	.43			
	39-60	10-90	1.40-1.65	0.001-0.6	0.06-0.12	—	0.0-0.5	.43	.43			
Janesburg-------------	0-8	18-27	1.20-1.50	0.2-0.6	0.20-0.24	0.0-2.9	2.0-4.0	.28	.28	2	6	48
	8-10	10-27	1.20-1.50	0.6-6	0.16-0.24	0.0-2.9	2.0-3.0	.32	.32			
	10-21	35-50	1.30-1.60	0.001-0.2	0.10-0.16	6.0-8.9	1.0-2.0	.32	.32			
	21-26	18-45	1.30-1.60	0.06-2	0.10-0.16	6.0-8.9	0.5-1.0	.43	.43			
	26-60	10-90	1.40-1.65	0.001-0.6	0.04-0.10	—	0.0-0.5	.43	.43			
35B:												
Moreau----------------	0-6	40-50	1.10-1.30	0.06-0.2	0.15-0.18	6.0-8.9	1.0-4.0	.28	.28	3	4L	86
	6-13	35-60	1.25-1.60	0.06-0.2	0.14-0.17	6.0-8.9	1.0-3.0	.32	.32			
	13-35	35-60	1.25-1.60	0.06-0.2	0.13-0.15	6.0-8.9	0.0-1.0	.43	.43			
	35-60	30-90	1.40-1.65	0.001-0.2	0.04-0.08	—	0.0-0.5	.43	.43			
35C:												
Moreau----------------	0-6	40-50	1.10-1.30	0.06-0.2	0.15-0.18	6.0-8.9	1.0-4.0	.28	.28	3	4L	86
	6-13	35-60	1.25-1.60	0.06-0.2	0.14-0.17	6.0-8.9	1.0-3.0	.32	.32			
	13-35	35-60	1.25-1.60	0.06-0.2	0.13-0.15	6.0-8.9	0.0-1.0	.43	.43			
	35-60	30-90	1.40-1.65	0.001-0.2	0.04-0.08	—	0.0-0.5	.43	.43			
Wayden----------------	0-3	40-50	1.10-1.50	0.06-0.2	0.15-0.18	6.0-8.9	0.5-2.0	.28	.28	2	4	86
	3-15	35-50	1.10-1.50	0.06-0.2	0.14-0.19	6.0-8.9	0.5-1.0	.32	.32			
	15-60	30-90	1.40-1.65	0.001-0.2	0.04-0.08	—	0.0-0.5	.43	.43			
35D:												
Moreau----------------	0-6	40-50	1.10-1.30	0.06-0.2	0.15-0.18	6.0-8.9	1.0-4.0	.28	.28	3	4L	86
	6-13	35-60	1.25-1.60	0.06-0.2	0.14-0.17	6.0-8.9	1.0-3.0	.32	.32			
	13-35	35-60	1.25-1.60	0.06-0.2	0.13-0.15	6.0-8.9	0.0-1.0	.43	.43			
	35-60	30-90	1.40-1.65	0.001-0.2	0.04-0.08	—	0.0-0.5	.43	.43			
Wayden----------------	0-3	40-50	1.10-1.50	0.06-0.2	0.15-0.18	6.0-8.9	0.5-2.0	.28	.28	2	4	86
	3-15	35-50	1.10-1.50	0.06-0.2	0.14-0.19	6.0-8.9	0.5-1.0	.32	.32			
	15-60	30-90	1.40-1.65	0.001-0.2	0.04-0.08	—	0.0-0.5	.43	.43			
36:												
Lawther---------------	0-10	40-60	1.10-1.30	0.06-0.2	0.15-0.18	6.0-8.9	2.0-4.0	.28	.28	5	4	86
	10-33	35-60	1.25-1.60	0.06-0.2	0.13-0.18	6.0-8.9	0.5-1.0	.32	.32			
	33-47	35-60	1.25-1.60	0.06-0.2	0.12-0.16	6.0-8.9	0.0-0.5	.32	.32			
	47-60	27-60	1.30-1.60	0.06-0.6	0.09-0.13	6.0-8.9	0.0-0.5	.32	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
38B:												
Searing---------------	0-8	18-27	1.20-1.40	0.6-2	0.20-0.23	0.0-2.9	3.0-7.0	.28	.28	3	6	48
	8-23	18-27	1.20-1.40	0.6-2	0.17-0.20	0.0-2.9	2.0-4.0	.28	.28			
	23-33	18-27	1.20-1.40	0.6-6	0.16-0.18	0.0-2.9	0.5-2.0	.28	.55			
	33-60	1-5	1.00-1.30	20-60	0.01-0.03	0.0-2.9	0.0-0.5	.10	.32			
Ringling--------------	0-5	18-27	1.10-1.30	0.6-2	0.16-0.20	0.0-2.9	2.0-5.0	.17	.17	2	5	56
	5-17	18-27	1.25-1.50	2-6	0.06-0.07	0.0-2.9	1.0-2.0	.10	.32			
	17-42	1-5	1.30-1.50	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.32			
	42-60	1-5	1.30-1.50	6-20	0.01-0.03	0.0-2.9	0.0-0.5	.10	.32			
40C:												
Rhoades---------------	0-3	18-27	1.10-1.30	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32	2	6	48
	3-8	35-50	1.20-1.50	0.001-0.2	0.10-0.12	6.0-8.9	0.5-2.0	.28	.28			
	8-14	35-50	1.20-1.50	0.001-0.2	0.10-0.12	6.0-8.9	0.5-2.0	.32	.32			
	14-46	20-50	1.20-1.50	0.2-0.6	0.10-0.12	6.0-8.9	0.0-0.5	.32	.32			
	46-60	20-45	1.20-1.50	0.2-0.6	0.10-0.12	6.0-8.9	0.0-0.5	.32	.32			
Slickspots------------	0-2	40-60	1.30-1.50	0.06-0.2	0.10-0.12	6.0-8.9	0.5-1.0	.32	.32	1	4L	86
	2-60	18-50	1.20-1.60	0.06-2	0.10-0.12	3.0-8.9	0.0-0.5	.32	.32			
Daglum----------------	0-7	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32	2	6	48
	7-8	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32			
	8-18	35-60	1.30-1.60	0.001-0.2	0.12-0.14	6.0-8.9	1.0-2.0	.32	.32			
	18-32	35-60	1.20-1.60	0.001-0.2	0.12-0.14	6.0-8.9	0.5-1.0	.32	.32			
	32-60	35-60	1.20-1.60	0.2-2	0.12-0.14	6.0-8.9	0.0-1.0	.32	.32			
41B:												
Daglum----------------	0-7	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32	2	6	48
	7-8	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32			
	8-18	35-60	1.30-1.60	0.001-0.2	0.12-0.14	6.0-8.9	1.0-2.0	.32	.32			
	18-32	35-60	1.20-1.60	0.001-0.2	0.12-0.14	6.0-8.9	0.5-1.0	.32	.32			
	32-60	35-60	1.20-1.60	0.2-2	0.12-0.14	6.0-8.9	0.0-1.0	.32	.32			
Rhoades---------------	0-3	18-27	1.10-1.30	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32	2	6	48
	3-8	35-50	1.20-1.50	0.001-0.2	0.10-0.12	6.0-8.9	0.5-2.0	.28	.28			
	8-14	35-50	1.20-1.50	0.001-0.2	0.10-0.12	6.0-8.9	0.5-2.0	.32	.32			
	14-46	20-50	1.20-1.50	0.2-0.6	0.10-0.12	6.0-8.9	0.0-0.5	.32	.32			
	46-60	20-45	1.20-1.50	0.2-0.6	0.10-0.12	6.0-8.9	0.0-0.5	.32	.32			
41C:												
Daglum----------------	0-5	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32	2	6	48
	5-8	18-30	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32			
	8-18	35-60	1.20-1.60	0.001-0.2	0.12-0.14	6.0-8.9	1.0-2.0	.32	.32			
	18-26	35-60	1.20-1.60	0.01-0.2	0.12-0.14	6.0-8.9	0.5-1.0	.32	.32			
	26-45	35-60	1.20-1.60	0.2-2	0.12-0.14	6.0-8.9	0.0-1.0	.32	.32			
	45-60	10-90	1.40-1.65	0.001-0.2	0.06-0.08	—	0.0-0.5	.32	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodibility group	Wind erodibility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
41C: (cont.)												
Rhoades---------------	0-4	18-27	1.10-1.30	0.6-2	0.13-0.15	0.0-2.9	2.0-6.0	.32	.32	2	6	48
	4-11	35-50	1.20-1.50	0.001-0.2	0.10-0.12	6.0-8.9	0.5-2.0	.28	.28			
	11-49	20-50	1.20-1.50	0.2-0.6	0.10-0.12	6.0-8.9	0.0-0.5	.32	.32			
	49-60	10-90	1.40-1.65	0.001-0.2	0.06-0.08	—	0.0-0.5	.32	.32			
42F:												
Dogtooth--------------	0-2	18-27	1.20-1.40	0.2-0.6	0.20-0.24	0.0-2.9	2.0-4.0	.28	.28	2	6	48
	2-8	35-50	1.20-1.60	0.001-0.2	0.10-0.16	6.0-8.9	1.0-2.0	.32	.32			
	8-13	35-50	1.20-1.60	0.001-0.2	0.10-0.16	6.0-8.9	0.5-2.0	.32	.32			
	13-21	18-50	1.20-1.60	0.001-0.6	0.10-0.16	6.0-8.9	0.5-1.0	.32	.32			
	21-60	10-90	1.40-1.65	0.001-0.6	0.06-0.12	—	0.0-0.5	.43	.43			
Janesburg-------------	0-8	18-27	1.20-1.50	0.2-0.6	0.20-0.24	0.0-2.9	2.0-4.0	.28	.28	2	6	48
	8-10	10-27	1.20-1.50	0.6-6	0.16-0.24	0.0-2.9	2.0-3.0	.32	.32			
	10-21	35-50	1.30-1.60	0.001-0.2	0.10-0.16	6.0-8.9	1.0-2.0	.32	.32			
	21-26	18-45	1.30-1.60	0.06-2	0.10-0.16	6.0-8.9	0.5-1.0	.43	.43			
	26-60	10-90	1.40-1.65	0.001-0.6	0.04-0.10	—	0.0-0.5	.43	.43			
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.2	.43	.43			
43C:												
Rhoades---------------	0-3	10-18	1.20-1.50	2-6	0.16-0.18	0.0-2.9	2.0-4.0	.24	.24	2	3	86
	3-8	35-50	1.20-1.50	0.001-0.2	0.10-0.12	6.0-8.9	0.5-2.0	.28	.28			
	8-14	35-50	1.20-1.50	0.001-0.2	0.10-0.12	6.0-8.9	0.5-2.0	.32	.32			
	14-46	20-50	1.20-1.50	0.2-0.6	0.10-0.12	6.0-8.9	0.0-0.5	.32	.32			
	46-60	20-45	1.20-1.50	0.2-0.6	0.10-0.12	6.0-8.9	0.0-0.5	.32	.32			
Daglum----------------	0-7	10-18	1.20-1.50	2-6	0.16-0.18	0.0-2.9	2.0-4.0	.24	.24	2	3	86
	7-8	18-27	1.20-1.50	0.6-2	0.13-0.15	0.0-2.9	2.0-4.0	.32	.32			
	8-18	35-60	1.30-1.60	0.001-0.2	0.12-0.14	6.0-8.9	1.0-2.0	.32	.32			
	18-32	35-60	1.20-1.60	0.001-0.2	0.12-0.14	6.0-8.9	0.5-1.0	.32	.32			
	32-60	35-60	1.20-1.60	0.2-2	0.12-0.14	6.0-8.9	0.0-1.0	.32	.32			
44B:												
Ekalaka---------------	0-6	10-18	1.30-1.50	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.24	.24	2	3	86
	6-12	5-18	1.35-1.55	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.24	.24			
	12-17	10-18	1.40-1.60	0.001-0.2	0.11-0.13	0.0-2.9	0.0-1.0	.24	.24			
	17-33	5-18	1.40-1.60	0.6-6	0.14-0.16	0.0-2.9	0.0-1.0	.24	.24			
	33-60	5-18	1.45-1.60	0.6-6	0.06-0.10	0.0-2.9	0.0-0.5	.24	.24			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
44B:(cont.)												
Lakota----------------	0-4	10-18	1.20-1.50	2-6	0.13-0.18	0.0-2.9	1.0-2.0	.24	.24	2	3	86
	4-8	5-18	1.20-1.50	2-6	0.06-0.18	0.0-2.9	0.0-2.0	.24	.24			
	8-14	10-18	1.40-1.60	0.06-0.2	0.10-0.16	0.0-2.9	0.0-2.0	.24	.24			
	14-34	5-18	1.40-1.60	2-6	0.08-0.11	0.0-2.9	0.5-1.0	.24	.24			
	34-50	5-18	1.30-1.60	2-6	0.05-0.14	0.0-2.9	0.0-1.0	.24	.24			
	50-60	1-10	1.45-1.70	0.06-2	0.02-0.04	—	0.0-0.5	.32	.32			
45:												
Harriet---------------	0-2	12-27	1.10-1.40	0.6-2	0.20-0.24	0.0-2.9	3.0-6.0	.37	.37	2	6	48
	2-18	35-50	1.20-1.60	0.001-0.06	0.10-0.15	6.0-8.9	1.0-3.0	.37	.37			
	18-28	18-40	1.20-1.60	0.6-2	0.10-0.15	3.0-5.9	0.5-1.0	.37	.37			
	28-38	10-18	1.40-1.60	0.6-2	0.09-0.15	0.0-2.9	0.0-1.0	.37	.37			
	38-40	23-35	1.35-1.55	0.6-2	0.09-0.12	3.0-5.9	0.0-0.5	.32	.32			
	40-60	15-45	1.20-1.60	0.06-0.2	0.09-0.12	3.0-5.9	0.0-0.5	.32	.32			
46C:												
Lakota----------------	0-4	10-18	1.20-1.50	2-6	0.13-0.18	0.0-2.9	1.0-2.0	.24	.24	2	3	86
	4-8	5-18	1.20-1.50	2-6	0.06-0.18	0.0-2.9	0.0-2.0	.24	.24			
	8-14	10-18	1.40-1.60	0.06-0.2	0.10-0.16	0.0-2.9	0.0-2.0	.24	.24			
	14-34	5-18	1.40-1.60	2-6	0.08-0.11	0.0-2.9	0.5-1.0	.24	.24			
	34-50	5-18	1.30-1.60	2-6	0.05-0.14	0.0-2.9	0.0-1.0	.24	.24			
	50-60	1-10	1.45-1.70	0.06-2	0.02-0.04	—	0.0-0.5	.32	.32			
Ekalaka---------------	0-6	10-18	1.30-1.50	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.24	.24	2	3	86
	6-12	5-18	1.35-1.55	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.24	.24			
	12-17	10-18	1.40-1.60	0.001-0.2	0.11-0.13	0.0-2.9	0.0-1.0	.24	.24			
	17-33	5-18	1.40-1.60	0.6-6	0.14-0.16	0.0-2.9	0.0-1.0	.24	.24			
	33-60	5-18	1.45-1.60	0.6-6	0.06-0.10	0.0-2.9	0.0-0.5	.24	.24			
47B:												
Dogtooth--------------	0-2	18-27	1.20-1.40	0.2-0.6	0.20-0.24	0.0-2.9	2.0-4.0	.28	.28	2	6	48
	2-8	35-50	1.20-1.60	0.001-0.2	0.10-0.16	6.0-8.9	1.0-2.0	.32	.32			
	8-13	35-50	1.20-1.60	0.001-0.2	0.10-0.16	6.0-8.9	0.5-2.0	.32	.32			
	13-21	18-50	1.20-1.60	0.001-0.6	0.10-0.16	6.0-8.9	0.5-1.0	.32	.32			
	21-60	10-90	1.40-1.65	0.001-0.6	0.04-0.10	—	0.0-0.5	.43	.43			
Janesburg-------------	0-8	18-27	1.20-1.50	0.2-0.6	0.20-0.24	0.0-2.9	2.0-4.0	.28	.28	2	6	48
	8-10	10-27	1.20-1.50	0.6-6	0.16-0.24	0.0-2.9	2.0-3.0	.32	.32			
	10-21	35-50	1.30-1.60	0.001-0.2	0.10-0.16	6.0-8.9	1.0-2.0	.32	.32			
	21-26	18-45	1.30-1.60	0.06-2	0.10-0.16	6.0-8.9	0.5-1.0	.43	.43			
	26-60	10-90	1.40-1.65	0.001-0.6	0.04-0.10	—	0.0-0.5	.43	.43			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
48B:												
Desart----------------	0-20	10-18	1.20-1.50	2-6	0.13-0.17	0.0-2.9	1.0-2.0	.20	.20	3	3	86
	20-24	5-15	1.20-1.50	2-6	0.09-0.15	0.0-2.9	0.5-2.0	.20	.20			
	24-31	10-18	1.30-1.60	0.001-0.2	0.12-0.14	0.0-2.9	0.5-1.0	.32	.32			
	31-60	5-20	1.30-1.60	0.06-6	0.08-0.14	0.0-2.9	0.0-0.5	.32	.32			
Ekalaka---------------	0-6	10-18	1.30-1.50	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.24	.24	2	3	86
	6-12	5-18	1.35-1.55	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.24	.24			
	12-17	10-18	1.40-1.60	0.001-0.2	0.11-0.13	0.0-2.9	0.0-1.0	.24	.24			
	17-33	5-18	1.40-1.60	0.6-6	0.14-0.16	0.0-2.9	0.0-1.0	.24	.24			
	33-60	5-18	1.45-1.60	0.6-6	0.06-0.10	0.0-2.9	0.0-0.5	.24	.24			
Telfer----------------	0-6	1-10	1.40-1.70	6-20	0.10-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	6-60	1-10	1.40-1.70	6-20	0.06-0.10	0.0-2.9	0.0-1.0	.17	.17			
49B:												
Lefor-----------------	0-7	10-25	1.10-1.30	2-6	0.16-0.18	0.0-2.9	2.0-4.0	.20	.20	3	3	86
	7-15	10-25	1.25-1.40	2-6	0.16-0.18	0.0-2.9	1.0-3.0	.32	.32			
	15-30	18-27	1.20-1.50	0.6-2	0.15-0.17	0.0-2.9	0.5-1.0	.32	.32			
	30-36	10-25	1.20-1.50	0.6-2	0.15-0.17	0.0-2.9	0.0-0.5	.24	.24			
	36-60	1-10	1.45-1.70	0.01-0.3	0.02-0.04	—	0.0-0.5	.32	.32			
51D:												
Vebar-----------------	0-5	10-18	1.20-1.50	2-6	0.15-0.17	0.0-2.9	1.0-4.0	.20	.20	3	3	86
	5-26	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	1.0-3.0	.20	.20			
	26-32	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	0.0-1.0	.20	.20			
	32-60	1-10	1.45-1.70	0.06-2	0.04-0.08	—	0.0-0.5	.32	.32			
Flasher---------------	0-6	3-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.5-1.0	.17	.17	2	2	134
	6-10	1-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.17	.17			
	10-60	1-10	1.45-1.70	0.01-2	0.04-0.08	—	0.0-0.5	.32	.32			
Tally-----------------	0-6	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	6-32	10-18	1.30-1.60	2-6	0.13-0.15	0.0-2.9	0.5-1.0	.20	.20			
	32-60	5-18	1.30-1.60	2-6	0.11-0.13	0.0-2.9	0.0-0.5	.24	.24			
51F:												
Flasher---------------	0-6	3-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.5-1.0	.17	.17	2	2	134
	6-10	1-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.17	.17			
	10-60	1-10	1.45-1.70	0.01-2	0.04-0.08	—	0.0-0.5	.32	.32			
Vebar-----------------	0-5	10-18	1.20-1.50	2-6	0.15-0.17	0.0-2.9	1.0-4.0	.20	.20	3	3	86
	5-26	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	1.0-3.0	.20	.20			
	26-32	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	0.0-1.0	.20	.20			
	32-60	1-10	1.45-1.70	0.06-2	0.04-0.08	—	0.0-0.5	.32	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
51F:(cont.)												
Parshall----------------	0-12	10-18	1.20-1.60	2-6	0.16-0.18	0.0-2.9	1.0-4.0	.20	.20	5	3	86
	12-29	10-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	1.0-3.0	.20	.20			
	29-48	5-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	0.0-1.0	.24	.24			
	48-60	5-18	1.40-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.17	.17			
52B:												
Vebar-------------------	0-5	10-18	1.20-1.50	2-6	0.15-0.17	0.0-2.9	1.0-4.0	.20	.20	3	3	86
	5-26	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	1.0-3.0	.20	.20			
	26-32	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	0.0-1.0	.20	.20			
	32-60	1-10	1.45-1.70	0.06-2	0.04-0.08	---	0.0-0.5	.32	.32			
Parshall----------------	0-12	10-18	1.20-1.60	2-6	0.16-0.18	0.0-2.9	1.0-4.0	.20	.20	5	3	86
	12-29	10-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	1.0-3.0	.20	.20			
	29-48	5-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	0.0-1.0	.24	.24			
	48-60	5-18	1.40-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.17	.17			
53B:												
Tally-------------------	0-6	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	6-32	10-18	1.30-1.60	2-6	0.13-0.15	0.0-2.9	0.5-1.0	.20	.20			
	32-60	5-18	1.30-1.60	2-6	0.11-0.13	0.0-2.9	0.0-0.5	.24	.24			
Parshall----------------	0-12	10-18	1.20-1.60	2-6	0.16-0.18	0.0-2.9	1.0-4.0	.20	.20	5	3	86
	12-29	10-18	1.30-1.60	2-6	0.13-0.17	0.0-2.9	1.0-3.0	.20	.20			
	29-48	5-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	0.0-1.0	.24	.24			
	48-60	5-18	1.40-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.17	.17			
53C:												
Tally-------------------	0-6	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	6-32	10-18	1.30-1.60	2-6	0.13-0.15	0.0-2.9	0.5-1.0	.20	.20			
	32-60	5-18	1.30-1.60	2-6	0.11-0.13	0.0-2.9	0.0-0.5	.24	.24			
Parshall----------------	0-12	10-18	1.20-1.60	2-6	0.16-0.18	0.0-2.9	1.0-4.0	.20	.20	5	3	86
	12-29	10-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	1.0-3.0	.20	.20			
	29-48	5-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	0.0-1.0	.24	.24			
	48-60	5-18	1.40-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.17	.17			
54C:												
Vebar-------------------	0-5	10-18	1.20-1.50	2-6	0.15-0.17	0.0-2.9	1.0-4.0	.20	.20	3	3	86
	5-26	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	1.0-3.0	.20	.20			
	26-32	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	0.0-1.0	.20	.20			
	32-60	1-10	1.45-1.70	0.06-2	0.02-0.04	---	0.0-0.5	.32	.32			
Flasher-----------------	0-6	3-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.5-1.0	.17	.17	2	2	134
	6-10	1-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.17	.17			
	10-60	1-10	1.45-1.70	0.01-2	0.04-0.08	---	0.0-0.5	.32	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
55B:												
Beisigl---------------	0-5	3-10	1.20-1.50	6-20	0.11-0.13	0.0-2.9	1.0-3.0	.17	.17	3	2	134
	5-27	1-10	1.30-1.70	6-20	0.05-0.10	0.0-2.9	0.5-1.0	.17	.20			
	27-60	1-10	1.45-1.70	0.06-2	0.02-0.04	—	0.0-0.5	.32	.32			
Lihen-----------------	0-9	1-10	1.25-1.60	6-20	0.06-0.18	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	9-24	1-10	1.25-1.60	6-20	0.06-0.18	0.0-2.9	1.0-3.0	.17	.17			
	24-32	1-10	1.25-1.45	6-20	0.06-0.12	0.0-2.9	1.0-2.0	.17	.17			
	32-60	1-10	1.40-1.60	6-20	0.05-0.12	0.0-2.9	0.0-0.5	.17	.17			
56:												
Parshall--------------	0-12	10-18	1.20-1.60	2-6	0.16-0.18	0.0-2.9	1.0-4.0	.20	.20	5	3	86
	12-29	10-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	1.0-3.0	.20	.20			
	29-48	5-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	0.0-1.0	.24	.24			
	48-60	5-18	1.40-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.17	.17			
57D:												
Beisigl---------------	0-5	3-10	1.20-1.50	6-20	0.11-0.13	0.0-2.9	1.0-3.0	.17	.17	3	2	134
	5-27	1-10	1.30-1.70	6-20	0.05-0.10	0.0-2.9	0.5-1.0	.17	.20			
	27-60	1-10	1.45-1.70	0.06-2	0.02-0.04	—	0.0-0.5	.32	.32			
Flasher---------------	0-6	3-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.5-1.0	.17	.17	2	2	134
	6-10	1-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.17	.17			
	10-60	1-10	1.45-1.70	0.01-2	0.04-0.08	—	0.0-0.5	.32	.32			
58B:												
Lihen-----------------	0-9	1-10	1.25-1.60	6-20	0.06-0.18	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	9-24	1-10	1.25-1.60	6-20	0.06-0.18	0.0-2.9	1.0-3.0	.17	.17			
	24-32	1-10	1.25-1.45	6-20	0.06-0.12	0.0-2.9	1.0-2.0	.17	.17			
	32-60	1-10	1.40-1.60	6-20	0.05-0.12	0.0-2.9	0.0-0.5	.17	.17			
Parshall--------------	0-12	10-18	1.20-1.60	2-6	0.16-0.18	0.0-2.9	1.0-4.0	.20	.20	5	3	86
	12-29	10-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	1.0-3.0	.20	.20			
	29-48	5-18	1.30-1.60	2-6	0.12-0.17	0.0-2.9	0.0-1.0	.24	.24			
	48-60	5-18	1.40-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.17	.17			
59F:												
Flasher---------------	0-6	3-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.5-1.0	.17	.17	2	2	134
	6-10	1-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.17	.17			
	10-60	1-10	1.45-1.70	0.01-2	0.04-0.08	—	0.0-0.5	.32	.32			
Rock outcrop----------	—	—	—	—	—	—	—	—	—	1	8	0

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
59F:(cont.)												
Vebar-----------------	0-5	10-18	1.20-1.50	2-6	0.15-0.17	0.0-2.9	1.0-4.0	.20	.20	3	3	86
	5-26	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	1.0-3.0	.20	.20			
	26-32	10-18	1.20-1.60	2-6	0.15-0.17	0.0-2.9	0.0-1.0	.20	.20			
	32-60	1-10	1.45-1.70	0.06-2	0.04-0.08	—	0.0-0.5	.32	.32			
60D:												
Wabek-----------------	0-5	15-27	1.10-1.50	2-6	0.20-0.22	0.0-2.9	1.0-2.0	.20	.28	2	5	56
	5-9	10-20	1.20-1.60	2-20	0.11-0.15	0.0-2.9	0.0-1.0	.10	.17			
	9-60	1-10	1.30-1.70	20-60	0.02-0.04	0.0-2.9	0.0-1.0	.10	.10			
Manning---------------	0-5	10-18	1.10-1.30	2-6	0.13-0.18	0.0-2.9	2.0-5.0	.20	.20	4	3	86
	5-18	10-20	1.20-1.50	2-6	0.13-0.19	0.0-2.9	1.0-3.0	.20	.24			
	18-25	10-20	1.30-1.50	2-6	0.12-0.20	0.0-2.9	1.0-2.0	.10	.20			
	25-60	1-10	1.20-1.70	20-60	0.02-0.08	0.0-2.9	0.0-1.0	.10	.20			
62B:												
Manning---------------	0-5	10-18	1.10-1.30	2-6	0.13-0.18	0.0-2.9	2.0-5.0	.20	.20	4	3	86
	5-18	10-20	1.20-1.50	2-6	0.13-0.19	0.0-2.9	1.0-3.0	.20	.24			
	18-25	10-20	1.30-1.50	2-6	0.12-0.20	0.0-2.9	1.0-2.0	.10	.20			
	25-60	1-10	1.20-1.70	20-60	0.02-0.08	0.0-2.9	0.0-1.0	.10	.20			
63B:												
Lehr------------------	0-6	18-27	1.10-1.40	0.6-6	0.17-0.22	0.0-2.9	1.0-3.0	.28	.28	3	5	56
	6-11	18-30	1.20-1.50	0.6-6	0.17-0.20	3.0-5.9	1.0-2.0	.20	.28			
	11-15	18-27	1.20-1.50	0.6-6	0.17-0.20	3.0-5.9	1.0-2.0	.20	.28			
	15-22	5-18	1.40-1.70	6-60	0.09-0.11	0.0-2.9	0.0-1.0	.10	.17			
	22-60	1-10	1.40-1.70	6-60	0.02-0.04	0.0-2.9	0.0-1.0	.10	.17			
Stady-----------------	0-6	18-27	1.10-1.30	0.6-2	0.17-0.20	0.0-2.9	2.0-4.0	.28	.28	4	5	56
	6-15	18-27	1.10-1.30	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.28	.28			
	15-29	18-27	1.10-1.40	0.6-2	0.17-0.19	0.0-2.9	0.0-1.0	.24	.32			
	29-60	1-10	1.30-1.70	20-60	0.02-0.04	0.0-2.9	0.0-0.5	.10	.17			
64:												
Stady-----------------	0-6	18-27	1.10-1.30	0.6-2	0.17-0.20	0.0-2.9	2.0-4.0	.28	.28	4	5	56
	6-15	18-27	1.10-1.30	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.28	.28			
	15-29	18-27	1.10-1.40	0.6-2	0.17-0.19	0.0-2.9	0.0-1.0	.24	.32			
	29-60	1-10	1.30-1.70	20-60	0.02-0.04	0.0-2.9	0.0-0.5	.10	.17			
65:												
Wanagan---------------	0-7	18-27	1.10-1.30	0.6-2	0.20-0.22	0.0-2.9	2.0-4.0	.28	.28	5	5	56
	7-14	18-27	1.20-1.40	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.24	.28			
	14-18	18-27	1.40-1.60	0.6-2	0.17-0.19	0.0-2.9	1.0-2.0	.24	.32			
	18-26	15-27	1.40-1.70	2-20	0.06-0.12	0.0-2.9	0.5-1.0	.10	.43			
	26-60	10-27	1.40-1.70	6-20	0.06-0.08	0.0-2.9	0.0-0.5	.10	.43			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
66F:												
Wabek-----------------	0-5	15-27	1.10-1.50	2-6	0.20-0.22	0.0-2.9	1.0-2.0	.20	.28	2	5	56
	5-9	10-20	1.20-1.60	2-20	0.11-0.15	0.0-2.9	0.0-1.0	.10	.17			
	9-60	1-10	1.30-1.70	20-60	0.02-0.04	0.0-2.9	0.0-1.0	.10	.10			
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.2	.43	.43			
Shambo----------------	0-9	18-27	1.10-1.30	0.6-2	0.20-0.22	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	9-13	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.28	.28			
	13-29	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-2.0	.28	.28			
	29-48	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
	48-60	18-35	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.0-1.0	.32	.32			
67B:												
Virgelle--------------	0-9	1-15	1.20-1.50	2-6	0.15-0.17	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	9-17	5-10	1.40-1.70	6-20	0.09-0.13	0.0-2.9	1.0-2.0	.20	.20			
	17-27	5-10	1.40-1.70	6-20	0.09-0.13	0.0-2.9	0.0-1.0	.20	.20			
	27-35	40-60	1.30-1.50	0.001-0.06	0.10-0.14	6.0-8.9	0.0-0.5	.32	.32			
	35-60	35-60	1.30-1.50	0.001-0.06	0.10-0.14	6.0-8.9	0.0-0.5	.32	.32			
68D:												
Telfer----------------	0-6	1-10	1.40-1.70	6-20	0.10-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	6-60	1-10	1.40-1.70	6-20	0.06-0.10	0.0-2.9	0.0-1.0	.17	.17			
68E:												
Telfer----------------	0-6	1-10	1.40-1.70	6-20	0.10-0.12	0.0-2.9	1.0-3.0	.17	.17	5	2	134
	6-60	1-10	1.40-1.70	6-20	0.06-0.10	0.0-2.9	0.0-1.0	.17	.17			
70:												
Bowbells--------------	0-6	18-27	1.10-1.40	0.6-2	0.17-0.19	0.0-2.9	2.0-6.0	.24	.24	5	6	48
	6-14	18-35	1.20-1.50	0.6-2	0.16-0.22	3.0-5.9	2.0-4.0	.28	.28			
	14-23	18-35	1.20-1.50	0.6-2	0.16-0.22	3.0-5.9	2.0-4.0	.28	.28			
	23-36	18-35	1.30-1.70	0.2-0.6	0.14-0.18	3.0-5.9	1.0-2.0	.37	.37			
	36-60	18-35	1.30-1.70	0.2-0.6	0.14-0.18	3.0-5.9	0.0-1.0	.37	.37			
71:												
Williams--------------	0-6	15-27	1.20-1.60	0.6-2	0.18-0.20	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	6-10	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	10-15	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	15-24	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	24-36	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
	36-60	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
								Kw	Kf	T		
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
71:(cont.)												
Bowbells--------------	0-6	18-27	1.10-1.40	0.6-2	0.17-0.19	0.0-2.9	2.0-6.0	.24	.24	5	6	48
	6-14	18-35	1.20-1.50	0.6-2	0.16-0.22	3.0-5.9	2.0-4.0	.28	.28			
	14-23	18-35	1.20-1.50	0.6-2	0.16-0.22	3.0-5.9	2.0-4.0	.28	.28			
	23-36	18-35	1.30-1.70	0.2-0.6	0.14-0.18	3.0-5.9	1.0-2.0	.37	.37			
	36-60	18-35	1.30-1.70	0.2-0.6	0.14-0.18	3.0-5.9	0.0-1.0	.37	.37			
71B:												
Williams--------------	0-6	15-27	1.20-1.60	0.6-2	0.18-0.20	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	6-10	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	10-15	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	15-24	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	24-36	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
	36-60	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
Bowbells--------------	0-6	18-27	1.10-1.40	0.6-2	0.17-0.19	0.0-2.9	2.0-6.0	.24	.24	5	6	48
	6-14	18-35	1.20-1.50	0.6-2	0.16-0.22	3.0-5.9	2.0-4.0	.28	.28			
	14-23	18-35	1.20-1.50	0.6-2	0.16-0.22	3.0-5.9	2.0-4.0	.28	.28			
	23-36	18-35	1.30-1.70	0.2-0.6	0.14-0.18	3.0-5.9	1.0-2.0	.37	.37			
	36-60	18-35	1.30-1.70	0.2-0.6	0.14-0.18	3.0-5.9	0.0-1.0	.37	.37			
73B:												
Williams--------------	0-6	15-27	1.20-1.60	0.6-2	0.18-0.20	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	6-10	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	10-15	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	15-24	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	24-36	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
	36-60	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
Reeder----------------	0-8	18-27	1.20-1.35	0.6-2	0.18-0.20	0.0-2.9	1.0-3.0	.28	.28	3	6	48
	8-17	18-35	1.20-1.40	0.6-2	0.15-0.18	3.0-5.9	1.0-3.0	.28	.28			
	17-36	18-35	1.20-1.50	0.6-2	0.14-0.17	3.0-5.9	0.5-2.0	.32	.32			
	36-60	5-35	1.40-1.70	0.06-2	0.02-0.10	—	0.0-0.5	.43	.43			
76C:												
Williams--------------	0-6	15-27	1.20-1.60	0.6-2	0.18-0.20	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	6-10	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	10-15	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	15-24	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	24-36	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
	36-60	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
Zahl------------------	0-5	18-27	1.10-1.40	0.6-2	0.17-0.22	3.0-5.9	1.0-4.0	.28	.28	5	4L	86
	5-20	20-30	1.20-1.60	0.6-2	0.15-0.19	3.0-5.9	0.0-2.0	.32	.32			
	20-60	20-30	1.30-1.60	0.2-0.6	0.15-0.19	3.0-5.9	0.0-0.5	.37	.37			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
76D:												
Zahl------------------	0-5	18-27	1.10-1.40	0.6-2	0.17-0.22	3.0-5.9	1.0-4.0	.28	.28	5	4L	86
	5-20	20-30	1.20-1.60	0.6-2	0.15-0.19	3.0-5.9	0.0-2.0	.32	.32			
	20-60	20-30	1.30-1.60	0.2-0.6	0.15-0.19	3.0-5.9	0.0-0.5	.37	.37			
Williams--------------	0-6	15-27	1.20-1.60	0.6-2	0.18-0.20	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	6-10	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	10-15	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	15-24	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	24-36	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
	36-60	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
76F:												
Zahl------------------	0-5	18-27	1.10-1.40	0.6-2	0.17-0.22	3.0-5.9	1.0-4.0	.28	.28	5	4L	86
	5-20	20-30	1.20-1.60	0.6-2	0.15-0.19	3.0-5.9	0.0-2.0	.32	.32			
	20-60	20-30	1.30-1.60	0.2-0.6	0.15-0.19	3.0-5.9	0.0-0.5	.37	.37			
Williams--------------	0-6	15-27	1.20-1.60	0.6-2	0.18-0.20	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	6-10	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	10-15	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	15-24	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	24-36	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
	36-60	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
77:												
Temvik----------------	0-7	18-27	1.10-1.30	0.6-2	0.22-0.24	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	7-24	18-30	1.10-1.50	0.6-2	0.20-0.22	0.0-2.9	0.5-2.0	.43	.43			
	24-44	18-35	1.30-1.50	0.2-0.6	0.16-0.20	3.0-5.9	0.5-1.0	.43	.43			
	44-60	18-35	1.35-1.60	0.2-0.6	0.14-0.18	3.0-5.9	0.0-1.0	.43	.43			
Wilton----------------	0-8	18-27	1.10-1.40	0.6-2	0.22-0.24	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	8-27	18-27	1.20-1.40	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	27-60	18-35	1.30-1.60	0.2-0.6	0.15-0.19	3.0-5.9	0.0-1.0	.37	.43			
77B:												
Temvik----------------	0-7	18-27	1.10-1.30	0.6-2	0.22-0.24	0.0-2.9	2.0-6.0	.32	.32	5	6	48
	7-24	18-30	1.10-1.50	0.6-2	0.20-0.22	0.0-2.9	0.5-2.0	.43	.43			
	24-44	18-35	1.30-1.50	0.2-0.6	0.16-0.20	3.0-5.9	0.5-1.0	.43	.43			
	44-60	18-35	1.35-1.60	0.2-0.6	0.14-0.18	3.0-5.9	0.0-1.0	.43	.43			
Williams--------------	0-6	18-27	1.15-1.30	0.6-2	0.19-0.22	0.0-2.9	2.0-7.0	.32	.32	5	6	48
	6-10	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	10-15	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	15-24	24-35	1.20-1.60	0.6-2	0.16-0.20	3.0-5.9	1.0-4.0	.28	.28			
	24-36	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
	36-60	20-35	1.30-1.60	0.2-0.6	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
80:												
Breien----------------	0-6	10-18	1.20-1.50	2-6	0.14-0.16	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	6-15	10-18	1.20-1.50	2-6	0.15-0.17	0.0-2.9	0.5-1.0	.20	.20			
	15-60	1-10	1.50-1.70	6-20	0.07-0.09	0.0-2.9	0.0-0.5	.17	.17			
82:												
Mckeen----------------	0-2	18-27	1.10-1.35	0.6-6	0.15-0.24	0.0-2.9	0.5-1.0	.28	.28	5	4L	86
	2-12	18-27	1.30-1.65	0.6-6	0.15-0.24	0.0-2.9	0.5-1.0	.28	.28			
	12-15	20-50	1.20-1.57	0.06-2	0.14-0.19	3.0-5.9	0.5-1.0	.28	.28			
	15-60	5-50	1.30-1.65	0.06-6	0.13-0.24	3.0-5.9	0.0-0.5	.28	.28			
83:												
Mckeen----------------	0-2	18-27	1.10-1.35	0.6-6	0.15-0.24	0.0-2.9	0.5-1.0	.28	.28	5	4L	86
	2-12	18-27	1.30-1.65	0.6-6	0.15-0.24	0.0-2.9	0.5-1.0	.28	.28			
	12-15	20-50	1.20-1.57	0.06-2	0.14-0.19	3.0-5.9	0.5-1.0	.28	.28			
	15-60	5-50	1.30-1.65	0.06-6	0.13-0.24	3.0-5.9	0.0-0.5	.28	.28			
85B:												
Banks-----------------	0-4	3-10	1.30-1.50	6-20	0.10-0.12	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	4-30	1-10	1.40-1.70	6-20	0.06-0.13	0.0-2.9	0.0-0.5	.17	.17			
	30-60	1-10	1.40-1.70	6-20	0.05-0.12	0.0-2.9	0.0-0.5	.17	.17			
86:												
Havrelon--------------	0-13	10-18	1.10-1.50	2-6	0.16-0.18	0.0-2.9	0.5-1.0	.32	.32	5	4L	86
	13-60	15-35	1.30-1.70	0.6-2	0.16-0.20	3.0-5.9	0.0-0.5	.32	.32			
87:												
Minnewaukan-----------	0-3	8-18	1.20-1.50	6-20	0.12-0.16	0.0-2.9	2.0-6.0	.20	.20	5	3	86
	3-5	1-10	1.40-1.60	6-20	0.04-0.10	0.0-2.9	2.0-6.0	.17	.17			
	5-60	1-10	1.40-1.70	6-20	0.04-0.12	0.0-2.9	0.0-1.0	.15	.15			
88:												
Havrelon--------------	0-13	18-27	1.10-1.50	0.6-2	0.20-0.24	3.0-5.9	0.5-1.0	.32	.32	5	4L	86
	13-60	15-35	1.30-1.70	0.6-2	0.16-0.20	3.0-5.9	0.0-0.5	.32	.32			
91:												
Lohler----------------	0-8	40-60	1.10-1.30	0.06-0.6	0.15-0.18	6.0-8.9	0.5-3.0	.28	.28	5	4	86
	8-60	35-60	1.20-1.50	0.06-0.2	0.13-0.17	6.0-8.9	0.0-0.5	.28	.28			
98:												
Mandan----------------	0-20	10-18	1.10-1.30	0.6-2	0.20-0.22	0.0-2.9	4.0-6.0	.32	.32	5	5	56
	20-29	10-18	1.10-1.40	0.6-2	0.17-0.22	0.0-2.9	2.0-4.0	.32	.32			
	29-47	10-18	1.10-1.40	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43			
	47-60	8-18	1.10-1.40	0.6-2	0.14-0.19	0.0-2.9	0.0-1.0	.32	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodi-bility group	Wind erodi-bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
98:(cont.)												
Linton----------------	0-7	10-18	1.10-1.40	0.6-2	0.20-0.24	0.0-2.9	3.0-6.0	.32	.32	5	5	56
	7-17	10-18	1.20-1.40	0.6-2	0.20-0.22	0.0-2.9	2.0-5.0	.32	.32			
	17-29	10-18	1.20-1.50	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32			
	29-60	10-18	1.20-1.50	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.32	.32			
98B:												
Linton----------------	0-7	10-18	1.10-1.40	0.6-2	0.20-0.24	0.0-2.9	3.0-6.0	.32	.32	5	5	56
	7-17	10-18	1.20-1.40	0.6-2	0.20-0.22	0.0-2.9	2.0-5.0	.32	.32			
	17-29	10-18	1.20-1.50	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32			
	29-60	10-18	1.20-1.50	0.6-2	0.20-0.22	0.0-2.9	0.0-1.0	.32	.32			
Mandan----------------	0-20	10-18	1.10-1.30	0.6-2	0.20-0.22	0.0-2.9	4.0-6.0	.32	.32	5	5	56
	20-29	10-18	1.10-1.40	0.6-2	0.17-0.22	0.0-2.9	2.0-4.0	.32	.32			
	29-47	10-18	1.10-1.40	0.6-2	0.20-0.22	0.0-2.9	1.0-2.0	.43	.43			
	47-60	8-18	1.10-1.40	0.6-2	0.14-0.19	0.0-2.9	0.0-1.0	.32	.32			
99F:												
Badland, outcrop------	0-60	10-60	1.10-1.50	0.001-2	0.04-0.08	3.0-9.0	0.0-0.3	.43	.43	1	4	86
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	0.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.5	.43	.43			
100:												
Pits------------------	0-6	1-10	1.40-1.60	6-60	0.01-0.04	0.0-2.9	0.5-1.0	.10	.20	1	8	0
	6-60	1-15	1.40-1.70	6-60	0.01-0.04	0.0-2.9	0.0-0.5	.10	.17			
105:												
Dumps and Pits--------	0-4	27-35	1.40-1.60	0.06-2	0.16-0.18	3.0-5.9	0.5-1.0	.37	.37	5	4L	86
	4-60	18-35	1.40-1.80	0.06-0.6	0.10-0.13	3.0-5.9	0.0-1.0	.37	.37			
110:												
Ustorthents-----------	0-4	27-40	1.40-1.60	0.2-2	0.20-0.24	0.0-2.9	0.5-2.0	.32	.32	1	4L	86
	4-60	10-35	1.40-1.80	0.001-2	0.02-0.10	—	0.0-0.5	.43	.43			
115:												
Riverwash-------------	0-6	1-5	1.40-1.70	6-20	0.03-0.04	0.0-2.9	0.0-0.5	.15	.15	5	1	180
	6-60	1-10	1.40-1.70	6-20	0.04-0.06	0.0-2.9	0.0-0.5	.15	.15			
154F:												
Arikara---------------	0-1	—	0.20-0.35	—	0.55-0.65	—	70-90	.32	.32	5	6	48
	1-2	18-35	1.00-1.20	0.6-2	0.18-0.22	0.0-2.9	3.0-6.0	.28	.28			
	2-14	18-35	1.20-1.40	0.6-2	0.18-0.22	3.0-5.9	1.0-2.0	.28	.28			
	14-39	15-35	1.20-1.40	0.6-2	0.15-0.20	3.0-5.9	1.0-2.0	.28	.32			
	39-60	15-35	1.15-1.35	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.28	.32			

Table 20.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Ksat	Available water capacity	Shrink-swell potential	Organic matter	Erosion factors Kw	Erosion factors Kf	Erosion factors T	Wind erodibility group	Wind erodibility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
154F:(cont.)												
Shambo----------------	0-9	18-27	1.10-1.30	0.6-2	0.20-0.22	0.0-2.9	2.0-6.0	.28	.28	5	6	48
	9-13	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-3.0	.28	.28			
	13-29	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	1.0-2.0	.28	.28			
	29-48	18-30	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.5-1.0	.32	.32			
	48-60	18-35	1.20-1.50	0.6-2	0.17-0.19	0.0-2.9	0.0-1.0	.32	.32			
Cabba-----------------	0-3	18-27	1.30-1.50	0.6-2	0.16-0.20	0.0-2.9	1.0-3.0	.32	.32	2	4L	86
	3-15	18-35	1.30-1.50	0.6-2	0.14-0.18	3.0-5.9	0.5-1.0	.43	.43			
	15-60	10-35	1.40-1.70	0.06-0.6	0.02-0.08	—	0.0-0.5	.43	.43			
161F:												
Beisigl---------------	0-5	3-10	1.20-1.50	6-20	0.11-0.13	0.0-2.9	1.0-3.0	.17	.17	3	2	134
	5-27	1-10	1.30-1.70	6-20	0.05-0.10	0.0-2.9	0.5-1.0	.17	.20			
	27-60	1-10	1.45-1.70	0.06-2	0.02-0.04	—	0.0-0.5	—	—			
Flasher---------------	0-6	3-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.5-1.0	.17	.17	2	2	134
	6-10	1-10	1.10-1.50	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.17	.17			
	10-60	1-10	1.45-1.70	0.01-2	0.04-0.08	—	0.0-0.5	.32	.32			
Arikara---------------	0-1	—	0.20-0.35	—	0.55-0.65	—	70-90	.32	.32	5	6	48
	1-2	18-35	1.00-1.20	0.6-2	0.18-0.22	0.0-2.9	3.0-6.0	.28	.28			
	2-14	18-35	1.20-1.40	0.6-2	0.18-0.22	3.0-5.9	1.0-2.0	.28	.28			
	14-39	15-35	1.20-1.40	0.6-2	0.15-0.20	3.0-5.9	1.0-2.0	.28	.32			
	39-60	15-35	1.15-1.35	0.6-2	0.14-0.20	0.0-2.9	0.5-1.0	.28	.32			
185B:												
Banks, slightly wet---	0-4	3-10	1.30-1.50	6-20	0.10-0.12	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	4-30	1-10	1.40-1.70	6-20	0.06-0.13	0.0-2.9	0.0-0.5	.17	.17			
	30-60	1-10	1.40-1.70	6-20	0.05-0.12	0.0-2.9	0.0-0.5	.17	.17			
186:												
Havrelon, slightly wet------------------	0-13	10-18	1.10-1.50	2-6	0.16-0.18	0.0-2.9	0.5-1.0	.32	.32	5	4L	86
	13-60	15-35	1.30-1.70	0.6-2	0.16-0.20	3.0-5.9	0.0-0.5	.32	.32			
188:												
Havrelon, slightly wet------------------	0-13	18-27	1.10-1.50	0.6-2	0.20-0.24	3.0-5.9	0.5-1.0	.32	.32	5	4L	86
	13-60	15-35	1.30-1.70	0.6-2	0.16-0.20	3.0-5.9	0.0-0.5	.32	.32			
M-W:												
Miscellaneous water---	—	—	—	—	—	—	—	—	—	-	—	—
W:												
Water-----------------	—	—	—	—	—	—	—	—	—	-	—	—

Table 21.--Chemical Properties of the Soils

(Dashes (—) indicate that data were not available or were not estimated.)

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
1:								
Tonka----------------	0-13	18-27	15-35	5.6-7.8	0	0	0	0
	13-19	15-25	15-35	5.6-7.3	0	0	0	0
	19-34	35-45	20-40	5.6-7.8	0-3	0-2	0.0-2.0	0-1
	34-50	35-45	10-40	6.6-7.8	1-10	1-5	0.0-4.0	0-2
	50-60	18-40	5-35	6.6-8.4	1-15	1-5	0.0-4.0	0-2
3:								
Velva----------------	0-6	10-18	5-15	6.6-7.8	0	0	0	0
	6-13	10-20	5-15	6.6-7.8	1-4	0	0	0
	13-60	10-20	5-15	6.6-8.4	1-15	0	0	0
4:								
Lallie---------------	0-2	27-40	20-35	6.6-8.4	5-25	0-2	0.0-4.0	0-2
	2-24	27-45	20-30	7.4-8.4	10-30	0-2	0.0-4.0	0-2
	24-32	27-50	20-30	7.4-8.4	5-30	0-2	0.0-8.0	0-2
	32-60	27-50	20-30	7.4-8.4	5-25	1-3	2.0-8.0	1-5
5:								
Dimmick--------------	0-3	—	140-180	6.1-7.3	—	—	—	—
	3-23	40-50	25-45	6.1-8.4	0	0	0	0
	23-63	40-60	20-35	6.6-8.4	0-5	0-2	0	0-1
6:								
Heil-----------------	0-3	18-27	15-30	5.6-7.3	0	0	0.0-2.0	0
	3-24	45-60	20-35	6.1-9.0	0-5	0	4.0-16.0	13-25
	24-38	27-50	15-40	7.4-9.0	3-15	0	4.0-16.0	0-5
	38-52	27-50	15-40	7.4-9.0	3-15	0-5	4.0-16.0	0-5
	52-60	20-50	10-40	7.4-9.0	3-15	0-5	4.0-16.0	0-5
7:								
Korell---------------	0-8	18-27	15-20	7.4-7.8	0	0	0	0
	8-15	18-27	15-20	7.9-8.4	1-5	0	0	0
	15-48	18-27	15-20	7.9-8.4	5-20	0-1	0.0-4.0	0-1
	48-60	18-30	10-15	7.9-8.4	5-15	0-2	0.0-4.0	0-2
8:								
Straw----------------	0-5	18-27	15-30	6.6-7.3	0-1	0	0.0-2.0	0
	5-23	18-27	15-30	6.6-7.8	0-5	0	0.0-2.0	0
	23-30	18-30	15-25	7.4-8.4	1-10	0	0.0-2.0	0
	30-36	18-35	15-25	7.4-8.4	3-10	0	0.0-2.0	0
	36-40	18-35	15-25	6.6-8.4	3-10	0	0.0-4.0	0-5
	40-66	18-35	15-25	7.4-8.4	3-10	0-2	0.0-4.0	0-5
9:								
Channel--------------	—	—	—	—	—	—	—	—
Straw----------------	0-5	18-27	15-30	6.6-7.3	0-1	0	0.0-2.0	0
	5-23	18-27	15-30	6.6-7.8	0-5	0	0.0-2.0	0
	23-30	18-30	15-25	7.4-8.4	1-10	0	0.0-2.0	0
	30-36	18-35	15-25	7.4-8.4	3-10	0	0.0-2.0	0
	36-40	18-35	15-25	6.6-8.4	3-10	0	0.0-4.0	0-5
	40-66	18-35	15-25	7.4-8.4	3-10	0-2	0.0-4.0	0-5
Velva----------------	0-6	10-18	5-15	6.6-7.8	0	0	0	0
	6-13	10-20	5-15	6.6-7.8	1-4	0	0	0
	13-60	10-20	5-15	6.6-8.4	1-15	0	0	0

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
10:								
Arnegard-------------	0-13	18-27	15-25	6.1-7.3	0	0	0	0
	13-36	18-30	10-20	6.1-7.8	0	0	0.0-2.0	0
	36-60	15-30	5-15	7.4-8.4	3-20	0	0.0-2.0	0
10B:								
Arnegard-------------	0-13	18-27	15-25	6.1-7.3	0	0	0	0
	13-36	18-30	10-20	6.1-7.8	0	0	0.0-2.0	0
	36-60	15-30	5-15	7.4-8.4	3-20	0	0.0-2.0	0
11:								
Amor-----------------	0-8	15-25	15-20	6.1-7.8	0	0	0	0
	8-19	18-30	15-20	6.6-7.8	0-5	0	0	0
	19-31	18-30	10-15	7.4-8.4	5-30	0-2	0.0-2.0	0-2
	31-60	5-35	5-20	7.4-8.4	0-15	0-2	0.0-4.0	0-4
Arnegard-------------	0-13	18-27	15-25	6.1-7.3	0	0	0	0
	13-36	18-30	10-20	6.1-7.8	0	0	0.0-2.0	0
	36-60	15-30	5-15	7.4-8.4	3-20	0	0.0-2.0	0
11B:								
Amor-----------------	0-8	15-25	15-20	6.1-7.8	0	0	0	0
	8-19	18-30	15-20	6.6-7.8	0-5	0	0	0
	19-31	18-30	10-15	7.4-8.4	5-30	0-2	0.0-2.0	0-2
	31-60	5-35	5-20	7.4-8.4	0-15	0-2	0.0-4.0	0-4
Shambo---------------	0-9	18-27	10-25	6.1-7.8	0	0	0	0
	9-13	18-30	10-20	6.6-7.8	0	0	0	0
	13-29	18-30	10-20	6.6-8.4	0-5	0	0	0
	29-48	18-30	10-20	7.4-8.4	5-20	0	0	0
	48-60	18-35	10-15	7.4-8.4	1-15	0	0	0
12C:								
Amor-----------------	0-8	15-25	15-20	6.1-7.8	0	0	0	0
	8-19	18-30	15-20	6.6-7.8	0-5	0	0	0
	19-31	18-30	10-15	7.4-8.4	5-30	0-2	0.0-2.0	0-2
	31-60	5-35	5-20	7.4-8.4	0-15	0-2	0.0-4.0	0-4
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
13D:								
Amor-----------------	0-8	15-25	15-20	6.1-7.8	0	0	0	0
	8-19	18-30	15-20	6.6-7.8	0-5	0	0	0
	19-31	18-30	10-15	7.4-8.4	5-30	0-2	0.0-2.0	0-2
	31-60	5-35	5-20	7.4-8.4	0-15	0-2	0.0-4.0	0-4
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
15B:								
Chama----------------	0-4	15-27	10-30	6.6-8.4	0-2	0	0.0-2.0	0
	4-8	18-35	10-25	7.4-8.4	3-10	0	0.0-2.0	0
	8-34	18-35	10-25	7.4-8.4	10-30	0	0.0-2.0	0
	34-60	10-35	5-20	7.4-8.4	0-15	0-5	0.0-8.0	0-4

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
15B:(cont.)								
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
15C:								
Chama----------------	0-4	15-27	10-30	6.6-8.4	0-2	0	0.0-2.0	0
	4-8	18-35	10-25	7.4-8.4	3-10	0	0.0-2.0	0
	8-34	18-35	10-25	7.4-8.4	10-30	0	0.0-2.0	0
	34-60	10-35	5-20	7.4-8.4	0-15	0-5	0.0-8.0	0-4
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
Sen------------------	0-6	18-27	10-25	6.6-7.8	0	0	0	0
	6-17	18-35	10-25	6.6-8.4	1-3	0	0	0
	17-34	18-30	10-25	7.4-8.4	10-30	0	0	0
	34-60	15-35	5-20	7.4-8.4	0-15	0-2	0.0-4.0	0-4
15D:								
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
Chama----------------	0-4	15-27	10-30	6.6-8.4	0-2	0	0.0-2.0	0
	4-8	18-35	10-25	7.4-8.4	3-10	0	0.0-2.0	0
	8-34	18-35	10-25	7.4-8.4	10-30	0	0.0-2.0	0
	34-60	10-35	5-20	7.4-8.4	0-15	0-5	0.0-8.0	0-4
Sen------------------	0-6	18-27	10-25	6.6-7.8	0	0	0	0
	6-17	18-35	10-25	6.6-8.4	1-3	0	0	0
	17-34	18-30	10-25	7.4-8.4	10-30	0	0	0
	34-60	15-35	5-20	7.4-8.4	0-15	0-2	0.0-4.0	0-4
15F:								
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
Chama----------------	0-4	15-27	10-30	6.6-8.4	0-2	0	0.0-2.0	0
	4-8	18-35	10-25	7.4-8.4	3-10	0	0.0-2.0	0
	8-34	18-35	10-25	7.4-8.4	10-30	0	0.0-2.0	0
	34-60	10-35	5-20	7.4-8.4	0-15	0-5	0.0-8.0	0-4
Arnegard-------------	0-13	18-27	15-25	6.1-7.3	0	0	0	0
	13-36	18-30	10-20	6.1-7.8	0	0	0.0-2.0	0
	36-60	15-30	5-15	7.4-8.4	3-20	0	0.0-2.0	0
16D:								
Ringling-------------	0-5	18-27	10-25	6.6-7.8	0	0	0	0
	5-17	18-25	5-20	6.6-7.8	1-3	0	0	0
	17-42	1-5	0-5	6.6-8.4	5-10	0	0	0
	42-60	1-5	0-5	6.6-8.4	1-5	0	0	0
Daglum---------------	0-7	18-27	10-30	5.6-7.3	0	0	0	0-5
	7-8	18-27	10-30	5.6-7.3	0	0	0	0-5
	8-18	35-60	20-50	6.1-9.0	0-3	0-2	2.0-8.0	10-20
	18-32	35-60	20-50	7.4-9.0	3-15	5-10	8.0-16.0	10-25
	32-60	35-60	10-40	7.4-9.0	3-15	0-5	8.0-16.0	10-25

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
16F:								
Brandenburg----------	0-4	10-25	10-25	6.6-7.8	1-5	0	0	0
	4-10	5-25	0-20	6.6-8.4	3-15	0	0	0
	10-60	1-5	0-3	6.6-8.4	3-15	0	0	0
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
Savage---------------	0-7	27-40	20-40	6.1-7.8	0	0	0	0
	7-25	35-50	25-40	6.6-7.8	0	0	0	0
	25-51	35-45	20-35	7.4-8.4	5-15	0	0.0-2.0	0
	51-60	35-45	20-35	7.4-8.4	5-15	0-2	0.0-4.0	0
17B:								
Sen------------------	0-6	18-27	10-25	6.6-7.8	0	0	0	0
	6-17	18-35	10-25	6.6-8.4	1-3	0	0	0
	17-34	18-30	10-25	7.4-8.4	10-30	0	0	0
	34-60	15-35	5-20	7.4-8.4	0-15	0-2	0.0-4.0	0-4
Chama----------------	0-4	15-27	10-30	6.6-8.4	0-2	0	0.0-2.0	0
	4-8	18-35	10-25	7.4-8.4	3-10	0	0.0-2.0	0
	8-34	18-35	10-25	7.4-8.4	10-30	0	0.0-2.0	0
	34-60	10-35	5-20	7.4-8.4	0-15	0-5	0.0-8.0	0-4
18B:								
Reeder---------------	0-8	18-27	20-30	6.1-7.8	0	0	0	0
	8-17	18-35	15-30	6.6-7.8	0	0	0	0
	17-36	18-35	15-30	7.4-8.4	10-20	0-1	0	0-2
	36-60	5-35	5-20	7.4-8.4	0-15	0-2	0.0-4.0	0-4
Farnuf---------------	0-9	18-27	15-20	6.1-7.3	0	0	0	0
	9-23	25-35	20-25	6.1-7.8	0-5	0	0	0
	23-34	18-35	15-20	7.4-8.4	5-15	0	0.0-2.0	0
	34-60	15-30	10-15	7.4-8.4	5-10	0	0.0-2.0	0
19:								
Farland--------------	0-4	18-27	10-30	6.1-7.8	0	0	0	0
	4-18	27-35	15-25	6.6-7.8	0	0	0	0
	18-34	18-35	10-25	7.4-8.4	1-20	0	0	0
	34-60	18-35	5-20	7.4-8.4	3-15	0	0	0
19B:								
Farland--------------	0-4	18-27	10-30	6.1-7.8	0	0	0	0
	4-18	27-35	15-25	6.6-7.8	0	0	0	0
	18-34	18-35	10-25	7.4-8.4	1-20	0	0	0
	34-60	18-35	5-20	7.4-8.4	3-15	0	0	0
19C:								
Farland--------------	0-4	18-27	10-30	6.1-7.8	0	0	0	0
	4-18	27-35	15-25	6.6-7.8	0	0	0	0
	18-34	18-35	10-25	7.4-8.4	1-20	0	0	0
	34-60	18-35	5-20	7.4-8.4	3-15	0	0	0
19D:								
Farland--------------	0-4	18-27	10-30	6.1-7.8	0	0	0	0
	4-18	27-35	15-25	6.6-7.8	0	0	0	0
	18-34	18-35	10-25	7.4-8.4	1-20	0	0	0
	34-60	18-35	5-20	7.4-8.4	3-15	0	0	0

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
20:								
Shambo	0-9	18-27	10-25	6.1-7.8	0	0	0	0
	9-13	18-30	10-20	6.6-7.8	0	0	0	0
	13-29	18-30	10-20	6.6-8.4	0-5	0	0	0
	29-48	18-30	10-20	7.4-8.4	5-20	0	0	0
	48-60	18-35	10-15	7.4-8.4	1-15	0	0	0
20B:								
Shambo	0-9	18-27	10-25	6.1-7.8	0	0	0	0
	9-13	18-30	10-20	6.6-7.8	0	0	0	0
	13-29	18-30	10-20	6.6-8.4	0-5	0	0	0
	29-48	18-30	10-20	7.4-8.4	5-20	0	0	0
	48-60	18-35	10-15	7.4-8.4	1-15	0	0	0
21B:								
Morton	0-5	18-27	15-30	6.6-7.8	0	0	0	0
	5-15	25-35	10-20	6.6-7.8	0	0	0.0-2.0	0
	15-33	20-35	10-20	7.4-8.4	10-20	0-2	0.0-4.0	0-2
	33-60	10-35	0-40	7.4-8.4	0-15	0-5	0.0-8.0	0-4
Farland	0-4	18-27	10-30	6.1-7.8	0	0	0	0
	4-18	27-35	15-25	6.6-7.8	0	0	0	0
	18-34	18-35	10-25	7.4-8.4	1-20	0	0	0
	34-60	18-35	5-20	7.4-8.4	3-15	0	0	0
22F:								
Cabba	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
Rock outcrop	—	—	—	—	—	—	—	—
Chama	0-4	15-27	10-30	6.6-8.4	0-2	0	0.0-2.0	0
	4-8	18-35	10-25	7.4-8.4	3-10	0	0.0-2.0	0
	8-34	18-35	10-25	7.4-8.4	10-30	0	0.0-2.0	0
	34-60	10-35	5-20	7.4-8.4	0-15	0-5	0.0-8.0	0-4
23C:								
Morton	0-5	18-27	15-30	6.6-7.8	0	0	0	0
	5-15	25-35	10-20	6.6-7.8	0	0	0.0-2.0	0
	15-33	20-35	10-20	7.4-8.4	10-20	0-2	0.0-4.0	0-2
	33-60	10-35	0-40	7.4-8.4	0-15	0-5	0.0-8.0	0-4
Cabba	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0-1
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-2
26:								
Grail	0-10	27-35	20-30	6.1-7.3	0	0	0.0-2.0	0
	10-24	35-45	20-30	6.6-8.4	1-5	0	0.0-2.0	0-1
	24-52	27-45	15-30	7.4-8.4	1-15	0	0.0-2.0	0-1
	52-60	18-45	15-25	7.4-8.4	1-15	0-2	0.0-4.0	0-2
27:								
Belfield	0-9	27-35	15-30	6.1-7.3	0	0	0.0-2.0	0-3
	9-12	27-35	15-30	6.1-7.3	0	0	0.0-2.0	0-3
	12-17	35-45	20-40	6.6-8.4	1-5	0	0.0-4.0	4-15
	17-24	35-45	20-30	6.6-8.4	1-5	0	0.0-4.0	4-15
	24-43	27-45	15-40	7.4-9.0	3-15	0-5	2.0-6.0	4-15
	43-60	27-45	15-35	7.9-9.0	3-15	0-5	4.0-16.0	4-20

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
27:(cont.)								
Grail----------------	0-10	27-35	20-30	6.1-7.3	0	0	0.0-2.0	0
	10-24	35-45	20-30	6.6-8.4	1-5	0	0.0-2.0	0-1
	24-52	27-45	15-30	7.4-8.4	1-15	0	0.0-2.0	0-1
	52-60	18-45	15-25	7.4-8.4	1-15	0-2	0.0-4.0	0-2
27B:								
Grail----------------	0-10	27-35	20-30	6.1-7.3	0	0	0.0-2.0	0
	10-24	35-45	20-30	6.6-8.4	1-5	0	0.0-2.0	0-1
	24-52	27-45	15-30	7.4-8.4	1-15	0	0.0-2.0	0-1
	52-60	18-45	15-25	7.4-8.4	1-15	0-2	0.0-4.0	0-2
Belfield-------------	0-9	27-35	15-30	6.1-7.3	0	0	0.0-2.0	0-3
	9-12	27-35	15-30	6.1-7.3	0	0	0.0-2.0	0-3
	12-17	35-45	20-40	6.6-8.4	1-5	0	0.0-4.0	4-15
	17-24	35-45	20-30	6.6-8.4	1-5	0	0.0-4.0	4-15
	24-43	27-45	15-40	7.4-9.0	3-15	0-5	2.0-6.0	4-15
	43-60	27-45	15-35	7.9-9.0	3-15	0-5	4.0-16.0	4-20
28:								
Belfield-------------	0-9	18-27	15-30	6.1-7.3	0	0	0.0-2.0	0-3
	9-12	27-35	15-30	6.1-7.3	0	0	0.0-2.0	0-3
	12-17	35-45	20-40	6.6-8.4	1-5	0	0.0-4.0	4-15
	17-24	35-45	20-30	6.6-8.4	1-5	0	0.0-4.0	4-15
	24-43	27-45	15-40	7.4-9.0	3-15	0-5	2.0-6.0	4-15
	43-60	27-45	15-35	7.9-9.0	3-15	0-5	4.0-16.0	4-20
Daglum---------------	0-7	18-27	10-30	5.6-7.3	0	0	0	0-5
	7-8	18-27	10-30	5.6-7.3	0	0	0	0-5
	8-18	35-60	20-50	6.1-9.0	0-3	0-2	2.0-8.0	10-20
	18-32	35-60	20-50	7.4-9.0	3-15	5-10	8.0-16.0	10-25
	32-60	35-60	10-40	7.4-9.0	3-15	0-5	8.0-16.0	10-25
28B:								
Belfield-------------	0-9	18-27	15-30	6.1-7.3	0	0	0.0-2.0	0-3
	9-12	27-35	15-30	6.1-7.3	0	0	0.0-2.0	0-3
	12-17	35-45	20-40	6.6-8.4	1-5	0	0.0-4.0	4-15
	17-24	35-45	20-30	6.6-8.4	1-5	0	0.0-4.0	4-15
	24-43	27-45	15-40	7.4-9.0	3-15	0-5	2.0-6.0	4-15
	43-60	27-45	15-35	7.9-9.0	3-15	0-5	4.0-16.0	4-20
Daglum---------------	0-7	18-27	10-30	5.6-7.3	0	0	0	0-5
	7-8	18-27	10-30	5.6-7.3	0	0	0	0-5
	8-18	35-60	20-50	6.1-9.0	0-3	0-2	2.0-8.0	10-20
	18-32	35-60	20-50	7.4-9.0	3-15	5-10	8.0-16.0	10-25
	32-60	35-60	10-40	7.4-9.0	3-15	0-5	8.0-16.0	10-25
29:								
Savage---------------	0-7	27-40	20-40	6.1-7.8	0	0	0	0
	7-25	35-50	25-40	6.6-7.8	0	0	0	0
	25-51	35-45	20-35	7.4-8.4	5-15	0	0.0-2.0	0
	51-60	35-45	20-35	7.4-8.4	5-15	0-2	0.0-4.0	0
29B:								
Savage---------------	0-7	27-40	20-40	6.1-7.8	0	0	0	0
	7-25	35-50	25-40	6.6-7.8	0	0	0	0
	25-51	35-45	20-35	7.4-8.4	5-15	0	0.0-2.0	0
	51-60	35-45	20-35	7.4-8.4	5-15	0-2	0.0-4.0	0

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
29C:								
Savage---------------	0-7	27-40	20-40	6.1-7.8	0	0	0	0
	7-25	35-50	25-40	6.6-7.8	0	0	0	0
	25-51	35-45	20-35	7.4-8.4	5-15	0	0.0-2.0	0
	51-60	35-45	20-35	7.4-8.4	5-15	0-2	0.0-4.0	0
30:								
Regent---------------	0-10	27-40	15-30	6.1-7.8	0	0	0	0
	10-26	35-50	20-35	7.4-8.4	1-3	0-4	0	0-1
	26-39	35-50	20-40	7.4-8.4	3-15	0-4	0.0-2.0	0-2
	39-60	10-90	10-55	7.4-8.4	0-15	0-5	0.0-4.0	0-4
Savage---------------	0-7	27-40	20-40	6.1-7.8	0	0	0	0
	7-25	35-50	25-40	6.6-7.8	0	0	0	0
	25-51	35-45	20-35	7.4-8.4	5-15	0	0.0-2.0	0
	51-60	35-45	20-35	7.4-8.4	5-15	0-2	0.0-4.0	0
30B:								
Regent---------------	0-10	27-40	15-30	6.1-7.8	0	0	0	0
	10-26	35-50	20-35	7.4-8.4	1-3	0-4	0	0-1
	26-39	35-50	20-40	7.4-8.4	3-15	0-4	0.0-2.0	0-2
	39-60	10-90	10-55	7.4-8.4	0-15	0-5	0.0-4.0	0-4
Savage---------------	0-7	27-40	20-40	6.1-7.8	0	0	0	0
	7-25	35-50	25-40	6.6-7.8	0	0	0	0
	25-51	35-45	20-35	7.4-8.4	5-15	0	0.0-2.0	0
	51-60	35-45	20-35	7.4-8.4	5-15	0-2	0.0-4.0	0
30C:								
Regent---------------	0-10	27-40	15-30	6.1-7.8	0	0	0.0-2.0	0
	10-26	35-50	20-35	7.4-8.4	1-3	0-4	0	0-1
	26-39	35-50	20-40	7.4-8.4	3-15	0-4	0.0-2.0	0-2
	39-60	10-90	10-55	7.4-8.4	0-15	0-5	0.0-4.0	0-4
Savage---------------	0-7	27-40	20-40	6.1-7.8	0	0	0	0
	7-25	35-50	25-40	6.6-7.8	0	0	0	0
	25-51	35-45	20-35	7.4-8.4	5-15	0	0.0-2.0	0
	51-60	35-45	20-35	7.4-8.4	5-15	0-2	0.0-4.0	0
31B:								
Regent---------------	0-10	27-40	15-30	6.1-7.8	0	0	0	0
	10-26	35-50	20-35	7.4-8.4	1-3	0-4	0	0
	26-39	35-50	20-40	7.4-8.4	3-15	0-4	0.0-2.0	0-2
	39-60	10-90	10-55	7.4-8.4	0-15	0-5	0.0-4.0	0-4
Janesburg------------	0-8	18-27	15-25	5.6-7.3	0	0	0	0-5
	8-10	10-27	10-25	5.6-7.3	0	0	0	0-5
	10-21	35-50	25-45	7.4-8.4	0-3	0-2	2.0-16.0	5-20
	21-26	18-45	10-40	7.9-9.0	3-15	0-10	2.0-16.0	10-25
	26-60	10-90	5-40	7.4-8.4	0-15	0-5	8.0-16.0	10-25
31C:								
Regent---------------	0-10	27-40	15-30	6.1-7.8	0	0	0	0
	10-26	35-50	20-35	7.4-8.4	1-3	0-4	0	0-1
	26-39	35-50	20-40	7.4-8.4	3-15	0-4	0.0-2.0	0-2
	39-60	10-90	10-55	7.4-8.4	0-15	0-5	0.0-4.0	0-4

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
31C:(cont.)								
Janesburg------------	0-8	18-27	15-25	5.6-7.3	0	0	0	0-5
	8-10	10-27	10-25	5.6-7.3	0	0	0	0-5
	10-21	35-50	25-45	7.4-8.4	0-3	0-2	2.0-16.0	5-20
	21-26	18-45	10-40	7.9-9.0	3-15	0-10	2.0-16.0	10-25
	26-60	10-90	5-40	7.4-8.4	0-15	0-5	8.0-16.0	10-25
35B:								
Moreau---------------	0-6	40-50	25-50	7.4-8.4	0-5	0	0.0-2.0	0
	6-13	35-60	20-55	7.4-9.0	1-10	0-1	0.0-4.0	0
	13-35	35-60	20-50	7.4-9.0	5-20	0-2	2.0-16.0	0-2
	35-60	30-90	10-40	7.4-8.4	0-15	0-5	0.0-8.0	0-4
35C:								
Moreau---------------	0-6	40-50	25-50	7.4-8.4	0-5	0	0.0-2.0	0
	6-13	35-60	20-55	7.4-9.0	1-10	0-1	0.0-4.0	0
	13-35	35-60	20-50	7.4-9.0	5-20	0-2	2.0-16.0	0-2
	35-60	30-90	10-40	7.4-8.4	0-15	0-5	0.0-8.0	0-4
Wayden---------------	0-3	40-50	20-40	6.6-9.0	0-10	0	0.0-2.0	0
	3-15	35-50	20-40	7.4-9.0	3-25	0-2	2.0-16.0	0-2
	15-60	30-90	10-40	7.4-8.4	0-15	0-5	0.0-8.0	0-4
35D:								
Moreau---------------	0-6	40-50	25-50	7.4-8.4	0-5	0	0.0-2.0	0
	6-13	35-60	20-55	7.4-9.0	1-10	0-1	0.0-4.0	0
	13-35	35-60	20-50	7.4-9.0	5-20	0-2	2.0-16.0	0-2
	35-60	30-90	10-40	7.4-8.4	0-15	0-5	0.0-8.0	0-4
Wayden---------------	0-3	40-50	20-40	6.6-9.0	0-10	0	0.0-2.0	0
	3-15	35-50	20-40	7.4-9.0	3-25	0-2	2.0-16.0	0-2
	15-60	30-90	10-40	7.4-8.4	0-15	0-5	0.0-8.0	0-4
36:								
Lawther--------------	0-10	40-60	20-45	6.6-8.4	1-3	0	0.0-2.0	0
	10-33	35-60	20-50	7.4-8.4	0-10	0	0.0-4.0	0
	33-47	35-60	20-50	7.9-8.4	3-15	0-2	4.0-8.0	0-2
	47-60	27-60	15-50	7.9-8.4	3-15	0-2	8.0-16.0	0-2
38B:								
Searing--------------	0-8	18-27	15-30	6.1-7.3	0	0	0	0
	8-23	18-27	10-25	6.6-8.4	1-3	0	0	0
	23-33	18-27	10-20	7.4-8.4	3-15	0	0	0
	33-60	1-5	0-5	7.4-8.4	3-15	0	0	0
Ringling-------------	0-5	18-27	10-25	6.6-7.8	0	0	0	0
	5-17	18-27	5-20	6.6-7.8	1-3	0	0	0
	17-42	1-5	0-5	6.6-8.4	5-10	0	0	0
	42-60	1-5	0-5	6.6-8.4	1-5	0	0	0
40C:								
Rhoades--------------	0-3	18-27	20-35	5.6-7.3	0	0	0	0
	3-8	35-50	20-45	6.6-9.0	0-5	0	2.0-16.0	10-20
	8-14	35-50	20-45	7.4-9.0	3-15	0-5	8.0-16.0	13-25
	14-46	20-50	15-35	7.4-9.0	3-15	0-5	8.0-16.0	13-25
	46-60	20-45	15-35	7.4-9.0	5-25	0-5	8.0-16.0	13-25
Slickspots-----------	0-2	40-60	25-35	7.4-9.0	10-25	0-5	8.0-16.0	5-20
	2-60	18-50	25-35	8.5-9.0	10-25	0-5	16.0-32.0	5-20

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
40C:(cont.)								
Daglum---------------	0-7	18-27	10-30	5.6-7.3	0	0	0	0-5
	7-8	18-27	10-30	5.6-7.3	0	0	0	0-5
	8-18	35-60	20-50	6.1-9.0	0-3	0-2	2.0-8.0	10-20
	18-32	35-60	20-50	7.4-9.0	3-15	5-10	8.0-16.0	10-25
	32-60	35-60	10-40	7.4-9.0	3-15	0-5	8.0-16.0	10-25
41B:								
Daglum---------------	0-7	18-27	10-30	5.6-7.3	0	0	0	0-5
	7-8	18-27	10-30	5.6-7.3	0	0	0	0-5
	8-18	35-60	20-50	6.1-9.0	0-3	0-2	2.0-8.0	10-20
	18-32	35-60	20-50	7.4-9.0	3-15	5-10	8.0-16.0	10-25
	32-60	35-60	10-40	7.4-9.0	3-15	0-5	8.0-16.0	10-25
Rhoades--------------	0-3	18-27	20-35	5.6-7.3	0	0	0	0
	3-8	35-50	20-45	6.6-9.0	0-5	0	2.0-16.0	10-20
	8-14	35-50	20-45	7.4-9.0	3-15	0-5	8.0-16.0	13-25
	14-46	20-50	15-35	7.4-9.0	3-15	0-5	8.0-16.0	13-25
	46-60	20-45	15-35	7.4-9.0	5-25	0-5	8.0-16.0	13-25
41C:								
Daglum---------------	0-5	18-27	10-30	5.6-7.3	0	0	0	0-5
	5-8	18-30	10-30	5.6-7.3	0	0	0	0-5
	8-18	35-60	20-50	6.1-9.0	0-3	0-2	2.0-8.0	10-20
	18-26	35-60	20-50	7.4-9.0	3-15	5-10	8.0-16.0	10-25
	26-45	35-60	10-40	7.4-9.0	3-15	0-2	8.0-16.0	10-25
	45-60	10-90	10-40	7.4-8.4	0-15	0-5	0.0-8.0	10-25
Rhoades--------------	0-4	18-27	20-35	5.6-7.3	0	0	0	0
	4-11	35-50	20-45	6.6-9.0	1-15	0-5	2.0-16.0	10-25
	11-49	20-50	15-35	7.4-9.0	3-15	0-5	8.0-16.0	13-25
	49-60	10-90	10-40	7.4-8.4	0-15	0-5	0.0-8.0	13-25
42F:								
Dogtooth-------------	0-2	18-27	15-30	5.6-7.3	0	0	0	0
	2-8	35-50	20-50	6.6-9.0	1-15	0	2.0-16.0	10-20
	8-13	35-50	20-50	7.4-9.0	3-15	0	8.0-16.0	10-25
	13-21	18-50	10-55	6.6-9.0	3-15	0-2	8.0-16.0	10-25
	21-60	10-90	10-55	7.4-8.4	0-15	0-5	0.0-8.0	10-25
Janesburg------------	0-8	18-27	15-25	5.6-7.3	0	0	0	0-5
	8-10	10-27	10-25	5.6-7.3	0	0	0	0-5
	10-21	35-50	25-45	7.4-8.4	0-3	0-2	2.0-16.0	5-20
	21-26	18-45	10-40	7.9-9.0	3-15	0-10	2.0-16.0	10-25
	26-60	10-90	5-40	7.4-8.4	0-15	0-5	8.0-16.0	10-25
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
43C:								
Rhoades--------------	0-3	10-18	10-25	5.6-7.3	0	0	0	0
	3-8	35-50	20-45	6.6-9.0	0-5	0	2.0-16.0	10-20
	8-14	35-50	20-45	7.4-9.0	3-15	0-5	8.0-16.0	13-25
	14-46	20-50	15-35	7.4-9.0	3-15	0-5	8.0-16.0	13-25
	46-60	20-45	15-35	7.4-9.0	5-25	0-5	8.0-16.0	13-25

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
43C:(cont.)								
Daglum---------------	0-7	10-18	10-25	5.6-7.3	0	0	0	0-5
	7-8	18-27	10-30	5.6-7.3	0	0	0	0-5
	8-18	35-60	20-50	6.1-9.0	0-3	0-2	2.0-8.0	10-20
	18-32	35-60	20-50	7.4-9.0	3-15	5-10	8.0-16.0	10-25
	32-60	35-60	10-40	7.4-9.0	3-15	0-5	8.0-16.0	10-25
44B:								
Ekalaka--------------	0-6	10-18	5-15	5.1-7.8	0	0	0.0-2.0	0-2
	6-12	5-18	5-15	5.1-8.4	0	0	0.0-2.0	0-4
	12-17	10-18	5-15	6.6-9.0	1-5	0-2	2.0-8.0	4-30
	17-33	5-18	5-15	7.4-9.0	3-15	0-2	4.0-12.0	5-25
	33-60	5-18	5-15	7.4-9.0	1-5	0-2	8.0-16.0	20-50
Lakota---------------	0-4	10-18	5-15	5.1-7.8	0	0	0	0
	4-8	5-18	0-15	5.1-8.4	0	0	0	0-5
	8-14	10-18	5-15	6.6-9.0	1-3	0	2.0-4.0	13-25
	14-34	5-18	5-15	7.4-9.0	1-15	0-5	8.0-16.0	0-15
	34-50	5-18	5-15	7.4-9.0	1-5	0	4.0-8.0	0-5
	50-60	1-10	0-5	7.4-8.4	0-10	0-1	0.0-2.0	0
45:								
Harriet--------------	0-2	12-27	13-23	6.6-8.4	0-5	0	0.0-2.0	0
	2-18	35-50	17-26	7.4-9.0	1-15	0-5	4.0-16.0	13-25
	18-28	18-40	12-17	7.9-9.0	5-25	0-5	4.0-16.0	2-10
	28-38	10-18	5-15	7.9-9.0	3-15	0-5	8.0-16.0	2-10
	38-40	23-35	15-30	7.9-9.0	3-15	0-5	8.0-16.0	0-5
	40-60	15-45	13-19	7.9-9.0	3-15	0-5	8.0-16.0	0-5
46C:								
Lakota---------------	0-4	10-18	5-15	5.1-7.8	0	0	0	0
	4-8	5-18	0-15	5.1-8.4	0	0	0	0-5
	8-14	10-18	5-15	6.6-9.0	1-3	0	2.0-4.0	13-25
	14-34	5-18	5-15	7.4-9.0	1-15	0-5	8.0-16.0	0-15
	34-50	5-18	5-15	7.4-9.0	1-5	0	4.0-8.0	0-5
	50-60	1-10	0-5	7.4-8.4	0-10	0-1	0.0-2.0	0
Ekalaka--------------	0-6	10-18	5-15	5.1-7.8	0	0	0.0-2.0	0-2
	6-12	5-18	5-15	5.1-8.4	0	0	0.0-2.0	0-4
	12-17	10-18	5-15	6.6-9.0	1-5	0-2	2.0-8.0	4-30
	17-33	5-18	5-15	7.4-9.0	3-15	0-2	4.0-12.0	5-25
	33-60	5-18	5-15	7.4-9.0	1-5	0-2	8.0-16.0	20-50
47B:								
Dogtooth-------------	0-2	18-27	15-30	5.6-7.3	0	0	0	0
	2-8	35-50	20-50	6.6-9.0	1-15	0	2.0-16.0	10-20
	8-13	35-50	20-50	7.4-9.0	3-15	0	8.0-16.0	10-25
	13-21	18-50	10-55	6.6-9.0	3-15	0-2	8.0-16.0	10-25
	21-60	10-90	5-40	7.4-8.4	0-15	0-2	8.0-16.0	10-25
Janesburg------------	0-8	18-27	15-25	5.6-7.3	0	0	0	0-5
	8-10	10-27	10-25	5.6-7.3	0	0	0	0-5
	10-21	35-50	25-45	7.4-8.4	0-3	0-2	2.0-16.0	5-20
	21-26	18-45	10-40	7.9-9.0	3-15	0-10	2.0-16.0	10-25
	26-60	10-90	5-40	7.4-8.4	0-15	0-5	8.0-16.0	10-25

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
48B:								
Desart---------------	0-20	10-18	1-10	6.1-7.8	0	0	0	0-5
	20-24	5-15	1-10	6.1-8.4	1-5	0	0	0-5
	24-31	10-18	5-15	8.5-9.0	1-5	0-2	2.0-8.0	13-25
	31-60	5-20	5-10	7.9-9.0	1-5	0-2	4.0-16.0	5-25
Ekalaka--------------	0-6	10-18	5-15	5.1-7.8	0	0	0.0-2.0	0-2
	6-12	5-18	5-15	5.1-8.4	0	0	0.0-2.0	0-4
	12-17	10-18	5-15	6.6-9.0	1-5	0-2	2.0-8.0	4-30
	17-33	5-18	5-15	7.4-9.0	3-15	0-2	4.0-12.0	5-25
	33-60	5-18	5-15	7.4-9.0	1-5	0-2	8.0-16.0	20-50
Telfer---------------	0-6	1-10	4-10	6.1-7.3	0-1	0	0	0
	6-60	1-10	2-5	6.6-7.8	0-3	0	0	0
49B:								
Lefor----------------	0-7	10-25	10-20	5.1-7.3	0	0	0	0
	7-15	10-25	5-20	5.6-7.3	0	0	0	0
	15-30	18-27	10-15	6.6-7.8	0	0	0	0
	30-36	10-25	5-10	7.4-8.4	3-15	0	0	0
	36-60	1-10	0-5	7.4-8.4	0-10	0-1	0.0-2.0	0
51D:								
Vebar----------------	0-5	10-18	10-15	6.1-7.8	0	0	0	0
	5-26	10-18	10-15	6.1-7.8	0	0	0	0
	26-32	10-18	5-10	7.4-8.4	1-10	0	0	0
	32-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0
Flasher--------------	0-6	3-10	3-5	6.6-8.4	0	0	0	0
	6-10	1-10	2-5	6.6-8.4	1-10	0	0	0
	10-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0
Tally----------------	0-6	10-18	5-20	6.1-7.8	0	0	0	0
	6-32	10-18	5-10	6.6-8.4	0	0	0	0
	32-60	5-18	5-10	7.4-8.4	5-15	0	0	0
51F:								
Flasher--------------	0-6	3-10	3-5	6.6-8.4	0	0	0	0
	6-10	1-10	2-5	6.6-8.4	1-10	0	0	0
	10-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0
Vebar----------------	0-5	10-18	10-15	6.1-7.8	0	0	0	0
	5-26	10-18	10-15	6.1-7.8	0	0	0	0
	26-32	10-18	5-10	7.4-8.4	1-10	0	0	0
	32-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0
Parshall-------------	0-12	10-18	7-15	5.6-7.8	0	0	0	0
	12-29	10-18	5-13	6.1-8.4	0-3	0	0	0
	29-48	5-18	5-10	7.4-8.4	0-10	0	0	0
	48-60	5-18	2-5	6.6-8.4	0-10	0	0	0
52B:								
Vebar----------------	0-5	10-18	10-15	6.1-7.8	0	0	0	0
	5-26	10-18	10-15	6.1-7.8	0	0	0	0
	26-32	10-18	5-10	7.4-8.4	1-10	0	0	0
	32-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
52B:(cont.)								
Parshall-------------	0-12	10-18	7-15	5.6-7.8	0	0	0	0
	12-29	10-18	5-13	6.1-8.4	0-3	0	0	0
	29-48	5-18	5-10	7.4-8.4	0-10	0	0	0
	48-60	5-18	2-5	6.6-8.4	0-10	0	0	0
53B:								
Tally----------------	0-6	10-18	5-20	6.1-7.8	0	0	0	0
	6-32	10-18	5-10	6.6-8.4	0	0	0	0
	32-60	5-18	5-10	7.4-8.4	5-15	0	0	0
Parshall-------------	0-12	10-18	7-15	5.6-7.8	0	0	0	0
	12-29	10-18	5-13	6.1-8.4	0-3	0	0	0
	29-48	5-18	5-10	7.4-8.4	0-10	0	0	0
	48-60	5-18	2-5	6.6-8.4	0-10	0	0	0
53C:								
Tally----------------	0-6	10-18	5-20	6.1-7.8	0	0	0	0
	6-32	10-18	5-10	6.6-8.4	0	0	0	0
	32-60	5-18	5-10	7.4-8.4	5-15	0	0	0
Parshall-------------	0-12	10-18	7-15	5.6-7.8	0	0	0	0
	12-29	10-18	5-13	6.1-8.4	0-3	0	0	0
	29-48	5-18	5-10	7.4-8.4	0-10	0	0	0
	48-60	5-18	2-5	6.6-8.4	0-10	0	0	0
54C:								
Vebar----------------	0-5	10-18	10-15	6.1-7.8	0	0	0	0
	5-26	10-18	10-15	6.1-7.8	0	0	0	0
	26-32	10-18	5-10	7.4-8.4	1-10	0	0	0
	32-60	1-10	0-5	7.4-8.4	0-10	0-1	0.0-2.0	0
Flasher--------------	0-6	3-10	3-5	6.6-8.4	0	0	0	0
	6-10	1-10	2-5	6.6-8.4	1-10	0	0	0
	10-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0
55B:								
Beisigl--------------	0-5	3-10	5-15	6.6-8.4	1-5	0	0	0
	5-27	1-10	0-10	7.4-8.4	3-15	0	0.0-1.0	0
	27-60	1-10	0-5	7.4-8.4	0-10	0-1	0.0-2.0	0
Lihen----------------	0-9	1-10	2-12	6.1-7.8	0	0	0	0
	9-24	1-10	2-12	6.1-8.4	0-3	0	0	0
	24-32	1-10	2-10	7.4-8.4	2-15	0	0	0
	32-60	1-10	0-7	7.4-8.4	0-12	0	0	0
56:								
Parshall-------------	0-12	10-18	7-15	5.6-7.8	0	0	0	0
	12-29	10-18	5-13	6.1-8.4	0-3	0	0	0
	29-48	5-18	5-10	7.4-8.4	0-10	0	0	0
	48-60	5-18	2-5	6.6-8.4	0-10	0	0	0
57D:								
Beisigl--------------	0-5	3-10	5-15	6.6-8.4	1-5	0	0	0
	5-27	1-10	0-10	7.4-8.4	3-15	0	0.0-1.0	0
	27-60	1-10	0-5	7.4-8.4	0-10	0-1	0.0-2.0	0

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
57D:(cont.)								
Flasher--------------	0-6	3-10	3-5	6.6-8.4	0	0	0	0
	6-10	1-10	2-5	6.6-8.4	1-10	0	0	0
	10-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0
58B:								
Lihen----------------	0-9	1-10	2-12	6.1-7.8	0	0	0	0
	9-24	1-10	2-12	6.1-8.4	0-3	0	0	0
	24-32	1-10	2-10	7.4-8.4	2-15	0	0	0
	32-60	1-10	0-7	7.4-8.4	0-12	0	0	0
Parshall-------------	0-12	10-18	7-15	5.6-7.8	0	0	0	0
	12-29	10-18	5-13	6.1-8.4	0-3	0	0	0
	29-48	5-18	5-10	7.4-8.4	0-10	0	0	0
	48-60	5-18	2-5	6.6-8.4	0-10	0	0	0
59F:								
Flasher--------------	0-6	3-10	3-5	6.6-8.4	0	0	0	0
	6-10	1-10	2-5	6.6-8.4	1-10	0	0	0
	10-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0
Rock outcrop---------	—	—	—	—	—	—	—	—
Vebar----------------	0-5	10-18	10-15	6.1-7.8	0	0	0	0
	5-26	10-18	10-15	6.1-7.8	0	0	0	0
	26-32	10-18	5-10	7.4-8.4	1-10	0	0	0
	32-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0
60D:								
Wabek----------------	0-5	15-27	5-10	6.6-8.4	0-5	0	0	0
	5-9	10-20	1-5	7.4-8.4	1-15	0	0	0
	9-60	1-10	0-5	7.4-8.4	1-15	0	0	0
Manning--------------	0-5	10-18	10-20	6.1-7.3	0	0	0	0
	5-18	10-20	5-20	6.6-7.8	0	0	0	0
	18-25	10-20	5-15	7.4-8.4	5-20	0	0	0
	25-60	1-10	1-5	7.4-8.4	0-5	0	0	0
62B:								
Manning--------------	0-5	10-18	10-20	6.1-7.3	0	0	0	0
	5-18	10-20	5-20	6.6-7.8	0	0	0	0
	18-25	10-20	5-15	7.4-8.4	5-20	0	0	0
	25-60	1-10	1-5	7.4-8.4	0-5	0	0	0
63B:								
Lehr-----------------	0-6	18-27	15-30	6.6-7.8	0	0	0	0
	6-11	18-30	10-30	6.6-7.8	0-5	0	0	0
	11-15	18-27	10-30	6.6-8.4	0-15	0	0	0
	15-22	5-18	0-5	7.4-8.4	0-10	0	0	0
	22-60	1-10	0-5	7.4-8.4	0-10	0	0	0
Stady----------------	0-6	18-27	10-20	6.6-7.3	0	0	0	0
	6-15	18-27	10-20	6.6-7.3	0	0	0	0
	15-29	18-27	10-15	7.4-8.4	1-10	0	0	0
	29-60	1-10	1-5	7.4-8.4	3-15	0	0	0

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
64:								
Stady----------------	0-6	18-27	10-20	6.6-7.3	0	0	0	0
	6-15	18-27	10-20	6.6-7.3	0	0	0	0
	15-29	18-27	10-15	7.4-8.4	1-10	0	0	0
	29-60	1-10	1-5	7.4-8.4	3-15	0	0	0
65:								
Wanagan--------------	0-7	18-27	10-30	6.1-7.8	0	0	0	0
	7-14	18-27	10-25	7.4-8.4	1-3	0	0	0
	14-18	18-27	5-20	7.4-8.4	1-20	0	0	0
	18-26	15-27	5-20	7.4-8.4	5-20	0	0	0
	26-60	10-27	5-15	7.4-8.4	3-15	0	0	0
66F:								
Wabek----------------	0-5	15-27	5-10	6.6-8.4	0-5	0	0	0
	5-9	10-20	1-5	7.4-8.4	1-15	0	0	0
	9-60	1-10	0-5	7.4-8.4	1-15	0	0	0
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
Shambo---------------	0-9	18-27	10-25	6.1-7.8	0	0	0	0
	9-13	18-30	10-20	6.6-7.8	0	0	0	0
	13-29	18-30	10-20	6.6-8.4	0-5	0	0	0
	29-48	18-30	10-20	7.4-8.4	5-20	0	0	0
	48-60	18-35	10-15	7.4-8.4	1-15	0	0	0
67B:								
Virgelle-------------	0-9	1-15	12-15	6.6-7.8	0	0	0	0
	9-17	5-10	5-10	6.6-7.8	0	0	0	0
	17-27	5-10	5-10	6.6-7.8	0	0	0	0
	27-35	40-60	20-35	7.4-8.4	10-15	1-5	0.0-1.0	0-1
	35-60	35-60	15-25	7.9-9.0	10-15	1-5	4.0-8.0	10-12
68D:								
Telfer---------------	0-6	1-10	4-10	6.1-7.3	0-1	0	0	0
	6-60	1-10	2-5	6.6-7.8	0-3	0	0	0
68E:								
Telfer---------------	0-6	1-10	4-10	6.1-7.3	0-1	0	0	0
	6-60	1-10	2-5	6.6-7.8	0-3	0	0	0
70:								
Bowbells-------------	0-6	18-27	15-25	6.1-7.3	0	0	0	0
	6-14	18-35	15-25	6.1-7.8	0-5	0	0	0
	14-23	18-35	15-25	6.1-7.8	0-5	0	0	0
	23-36	18-35	15-25	7.4-8.4	5-25	0-1	0	0
	36-60	18-35	15-25	7.4-8.4	5-15	0-1	0.0-2.0	0-1
71:								
Williams-------------	0-6	15-27	15-30	6.6-7.8	0	0	0	0
	6-10	24-35	10-30	6.6-7.8	0-5	0	0	0
	10-15	24-35	10-30	6.6-7.8	0-5	0	0	0
	15-24	24-35	10-30	7.4-8.4	15-30	0	0	0
	24-36	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
	36-60	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
71:(cont.)								
Bowbells-------------	0-6	18-27	15-25	6.1-7.3	0	0	0	0
	6-14	18-35	15-25	6.1-7.8	0-5	0	0	0
	14-23	18-35	15-25	6.1-7.8	0-5	0	0	0
	23-36	18-35	15-25	7.4-8.4	5-25	0-1	0	0
	36-60	18-35	15-25	7.4-8.4	5-15	0-1	0.0-2.0	0-1
71B:								
Williams-------------	0-6	15-27	15-30	6.6-7.8	0	0	0	0
	6-10	24-35	10-30	6.6-7.8	0-5	0	0	0
	10-15	24-35	10-30	6.6-7.8	0-5	0	0	0
	15-24	24-35	10-30	7.4-8.4	15-30	0	0	0
	24-36	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
	36-60	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
Bowbells-------------	0-6	18-27	15-25	6.1-7.3	0	0	0	0
	6-14	18-35	15-25	6.1-7.8	0-5	0	0	0
	14-23	18-35	15-25	6.1-7.8	0-5	0	0	0
	23-36	18-35	15-25	7.4-8.4	5-25	0-1	0	0
	36-60	18-35	15-25	7.4-8.4	5-15	0-1	0.0-2.0	0-1
73B:								
Williams-------------	0-6	15-27	15-30	6.6-7.8	0	0	0	0
	6-10	24-35	10-30	6.6-7.8	0-5	0	0	0
	10-15	24-35	10-30	6.6-7.8	0-5	0	0	0
	15-24	24-35	10-30	7.4-8.4	15-30	0	0	0
	24-36	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
	36-60	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
Reeder---------------	0-8	18-27	20-30	6.1-7.8	0	0	0	0
	8-17	18-35	15-30	6.6-7.8	0	0	0	0
	17-36	18-35	15-30	7.4-8.4	10-20	0-1	0	0-2
	36-60	5-35	5-20	7.4-8.4	0-15	0-2	0.0-4.0	0-4
76C:								
Williams-------------	0-6	15-27	15-30	6.6-7.8	0	0	0	0
	6-10	24-35	10-30	6.6-7.8	0-5	0	0	0
	10-15	24-35	10-30	6.6-7.8	0-5	0	0	0
	15-24	24-35	10-30	7.4-8.4	15-30	0	0	0
	24-36	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
	36-60	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
Zahl-----------------	0-5	18-27	10-20	6.6-8.4	1-10	0	0	0
	5-20	20-30	10-15	7.4-8.4	15-35	0-2	0	0
	20-60	20-30	10-15	7.4-8.4	5-25	0-2	0.0-2.0	0-1
76D:								
Zahl-----------------	0-5	18-27	10-20	6.6-8.4	1-10	0	0	0
	5-20	20-30	10-15	7.4-8.4	15-35	0-2	0	0
	20-60	20-30	10-15	7.4-8.4	5-25	0-2	0.0-2.0	0-1
Williams-------------	0-6	15-27	15-30	6.6-7.8	0	0	0	0
	6-10	24-35	10-30	6.6-7.8	0-5	0	0	0
	10-15	24-35	10-30	6.6-7.8	0-5	0	0	0
	15-24	24-35	10-30	7.4-8.4	15-30	0	0	0
	24-36	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
	36-60	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon-ate	Gypsum	Salinity	Sodium adsorp-tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
76F:								
Zahl-----------------	0-5	18-27	10-20	6.6-8.4	1-10	0	0	0
	5-20	20-30	10-15	7.4-8.4	15-35	0-2	0	0
	20-60	20-30	10-15	7.4-8.4	5-25	0-2	0.0-2.0	0-1
Williams-------------	0-6	15-27	15-30	6.6-7.8	0	0	0	0
	6-10	24-35	10-30	6.6-7.8	0-5	0	0	0
	10-15	24-35	10-30	6.6-7.8	0-5	0	0	0
	15-24	24-35	10-30	7.4-8.4	15-30	0	0	0
	24-36	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
	36-60	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
77:								
Temvik---------------	0-7	18-27	10-25	6.6-7.3	0	0	0	0
	7-24	18-30	10-25	6.6-7.8	0-3	0	0	0
	24-44	18-35	5-20	7.4-8.4	4-20	0	0	0
	44-60	18-35	5-20	7.4-8.4	3-15	0	0	0
Wilton---------------	0-8	18-27	10-30	6.1-7.3	0	0	0	0
	8-27	18-27	10-20	6.6-7.8	0-5	0	0	0
	27-60	18-35	5-25	7.4-8.4	1-15	0	0	0
77B:								
Temvik---------------	0-7	18-27	10-25	6.6-7.3	0	0	0	0
	7-24	18-30	10-25	6.6-7.8	0-3	0	0	0
	24-44	18-35	5-20	7.4-8.4	4-20	0	0	0
	44-60	18-35	5-20	7.4-8.4	3-15	0	0	0
Williams-------------	0-6	18-27	15-30	6.6-7.8	0	0	0	0
	6-10	24-35	10-30	6.6-7.8	0-5	0	0	0
	10-15	24-35	10-30	6.6-7.8	0-5	0	0	0
	15-24	24-35	10-30	7.4-8.4	15-30	0	0	0
	24-36	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
	36-60	20-35	10-25	7.4-8.4	5-20	0-2	0.0-2.0	0-5
80:								
Breien---------------	0-6	10-18	5-20	6.6-7.8	0	0	0	0
	6-15	10-18	5-15	6.6-7.8	0-3	0	0	0
	15-60	1-10	0-10	7.4-8.4	1-15	0	0	0
82:								
Mckeen---------------	0-2	18-27	5-20	6.6-7.8	1-10	0	0	0
	2-12	18-27	5-20	7.4-8.4	3-25	0	0	0
	12-15	20-50	5-35	6.6-8.4	1-10	0	0	0
	15-60	5-50	2-35	7.4-8.4	3-25	0	0.0-4.0	0
83:								
Mckeen---------------	0-2	18-27	5-20	6.6-7.8	1-10	0	0	0
	2-12	18-27	5-20	7.4-8.4	3-25	0	0	0
	12-15	20-50	5-35	6.6-8.4	1-10	0	0	0
	15-60	5-50	2-35	7.4-8.4	3-25	0	0.0-4.0	0
85B:								
Banks----------------	0-4	3-10	1-6	6.6-7.8	1-3	0	0	0
	4-30	1-10	0-6	7.4-8.4	1-5	0-2	0	0
	30-60	1-10	0-6	7.4-8.4	1-5	0-2	0	0

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
86:								
Havrelon-------------	0-13	10-18	5-15	7.4-7.9	1-5	0	0	0
	13-60	15-35	10-20	7.4-7.9	1-5	0-1	2.0-4.0	0-1
87:								
Minnewaukan----------	0-3	8-18	2-12	6.6-7.8	0-2	0	2.0-4.0	0-1
	3-5	1-10	2-12	6.6-7.8	0-2	0	2.0-4.0	0-1
	5-60	1-10	2-7	7.4-8.4	3-20	0	2.0-4.0	0-5
88:								
Havrelon-------------	0-13	18-27	10-20	7.4-7.9	1-5	0	0	0
	13-60	15-35	10-20	7.4-7.9	1-5	0-1	2.0-4.0	0-1
91:								
Lohler---------------	0-8	40-60	30-45	6.6-8.4	5-15	0	0	0
	8-60	35-60	25-45	7.4-9.0	10-20	0	0	0
98:								
Mandan---------------	0-20	10-18	10-25	6.6-7.4	0	0	0	0
	20-29	10-18	10-20	6.6-8.4	2-10	0	0	0
	29-47	10-18	5-15	7.4-8.4	5-25	0	0	0
	47-60	8-18	5-15	7.4-8.4	5-25	0	0	0
Linton---------------	0-7	10-18	10-20	6.6-7.8	0	0	0	0
	7-17	10-18	10-20	6.6-7.8	0	0	0	0
	17-29	10-18	5-15	7.4-8.4	1-10	0	0	0
	29-60	10-18	5-15	7.4-8.4	1-10	0	0	0
98B:								
Linton---------------	0-7	10-18	10-20	6.6-7.8	0	0	0	0
	7-17	10-18	10-20	6.6-7.8	0	0	0	0
	17-29	10-18	5-15	7.4-8.4	1-10	0	0	0
	29-60	10-18	5-15	7.4-8.4	1-10	0	0	0
Mandan---------------	0-20	10-18	10-25	6.6-7.4	0	0	0	0
	20-29	10-18	10-20	6.6-8.4	2-10	0	0	0
	29-47	10-18	5-15	7.4-8.4	5-25	0	0	0
	47-60	8-18	5-15	7.4-8.4	5-25	0	0	0
99F:								
Badland, outcrop-----	0-60	10-60	5-40	6.1-9.0	2-15	0-3	2.0-16.0	2-30
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
100:								
Pits-----------------	0-6	1-10	2-12	6.6-8.4	0-3	0	0	0
	6-60	1-15	1-10	6.6-8.4	5-20	0	0	0
105:								
Dumps and Pits-------	0-4	27-35	10-25	6.6-8.4	5-20	0-5	0.0-4.0	2-10
	4-60	18-35	5-25	6.6-8.4	10-30	1-5	4.0-16.0	2-20
110:								
Ustorthents----------	0-4	27-40	10-20	5.6-8.4	0-10	0	0	0
	4-60	10-35	0-40	7.4-8.4	0-15	0-5	0.0-8.0	0-4

Table 21.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Cation exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorp- tion ratio
	In	Pct	meq/100 g	pH	Pct	Pct	mmhos/cm	
115:								
Riverwash------------	0-6	1-5	—	6.1-7.8	—	—	0	—
	6-60	1-10	—	6.1-7.8	—	—	0	—
154F:								
Arikara--------------	0-1	—	140-180	6.1-7.3	—	—	—	—
	1-2	18-35	10-30	6.1-7.8	0	0	0	0
	2-14	18-35	10-25	6.1-7.8	0	0	0	0
	14-39	15-35	10-25	7.4-8.4	1-10	0	0.0-2.0	0
	39-60	15-35	5-20	7.4-8.4	1-5	0	0.0-4.0	0
Shambo---------------	0-9	18-27	10-25	6.1-7.8	0	0	0	0
	9-13	18-30	10-20	6.6-7.8	0	0	0	0
	13-29	18-30	10-20	6.6-8.4	0-5	0	0	0
	29-48	18-30	10-20	7.4-8.4	5-20	0	0	0
	48-60	18-35	10-15	7.4-8.4	1-15	0	0	0
Cabba----------------	0-3	18-27	10-15	6.6-8.4	2-5	0	0.0-2.0	0
	3-15	18-35	10-20	7.4-8.4	1-15	0	1.0-2.0	0
	15-60	10-35	5-20	7.4-8.4	0-15	0-5	2.0-4.0	0-4
161F:								
Beisigl--------------	0-5	3-10	5-15	6.6-8.4	1-5	0	0	0
	5-27	1-10	0-10	7.4-8.4	3-15	0	0.0-1.0	0
	27-60	1-10	0-5	7.4-8.4	0-10	0-1	0.0-2.0	0
Flasher--------------	0-6	3-10	3-5	6.6-8.4	0	0	0	0
	6-10	1-10	2-5	6.6-8.4	1-10	0	0	0
	10-60	1-10	0-10	7.4-8.4	0-10	0-1	0.0-2.0	0
Arikara--------------	0-1	—	140-180	6.1-7.3	—	—	—	—
	1-2	18-35	10-30	6.1-7.8	0	0	0	0
	2-14	18-35	10-25	6.1-7.8	0	0	0	0
	14-39	15-35	10-25	7.4-8.4	1-10	0	0.0-2.0	0
	39-60	15-35	5-20	7.4-8.4	1-5	0	0.0-4.0	0
185B:								
Banks, slightly wet--	0-4	3-10	1-6	6.6-7.8	1-3	0	0	0
	4-30	1-10	0-6	7.4-8.4	1-5	0-2	0	0
	30-60	1-10	0-6	7.4-8.4	1-5	0-2	0	0
186:								
Havrelon, slightly	0-13	10-18	5-15	7.4-7.9	1-5	0	0	0
wet-----------------	13-60	15-35	10-20	7.4-7.9	1-5	0-1	2.0-4.0	0-1
188:								
Havrelon, slightly	0-13	18-27	10-20	7.4-7.9	1-5	0	0	0
wet-----------------	13-60	15-35	10-20	7.4-7.9	1-5	0-1	2.0-4.0	0-1
M-W:								
Miscellaneous water--	—	—	—	—	—	—	—	—
W:								
Water----------------	—	—	—	—	—	—	—	—

Table 22.--Water Features

(Dashes (--) indicate that an assignment has not been made. Depths of layers are in feet)

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
1:									
Tonka---------------------	C/D								
		January	1.5-3.5	> 6.0	---	---	None	---	---
		February	1.5-3.5	> 6.0	---	---	None	---	---
		March	0.0	1.0.1.5	0.0-1.0	Long	Frequent	---	---
			1.5-2.0	> 6.0					
		April	0.0	1.0-1.5	0.0-1.0	Long	Frequent	---	---
			1.5-2.0	> 6.0					
		May	0.0	> 6.0	0.0-0.5	Very long	Frequent	---	---
		June	0.0-1.5	> 6.0	0.0-0.5	Long	Occasional	---	---
		July	1.5-3.5	> 6.0	---	---	None	---	---
		August	3.5-5.0	> 6.0	---	---			
		September	1.5-3.5	> 6.0	---	---	None	---	---
		October	1.5-3.5	> 6.0	---	---	None	---	---
		November	1.5-3.5	> 6.0	---	---	None	---	---
		December	1.5-3.5	> 6.0	---	---	None	---	---
3:									
Velva---------------------	B								
		March	---	---	---	---	None	Very brief	Rare
		April	---	---	---	---	None	Very brief	Rare
		May	---	---	---	---	None	Very brief	Rare
		June	---	---	---	---	None	Very brief	Rare
4:									
Lallie--------------------	D								
		January	0.0	> 6.0	0.0-2.0	Brief	Rare	---	---
		February	0.0	> 6.0	0.0-2.0	Brief	Rare	---	---
		March	0.0	> 6.0	0.0-2.0	Brief	Rare	---	---
		April	0.0	> 6.0	0.0-2.0	Long	Frequent	Long	Frequent
		May	0.0	> 6.0	0.0-2.0	Long	Frequent	Long	Frequent
		June	0.0	> 6.0	0.0-2.0	Long	Frequent	Long	Frequent
		July	0.0	> 6.0	0.0-2.0	Brief	Rare	---	---
		August	0.0-1.0	> 6.0	0.0-2.0	---	None	---	---
		September	0.0-1.0	> 6.0	0.0-2.0	---	None	---	---
		October	0.0-1.0	> 6.0	0.0-2.0	---	None	---	---
		November	0.0	> 6.0	0.0-2.0	Brief	Rare	---	---
		December	0.0	> 6.0	0.0-2.0	Brief	Rare	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
5:									
Dimmick-------------------	D								
		January	1.0-1.5	> 6.0	---	---	None	---	---
		February	1.0-1.5	> 6.0	---	---	None	---	---
		March	0.0	> 6.0	0.0-1.0	Very long	Frequent	---	---
		April	0.0	> 6.0	0.0-1.0	Very long	Frequent	---	---
		May	0.0	> 6.0	0.0-1.0	Very long	Frequent	---	---
		June	0.0-1.0	> 6.0	0.0-1.0	Long	Occasional	---	---
		July	1.0-1.5	> 6.0	---	---	None	---	---
		August	1.5-3.5	> 6.0	---	---	None	---	---
		September	1.5-3.5	> 6.0	---	---	None	---	---
		October	1.0-1.5	> 6.0	---	---	None	---	---
		November	1.0-1.5	> 6.0	---	---	None	---	---
		December	1.0-1.5	> 6.0	---	---	None	---	---
6:									
Heil----------------------	D								
		January	1.5-3.5	> 6.0	---	---	None	---	---
		February	1.5-3.5	> 6.0	---	---	None	---	---
		March	0.0-1.5	> 6.0	0.0-1.0	Very long	Frequent	---	---
		April	0.0-1.5	> 6.0	0.0-1.0	Very long	Frequent	---	---
		May	0.0-1.5	> 6.0	0.0-1.0	Very long	Frequent	---	---
		June	0.0-1.5	> 6.0	0.0-1.0	Very long	Frequent	---	---
		July	1.5-3.5	> 6.0	---	---	None	---	---
		August	3.5-5.0	> 6.0	---	---	None	---	---
		September	3.5-5.0	> 6.0	---	---	None	---	---
		October	1.5-3.5	> 6.0	---	---	None	---	---
		November	1.5-3.5	> 6.0	---	---	None	---	---
		December	1.5-3.5	> 6.0	---	---	None	---	---
7:									
Korell--------------------	B								
		March	---	---	---	---	---	Brief	Rare
		April	---	---	---	---	---	Brief	Rare
		May	---	---	---	---	---	Brief	Rare
		June	---	---	---	---	---	Brief	Rare
8:									
Straw---------------------	B								
		March	---	---	---	---	---	Brief	Rare
		April	---	---	---	---	---	Brief	Rare
		May	---	---	---	---	---	Brief	Rare
		June	---	---	---	---	---	Brief	Rare

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
9:									
Channel	---								
		March	3.5-5.0	> 6.0	---	---	---	Brief	Frequent
		April	3.5-5.0	> 6.0	---	---	---	Brief	Frequent
		May	3.5-5.0	> 6.0	---	---	---	Brief	Frequent
		June	3.5-5.0	> 6.0	---	---	---	Brief	Occasiona
Straw	B								
		March	3.5-5.0	> 6.0	---	---	---	Brief	Frequent
		April	3.5-5.0	> 6.0	---	---	---	Brief	Frequent
		May	3.5-5.0	> 6.0	---	---	---	Brief	Frequent
		June	3.5-5.0	> 6.0	---	---	---	Brief	Occasiona
Velva	B								
		March	3.5-5.0	> 6.0	---	---	---	Brief	Frequent
		April	3.5-5.0	> 6.0	---	---	---	Brief	Frequent
		May	3.5-5.0	> 6.0	---	---	---	Brief	Frequent
		June	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
10:									
Arnegard	B								
		All months	---	---	---	---	---	---	---
10B:									
Arnegard	B								
		All months	---	---	---	---	---	---	---
11:									
Amor	B								
		All months	---	---	---	---	---	---	---
Arnegard	B								
		All months	---	---	---	---	---	---	---
11B:									
Amor	B								
		All months	---	---	---	---	---	---	---
Shambo	B								
		All months	---	---	---	---	---	---	---
12C:									
Amor	B								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
12C:(cont.)									
Cabba	D								
		All months	---	---	---	---	---	---	---
13D:									
Amor	B								
		All months	---	---	---	---	---	---	---
Cabba	D								
		All months	---	---	---	---	---	---	---
15B:									
Chama	B								
		All months	---	---	---	---	---	---	---
Cabba	D								
		All months	---	---	---	---	---	---	---
15C:									
Chama	B								
		All months	---	---	---	---	---	---	---
Cabba	D								
		All months	---	---	---	---	---	---	---
Sen	B								
		All months	---	---	---	---	---	---	---
15D:									
Cabba	D								
		All months	---	---	---	---	---	---	---
Chama	B								
		All months	---	---	---	---	---	---	---
Sen	B								
		All months	---	---	---	---	---	---	---
15F:									
Cabba	D								
		All months	---	---	---	---	---	---	---
Chama	B								
		All months	---	---	---	---	---	---	---
Arnegard	B								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
16D:									
Ringling------------------	B								
		All months	---	---	---	---	---	---	---
Daglum--------------------	D								
		All months	---	---	---	---	---	---	---
16F:									
Brandenburg---------------	B								
		All months	---	---	---	---	---	---	---
Cabba---------------------	D								
		All months	---	---	---	---	---	---	---
Savage--------------------	C								
		All months	---	---	---	---	---	---	---
17B:									
Sen-----------------------	B								
		All months	---	---	---	---	---	---	---
Chama---------------------	B								
		All months	---	---	---	---	---	---	---
18B:									
Reeder--------------------	B								
		All months	---	---	---	---	---	---	---
Farnuf--------------------	B								
		All months	---	---	---	---	---	---	---
19:									
Farland-------------------	B								
		All months	---	---	---	---	---	---	---
19B:									
Farland-------------------	B								
		All months	---	---	---	---	---	---	---
19C:									
Farland-------------------	B								
		All months	---	---	---	---	---	---	---
19D:									
Farland-------------------	B								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
20:									
Shambo	B								
		All months	---	---	---	---	---	---	---
20B:									
Shambo	B								
		All months	---	---	---	---	---	---	---
21B:									
Morton	B								
		All months	---	---	---	---	---	---	---
Farland	B								
		All months	---	---	---	---	---	---	---
22F:									
Cabba	D								
		All months	---	---	---	---	---	---	---
Rock outcrop	D								
		All months	---	---	---	---	---	---	---
Chama	B								
		All months	---	---	---	---	---	---	---
23C:									
Morton	B								
		All months	---	---	---	---	---	---	---
Cabba	D								
		All months	---	---	---	---	---	---	---
26:									
Grail	C								
		April	3.5-5.0	> 6.0	---	---	---	---	---
		May	3.5-5.0	> 6.0	---	---	---	---	---
		June	3.5-5.0	> 6.0	---	---	---	---	---
27:									
Belfield	C								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
27:(cont.)									
Grail----------------------	C								
		April	3.5-5.0	> 6.0	---	---	---	---	---
		May	3.5-5.0	> 6.0	---	---	---	---	---
		June	3.5-5.0	> 6.0	---	---	---	---	---
27B:									
Grail----------------------	C								
		All months	---	---	---	---	---	---	---
Belfield-------------------	C								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
28:									
Belfield-------------------	C								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
Daglum---------------------	D								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
28B:									
Belfield-------------------	C								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
Daglum---------------------	D								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
29:									
Savage---------------------	C								
		All months	---	---	---	---	---	---	---
29B:									
Savage---------------------	C								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
29C:									
Savage	C								
		All months	---	---	---	---	---	---	---
30:									
Regent	C								
		All months	---	---	---	---	---	---	---
Savage	C								
		All months	---	---	---	---	---	---	---
30B:									
Regent	C								
		All months	---	---	---	---	---	---	---
Savage	C								
		All months	---	---	---	---	---	---	---
30C:									
Regent	C								
		All months	---	---	---	---	---	---	---
Savage	C								
		All months	---	---	---	---	---	---	---
31B:									
Regent	C								
		All months	---	---	---	---	---	---	---
Janesburg	D								
		All months	---	---	---	---	---	---	---
31C:									
Regent	C								
		All months	---	---	---	---	---	---	---
Janesburg	D								
		All months	---	---	---	---	---	---	---
35B:									
Moreau	D								
		All months	---	---	---	---	---	---	---
35C:									
Moreau	D								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
35C:(cont.)									
Wayden--------------------	D								
		All months	---	---	---	---	---	---	---
35D:									
Moreau--------------------	D								
		All months	---	---	---	---	---	---	---
Wayden--------------------	D								
		All months	---	---	---	---	---	---	---
36:									
Lawther-------------------	D								
		All months	---	---	---	---	---	---	---
38B:									
Searing-------------------	B								
		All months	---	---	---	---	---	---	---
Ringling------------------	B								
		All months	---	---	---	---	---	---	---
40C:									
Rhoades-------------------	D								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
Slickspots----------------	D								
		March	---	---	0.0-0.3	Brief	Frequent	---	---
		April	4.0-6.0	> 6.0	0.0-0.3	Brief	Frequent	---	---
		May	4.0-6.0	> 6.0	0.0-0.3	Very brief	Occasional	---	---
		June	4.0-6.0	> 6.0	0.0-0.3	Very brief	Occasional	---	---
		July	---	---	0.0-0.3	Very brief	Rare	---	---
Daglum--------------------	D								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
41B:									
Daglum--------------------	D								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
41B:(cont.)									
Rhoades-------------------	D								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
41C:									
Daglum--------------------	D								
		All months	---	---	---	---	---	---	---
Rhoades-------------------	D								
		All months	---	---	---	---	---	---	---
42F:									
Dogtooth------------------	D								
		All months	---	---	---	---	---	---	---
Janesburg-----------------	D								
		All months	---	---	---	---	---	---	---
Cabba---------------------	D								
		All months	---	---	---	---	---	---	---
43C:									
Rhoades-------------------	D								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
Daglum--------------------	D								
		April	4.0-6.0	> 6.0	---	---	---	---	---
		May	4.0-6.0	> 6.0	---	---	---	---	---
		June	4.0-6.0	> 6.0	---	---	---	---	---
44B:									
Ekalaka-------------------	D								
		All months	---	---	---	---	---	---	---
Lakota--------------------	D								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water Table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
45:									
Harriet--------------------	D								
		January	1.5-3.5	> 6.0	---	---	---	---	---
		February	1.5-3.5	> 6.0	---	---	---	---	---
		March	0.0-1.5	> 6.0	---	---	---	Brief	Occasional
		April	0.0-1.5	> 6.0	---	---	---	Brief	Occasional
		May	0.0-1.5	> 6.0	---	---	---	Brief	Occasional
		June	0.0-1.5	> 6.0	---	---	---	Very brief	Occasional
		July	1.5-3.5	> 6.0	---	---	---	---	---
		August	3.5-5.0	> 6.0	---	---	---	---	---
		September	3.5-5.0	> 6.0	---	---	---	---	---
		October	1.5-3.5	> 6.0	---	---	---	---	---
		November	1.5-3.5	> 6.0	---	---	---	---	---
		December	1.5-3.5	> 6.0	---	---	---	---	---
46C:									
Lakota--------------------	D								
		All months	---	---	---	---	---	---	---
Ekalaka--------------------	D								
		All months	---	---	---	---	---	---	---
47B:									
Dogtooth------------------	D								
		All months	---	---	---	---	---	---	---
Janesburg-----------------	D								
		All months	---	---	---	---	---	---	---
48B:									
Desart--------------------	C								
		All months	---	---	---	---	---	---	---
Ekalaka-------------------	D								
		All months	---	---	---	---	---	---	---
Telfer--------------------	A								
		All months	---	---	---	---	---	---	---
49B:									
Lefor---------------------	C								
		All months	---	---	---	---	---	---	---
51D:									
Vebar---------------------	B								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
51D:(cont.)									
Flasher	D								
		All months	---	---	---	---	---	---	---
Tally	B								
		All months	---	---	---	---	---	---	---
51F:									
Flasher	D								
		All months	---	---	---	---	---	---	---
Vebar	B								
		All months	---	---	---	---	---	---	---
Parshall	B								
		All months	---	---	---	---	---	---	---
52B:									
Vebar	B								
		All months	---	---	---	---	---	---	---
Parshall	B								
		All months	---	---	---	---	---	---	---
53B:									
Tally	B								
		All months	---	---	---	---	---	---	---
Parshall	B								
		All months	---	---	---	---	---	---	---
53C:									
Tally	B								
		All months	---	---	---	---	---	---	---
Parshall	B								
		All months	---	---	---	---	---	---	---
54C:									
Vebar	B								
		All months	---	---	---	---	---	---	---
Flasher	D								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
55B:									
Beisigl	A								
		All months	---	---	---	---	---	---	---
Lihen	A								
		All months	---	---	---	---	---	---	---
56:									
Parshall	B								
		All months	---	---	---	---	---	---	---
57D:									
Beisigl	A								
		All months	---	---	---	---	---	---	---
Flasher	A								
		All months	---	---	---	---	---	---	---
58B:									
Lihen	A								
		All months	---	---	---	---	---	---	---
Parshall	B								
		All months	---	---	---	---	---	---	---
59F:									
Flasher	D								
		All months	---	---	---	---	---	---	---
Rock outcrop	D								
		All months	---	---	---	---	---	---	---
Vebar	B								
		All months	---	---	---	---	---	---	---
60D:									
Wabek	A								
		All months	---	---	---	---	---	---	---
Manning	B								
		All months	---	---	---	---	---	---	---
62B:									
Manning	B								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydrologic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
63B:									
Lehr	B								
		All months	---	---	---	---	---	---	---
Stady	B								
		All months	---	---	---	---	---	---	---
64:									
Stady	B								
		All months	---	---	---	---	---	---	---
65:									
Wanagan	B								
		All months	---	---	---	---	---	---	---
66F:									
Wabek	A								
		All months	---	---	---	---	---	---	---
Cabba	D								
		All months	---	---	---	---	---	---	---
Shambo	B								
		All months	---	---	---	---	---	---	---
67B:									
Virgelle	C								
		All months	---	---	---	---	---	---	---
68D:									
Telfer	A								
		All months	---	---	---	---	---	---	---
68E:									
Telfer	A								
		All months	---	---	---	---	---	---	---
70:									
Bowbells	B								
		April	3.5-5.0	> 6.0	---	---	---	---	---
		May	3.5-5.0	> 6.0	---	---	---	---	---
		June	3.5-5.0	> 6.0	---	---	---	---	---
71:									
Williams	B								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
71:(cont.)									
Bowbells------------------	B								
		April	3.5-5.0	> 6.0	---	---	---	---	---
		May	3.5-5.0	> 6.0	---	---	---	---	---
		June	3.5-5.0	> 6.0	---	---	---	---	---
71B:									
Williams------------------	B								
		All months	---	---	---	---	---	---	---
Bowbells------------------	B								
		April	3.5-5.0	> 6.0	---	---	---	---	---
		May	3.5-5.0	> 6.0	---	---	---	---	---
		June	3.5-5.0	> 6.0	---	---	---	---	---
73B:									
Williams------------------	B								
		All months	---	---	---	---	---	---	---
Reeder--------------------	B								
		All months	---	---	---	---	---	---	---
76C:									
Williams------------------	B								
		All months	---	---	---	---	---	---	---
Zahl----------------------	B								
		All months	---	---	---	---	---	---	---
76D:									
Zahl----------------------	B								
		All months	---	---	---	---	---	---	---
Williams------------------	B								
		All months	---	---	---	---	---	---	---
76F:									
Zahl----------------------	B								
		All months	---	---	---	---	---	---	---
Williams------------------	B								
		All months	---	---	---	---	---	---	---
77:									
Temvik--------------------	B								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
77:(cont.)									
Wilton	B								
		All months	---	---	---	---	---	---	---
77B:									
Temvik	B								
		All months	---	---	---	---	---	---	---
Williams	B								
		All months	---	---	---	---	---	---	---
80:									
Breien	B								
		March	---	---	---	---	---	Brief	Rare
		April	---	---	---	---	---	Brief	Rare
		May	---	---	---	---	---	Brief	Rare
		June	---	---	---	---	---	Brief	Rare
82:									
Mckeen	D								
		January	0.0-1.0	> 6.0	---	---	---	---	---
		February	0.0-1.0	> 6.0	---	---	---	---	---
		March	0.0-0.5	> 6.0	---	---	---	Long	Frequent
		April	0.0-0.5	> 6.0	---	---	---	Long	Frequent
		May	0.0-0.5	> 6.0	---	---	---	Long	Frequent
		June	0.0-0.5	> 6.0	---	---	---	Long	Frequent
		July	0.0-0.5	> 6.0	---	---	---	---	---
		August	0.0-1.0	> 6.0	---	---	---	---	---
		September	0.0-1.0	> 6.0	---	---	---	---	---
		October	0.0-1.0	> 6.0	---	---	---	---	---
		November	0.0-1.0	> 6.0	---	---	---	---	---
		December	0.0-1.0	> 6.0	---	---	---	---	---
83:									
Mckeen	D								
		January	0.0	> 6.0	1.0-3.0	Very long	Frequent	---	---
		February	0.0	> 6.0	1.0-3.0	Very long	Frequent	---	---
		March	0.0	> 6.0	1.0-3.0	Very long	Frequent	---	---
		April	0.0	> 6.0	1.0-3.0	Very long	Frequent	Very long	Frequent
		May	0.0	> 6.0	1.0-3.0	Very long	Frequent	Very long	Frequent
		June	0.0	> 6.0	1.0-3.0	Very long	Frequent	Very long	Frequent
		July	0.0	> 6.0	1.0-3.0	Very long	Frequent	---	---
		August	0.0	> 6.0	1.0-3.0	Very long	Frequent	---	---
		September	0.0	> 6.0	1.0-3.0	Very long	Frequent	---	---
		October	0.0	> 6.0	1.0-3.0	Very long	Frequent	---	---
		November	0.0	> 6.0	1.0-3.0	Very long	Frequent	---	---
		December	0.0	> 6.0	1.0-3.0	Very long	Frequent	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
85B:									
Banks----------------------	A								
		March	---	---	---	---	---	Brief	Occasional
		April	---	---	---	---	---	Brief	Occasional
		May	---	---	---	---	---	Brief	Occasional
		June	---	---	---	---	---	Brief	Occasional
86:									
Havrelon-------------------	B								
		March	---	---	---	---	---	Brief	Occasional
		April	---	---	---	---	---	Brief	Occasional
		May	---	---	---	---	---	Brief	Occasional
		June	---	---	---	---	---	Brief	Occasional
87:									
Minnewaukan----------------	D								
		January	0.5-1.5	> 6.0	---	---	None	---	---
		February	0.5-1.5	> 6.0	---	---	None	---	---
		March	0.0	> 6.0	0.0-0.5	Very long	Frequent	Very long	Frequent
		April	0.0	> 6.0	0.0-0.5	Very long	Frequent	Long	Frequent
		May	0.0	> 6.0	0.0-0.5	Very long	Frequent	Long	Frequent
		June	0.0-1.5	> 6.0	0.0-0.5	Long	Occasional	Long	Frequent
		July	1.0-1.5	> 6.0	---	---	None	---	---
		August	1.5-3.5	> 6.0	---	---	None	---	---
		September	1.5-3.5	> 6.0	---	---	None	---	---
		October	0.5-1.5	> 6.0	---	---	None	---	---
		November	0.5-1.5	> 6.0	---	---	None	---	---
		December	0.5-1.5	> 6.0	---	---	None	---	---
88:									
Havrelon-------------------	B								
		March	---	---	---	---	---	Brief	Occasional
		April	---	---	---	---	---	Brief	Occasional
		May	---	---	---	---	---	Brief	Occasional
		June	---	---	---	---	---	Brief	Occasional
91:									
Lohler---------------------	D								
		March	---	---	---	---	---	Brief	Occasional
		April	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
		May	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
		June	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
98:									
Mandan---------------------	B								
		All months	---	---	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
98:(cont.)									
Linton	B								
		All months	---	---	---	---	---	---	---
98B:									
Linton	B								
		All months	---	---	---	---	---	---	---
Mandan	B								
		All months	---	---	---	---	---	---	---
99F:									
Badland, outcrop	D								
		All months	---	---	---	---	---	---	---
Cabba	D								
		All months	---	---	---	---	---	---	---
100:									
Pits	A								
		All months	---	---	---	---	---	---	---
105:									
Dumps and Pits	C								
		All months	---	---	---	---	---	---	---
110:									
Ustorthents	D								
		All months	---	---	---	---	---	---	---
115:									
Riverwash	D								
		January	0.0-2.0	> 6.0	---	---	---	---	---
		February	0.0-2.0	> 6.0	---	---	---	---	---
		March	0.0-2.0	> 6.0	---	---	---	Very long	Frequent
		April	0.0-2.0	> 6.0	---	---	---	Very long	Frequent
		May	0.0-2.0	> 6.0	---	---	---	Very long	Frequent
		June	0.0-2.0	> 6.0	---	---	---	Very long	Frequent
		July	0.0-2.0	> 6.0	---	---	---	Very long	Frequent
		August	0.0-2.0	> 6.0	---	---	---	Very long	Frequent
		September	0.0-2.0	> 6.0	---	---	---	Very long	Frequent
		October	0.0-2.0	> 6.0	---	---	---	Very long	Frequent
		November	0.0-2.0	> 6.0	---	---	---	Very long	Frequent
		December	0.0-2.0	> 6.0	---	---	---	---	---

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table: Upper limit	Water Table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
154F:									
Arikara-------------------	B								
		All months	---	---	---	---	---	---	---
Shambo--------------------	B								
		All months	---	---	---	---	---	---	---
Cabba---------------------	D								
		All months	---	---	---	---	---	---	---
161F:									
Beisigl-------------------	A								
		All months	---	---	---	---	---	---	---
Flasher-------------------	D								
		All months	---	---	---	---	---	---	---
Arikara-------------------	B								
		All months	---	---	---	---	---	---	---
185B:									
Banks, slightly wet-------	A								
		March	---	---	---	---	---	Brief	Occasional
		April	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
		May	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
		June	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
186:									
Havrelon, slightly wet----	B								
		March	---	---	---	---	---	Brief	Occasional
		April	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
		May	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
		June	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
188:									
Havrelon, slightly wet----	B								
		March	---	---	---	---	---	Brief	Occasional
		April	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
		May	3.5-5.0	> 6.0	---	---	---	Brief	Occasional
		June	3.5-5.0	> 6.0	---	---	---	Brief	Occasional

Table 22.--Water Features--Continued

Map symbol and soil name	Hydro-logic group	Month	Water Table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
M-W:									
Miscellaneous water-------	---								
		All months	0.0	0.0-0.0	0.0-6.0	Very long	Frequent	---	---
W:									
Water---------------------	---								
		All months	0.0	0.0-0.0	0.0-6.0	Very long	Frequent	---	---

Table 23.--Soil Features

(Dashes (--) indicate that an assignment has not been made.)

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
1:							
Tonka------------------	---	---	---	---	High	High	Low
3:							
Velva------------------	---	---	---	---	Moderate	High	Low
4:							
Lallie-----------------	---	---	---	---	High	High	High
5:							
Dimmick----------------	---	---	---	---	Moderate	High	Low
6:							
Heil-------------------	Natric	1-4	---	---	Moderate	High	Moderate
7:							
Korell-----------------	---	---	---	---	Moderate	High	Low
8:							
Straw------------------	---	---	---	---	Moderate	High	Low
9:							
Channel----------------	---	---	---	---	---	---	---
Straw------------------	---	---	---	---	Moderate	High	Low
Velva------------------	---	---	---	---	Moderate	High	Low
10:							
Arnegard---------------	---	---	---	---	Moderate	High	Low
10B:							
Arnegard---------------	---	---	---	---	Moderate	High	Low
11:							
Amor-------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Moderate
Arnegard---------------	---	---	---	---	Moderate	High	Low
11B:							
Amor-------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
11B:(cont.)							
Shambo------------------	---	---	---	---	Moderate	Moderate	Low
12C:							
Amor--------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Moderate
Cabba-------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
13D:							
Amor--------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Moderate
Cabba-------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
15B:							
Chama-------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Low
Cabba-------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
15C:							
Chama-------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Low
Cabba-------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
Sen---------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Moderate
15D:							
Cabba-------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
Chama-------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Low
Sen---------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
15F:							
Cabba------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
Chama------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Low
Arnegard---------------	---	---	---	---	Moderate	High	Low
16D:							
Ringling---------------	Strongly contrasting textural stratification	5-20	---	---	Low	Moderate	Low
Daglum-----------------	Natric	4-20	---	---	Moderate	High	Moderate
16F:							
Brandenburg------------	Strongly contrasting textural stratification	0-20	---	---	Low	High	Moderate
Cabba------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
Savage-----------------	---	---	---	---	Low	High	Low
17B:							
Sen--------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Moderate
Chama------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Low
18B:							
Reeder-----------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Moderate
Farnuf-----------------	---	---	---	---	Moderate	High	Low
19:							
Farland----------------	---	---	---	---	Moderate	High	Moderate
19B:							
Farland----------------	---	---	---	---	Moderate	High	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
19C:							
Farland----------------	---	---	---	---	Moderate	High	Moderate
19D:							
Farland----------------	---	---	---	---	Moderate	High	Moderate
20:							
Shambo-----------------	---	---	---	---	Moderate	Moderate	Low
20B:							
Shambo-----------------	---	---	---	---	Moderate	Moderate	Low
21B:							
Morton-----------------	Bedrock (paralithic)	20-40	---	---	Moderate	Moderate	Low
Farland----------------	---	---	---	---	Moderate	High	Moderate
22F:							
Cabba------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
Rock outcrop-----------	Bedrock (lithic)	0-1	---	---	Low	Moderate	Low
Chama------------------	Bedrock (paralithic)	20-40	---	---	Moderate	High	Low
23C:							
Morton-----------------	Bedrock (paralithic)	20-40	---	---	Moderate	Moderate	Low
Cabba------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
26:							
Grail------------------	---	---	---	---	Moderate	High	Low
27:							
Belfield---------------	---	---	---	---	Low	High	Moderate
Grail------------------	---	---	---	---	Moderate	High	Low
27B:							
Grail------------------	---	---	---	---	Moderate	High	Low
Belfield---------------	---	---	---	---	Low	High	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
28:							
Belfield	---	---	---	---	Low	High	Moderate
Daglum	Natric	4-20	---	---	Moderate	High	Moderate
28B:							
Belfield	---	---	---	---	Low	High	Moderate
Daglum	Natric	4-20	---	---	Moderate	High	Moderate
29:							
Savage	---	---	---	---	Low	High	Low
29B:							
Savage	---	---	---	---	Low	High	Low
29C:							
Savage	---	---	---	---	Low	High	Low
30:							
Regent	Bedrock (paralithic)	20-40	---	---	Low	High	Moderate
Savage	---	---	---	---	Low	High	Low
30B:							
Regent	Bedrock (paralithic)	20-40	---	---	Low	High	Moderate
Savage	---	---	---	---	Low	High	Low
30C:							
Regent	Bedrock (paralithic)	20-40	---	---	Low	High	Moderate
Savage	---	---	---	---	Low	High	Low
31B:							
Regent	Bedrock (paralithic)	20-40	---	---	Low	High	Moderate
Janesburg	Natric Bedrock (paralithic)	2-13 20-40	---	---	Moderate	High	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
31C:							
Regent	Bedrock (paralithic)	20-40	---	---	Low	High	Moderate
Janesburg	Natric Bedrock (paralithic)	2-13 20-40	---	---	Moderate	High	Moderate
35B:							
Moreau	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
35C:							
Moreau	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
Wayden	Bedrock (paralithic)	10-20	---	---	Low	High	Moderate
35D:							
Moreau	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
Wayden	Bedrock (paralithic)	10-20	---	---	Low	High	Moderate
36:							
Lawther	---	---	---	---	Low	High	High
38B:							
Searing	Strongly contrasting textural stratification	20-40	---	---	Moderate	High	Moderate
Ringling	Strongly contrasting textural stratification	12-20	---	---	Low	Moderate	Low
40C:							
Rhoades	Natric	1-5	---	---	Low	High	Moderate
Slickspots	---	---	---	---	Low	High	Moderate
Daglum	Natric	4-20	---	---	Moderate	High	Moderate

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
41B:							
Daglum	Natric	4-20	---	---	Moderate	High	Moderate
Rhoades	Natric	1-5	---	---	Low	High	Moderate
41C:							
Daglum	Natric	4-20	---	---	Moderate	High	Moderate
Rhoades	Natric	1-5	---	---	Low	High	Moderate
42F:							
Dogtooth	Natric	2-4	---	---	Low	High	Moderate
	Bedrock (paralithic)	20-40					
Janesburg	Natric	2-13	---	---	Moderate	High	Moderate
	Bedrock (paralithic)	20-40					
Cabba	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
43C:							
Rhoades	Natric	1-5	---	---	Low	High	Moderate
Daglum	Natric	4-20	---	---	Moderate	High	Moderate
44B:							
Ekalaka	Natric	5-20	---	---	Moderate	High	Moderate
Lakota	Natric	2-10	---	---	Moderate	High	Moderate
45:							
Harriet	Natric	0-5	---	---	High	High	Moderate
46C:							
Lakota	Natric	2-10	---	---	Moderate	High	Moderate
Ekalaka	Natric	5-20	---	---	Moderate	High	Moderate
47B:							
Dogtooth	Natric	2-4	---	---	Low	High	Moderate
	Bedrock (paralithic)	20-40					

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
47B:(cont.)							
Janesburg--------------	Natric	2-13	---	---	Moderate	High	Moderate
	Bedrock (paralithic)	20-40					
48B:							
Desart-----------------	Natric	15-30	---	---	Moderate	High	Moderate
Ekalaka----------------	Natric	5-20	---	---	Moderate	High	Moderate
Telfer-----------------	---	---	---	---	Low	Moderate	Low
49B:							
Lefor------------------	Bedrock (paralithic)	20-40	---	---	Moderate	Moderate	Low
51D:							
Vebar------------------	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
Flasher----------------	Bedrock (paralithic)	7-20	---	---	Low	Moderate	Low
Tally------------------	---	---	---	---	Moderate	High	Low
51F:							
Flasher----------------	Bedrock (paralithic)	7-20	---	---	Low	Moderate	Low
Vebar------------------	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
Parshall---------------	---	---	---	---	Moderate	Moderate	Low
52B:							
Vebar------------------	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
Parshall---------------	---	---	---	---	Moderate	Moderate	Low

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
53B:							
Tally------------------	---	---	---	---	Moderate	High	Low
Parshall---------------	---	---	---	---	Moderate	Moderate	Low
53C:							
Tally------------------	---	---	---	---	Moderate	High	Low
Parshall---------------	---	---	---	---	Moderate	Moderate	Low
54C:							
Vebar------------------	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
Flasher----------------	Bedrock (paralithic)	7-20	---	---	Low	Moderate	Low
55B:							
Beisigl----------------	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
Lihen------------------	---	---	---	---	Low	High	Low
56:							
Parshall---------------	---	---	---	---	Moderate	Moderate	Low
57D:							
Beisigl----------------	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
Flasher----------------	Bedrock (paralithic)	7-20	---	---	Low	Moderate	Low
58B:							
Lihen------------------	---	---	---	---	Low	High	Low
Parshall---------------	---	---	---	---	Moderate	Moderate	Low
59F:							
Flasher----------------	Bedrock (paralithic)	7-20	---	---	Low	Moderate	Low
Rock outcrop-----------	Bedrock (lithic)	0-1	---	---	Low	Moderate	Low
Vebar------------------	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
60D:							
Wabek------------------	Strongly contrasting textural stratification	7-14	---	---	Low	Moderate	Low
Manning----------------	Strongly contrasting textural stratification	24-40	---	---	Low	Moderate	Low
62B:							
Manning----------------	Strongly contrasting textural stratification	24-40	---	---	Low	Moderate	Low
63B:							
Lehr-------------------	Strongly contrasting textural stratification	14-20	---	---	Low	Moderate	Low
Stady------------------	Strongly contrasting textural stratification	20-40	---	---	Moderate	Moderate	Low
64:							
Stady------------------	Strongly contrasting textural stratification	20-40	---	---	Moderate	Moderate	Low
65:							
Wanagan----------------	---	---	---	---	Moderate	Moderate	Low
66F:							
Wabek------------------	Strongly contrasting textural stratification	7-14	---	---	Low	Moderate	Low
Cabba------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
66F:(cont.)							
Shambo	---	---	---	---	---	Moderate	Low
67B:							
Virgelle	Abrupt textural change	20-40	---	---	Moderate	High	Moderate
68D:							
Telfer	---	---	---	---	Low	Moderate	Low
68E:							
Telfer	---	---	---	---	Low	Moderate	Low
70:							
Bowbells	---	---	---	---	Moderate	High	Low
71:							
Williams	---	---	---	---	Moderate	High	Low
Bowbells	---	---	---	---	Moderate	High	Low
71B:							
Williams	---	---	---	---	Moderate	High	Low
Bowbells	---	---	---	---	Moderate	High	Low
73B:							
Williams	---	---	---	---	Moderate	High	Low
Reeder	Bedrock (paralithic)	20-40	---	---	Moderate	High	Moderate
76C:							
Williams	---	---	---	---	Moderate	High	Low
Zahl	---	---	---	---	Moderate	Moderate	Low
76D:							
Zahl	---	---	---	---	Moderate	Moderate	Low
Williams	---	---	---	---	Moderate	High	Low
76F:							
Zahl	---	---	---	---	Moderate	Moderate	Low
Williams	---	---	---	---	Moderate	High	Low

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
77:							
Temvik	---	---	---	---	Moderate	High	Low
Wilton	---	---	---	---	Moderate	Moderate	Low
77B:							
Temvik	---	---	---	---	Moderate	High	Low
Williams	---	---	---	---	Moderate	High	Low
80:							
Breien	---	---	---	---	Low	High	Low
82:							
Mckeen	---	---	---	---	High	High	Moderate
83:							
Mckeen	---	---	---	---	High	High	Moderate
85B:							
Banks	---	---	---	---	Low	Moderate	Low
86:							
Havrelon	---	---	---	---	Moderate	High	Low
87:							
Minnewaukan	---	---	---	---	Moderate	High	Low
88:							
Havrelon	---	---	---	---	Moderate	High	Low
91:							
Lohler	---	---	---	---	Moderate	High	Low
98:							
Mandan	---	---	---	---	Moderate	Moderate	Low
Linton	---	---	---	---	Moderate	Moderate	Low
98B:							
Linton	---	---	---	---	Moderate	Moderate	Low
Mandan	---	---	---	---	Moderate	Moderate	Low

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
99F:							
Badland, outcrop-------	Bedrock (paralithic)	0-5	---	---	Low	High	High
Cabba------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
100:							
Pits-------------------	---	---	---	---	None	Low	Low
105:							
Dumps And Pits---------	---	---	---	---	Moderate	High	Low
110:							
Ustorthents------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
115:							
Riverwash--------------	---	---	---	---	Low	Moderate	Low
154F:							
Arikara----------------	---	---	---	---	Moderate	High	Moderate
Shambo-----------------	---	---	---	---	---	Moderate	Low
Cabba------------------	Bedrock (paralithic)	10-20	---	---	Moderate	High	Low
161F:							
Beisigl----------------	Bedrock (paralithic)	20-40	---	---	Low	Moderate	Low
Flasher----------------	Bedrock (paralithic)	7-20	---	---	Low	Moderate	Low
Arikara----------------	---	---	---	---	Moderate	High	Moderate
185B:							
Banks, slightly wet----	---	---	---	---	Low	Moderate	Low
186:							
Havrelon, slightly wet-	---	---	---	---	Moderate	High	Low
188:							
Havrelon, slightly wet-	---	---	---	---	Moderate	High	Low

Table 23.--Soil Features--Continued

Map symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
M-W:							
Miscellaneous water----	---	---	---	---	---	---	---
W:							
Water------------------	---	---	---	---	---	---	---

Table 24.--Hydric Soils List

See end of table for criteria codes and definitions.

There may be small areas of included soils or miscellaneous areas that are significant to use and management of the soil; yet are too small to delineate on the soil map at the map's original scale. These may be designated as spot symbols and are described on the conventional and special symbols legend.

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
1:							
Tonka silt loam, 0 to 1 percent slopes	Tonka	Yes	depression	2B3,3	Yes	No	Yes
	Tonka, silty clay loam	Yes	depression	3,2B3	Yes	No	Yes
	Grail	No	---	---	---	---	---
	Hamerly	No	---	---	---	---	---
3:							
Velva fine sandy loam, 0 to 2 percent slopes	Velva	No	terrace, flood plain	---	---	---	---
	Banks	No	---	---	---	---	---
	Korchea	No	---	---	---	---	---
	Channel	---	---	---	---	---	---
	Breien	No	---	---	---	---	---
	Minnewaukan	Yes	channel	2B2	Yes	No	No
4:							
Lallie silty clay loam, ponded, 0 to 1 percent slopes	Lallie	Yes	flood plain, oxbow	3,2B3	Yes	No	Yes
	Havrelon	No	---	---	---	---	---
	Mckeen	Yes	depression	3,2B3	Yes	No	Yes
5:							
Dimmick silty clay, 0 to 1 percent slopes	Dimmick	Yes	depression	2B3,3	Yes	No	Yes
	Dimmick, silty clay loam	Yes	depression	3,2B3	Yes	No	Yes
	Heil	Yes	depression	2B3,3	Yes	No	Yes
6:							
Heil silt loam, 0 to 1 percent slopes	Heil	Yes	depression	2B3,3	Yes	No	Yes
	Heil, silty clay	Yes	depression	3,2B3	Yes	No	Yes
	Belfield	No	alluvial flat	---	---	---	---
	Dimmick	Yes	depression	2B3,3	Yes	No	Yes
	Rhoades	No	---	---	---	---	---
	Regan	Yes	---	3,2B3	Yes	No	Yes
7:							
Korell loam, 0 to 2 percent slopes	Korell	No	flood plain	---	---	---	---
	Straw	No	flood plain	---	---	---	---
	Channel	No	---	---	---	---	---
	Velva, very fine sandy loam	No	flood plain, terrace	---	---	---	---
	Velva, loam						
	Daglum	No	---	---	---	---	---
	Havrelon	No	---	---	---	---	---
	Magnus	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
8:							
Straw loam, 0 to 2 percent slopes	Straw	No	flood plain	---	---	---	---
	Korell	No	flood plain	---	---	---	---
	Velva	No	flood plain, terrace	---	---	---	---
	Channel	No	---	---	---	---	---
	Arnegard	No	---	---	---	---	---
	Havrelon, fine sandy loam	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
9:							
Straw and Velva soils, channeled, 0 to 2 percent slopes	Channel	---	---	---	---	---	---
	Straw	No	flood plain	---	---	---	---
	Velva	No	flood plain, stream terrace	---	---	---	---
	Korell	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Lallie, frequently flooded	Yes	oxbow	2B3,4,3	Yes	Yes	Yes
	Regan, frequently flooded	Yes	drainageway	2B3,4	Yes	Yes	No
10:							
Arnegard loam, 0 to 2 percent slopes	Arnegard	No	alluvial flat, swale	---	---	---	---
	Farnuf	No	alluvial fan, terrace	---	---	---	---
	Parshall	No	swale	---	---	---	---
	Belfield	No	alluvial flat	---	---	---	---
	Grail	No	alluvial flat	---	---	---	---
	Stady	No	terrace	---	---	---	---
	Amor	No	ridge	---	---	---	---
	Savage	No	alluvial flat	---	---	---	---
10B:							
Arnegard loam, 2 to 6 percent slopes	Arnegard	No	alluvial fan	---	---	---	---
	Grail	No	---	---	---	---	---
	Shambo	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Parshall	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Wabek	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
11:							
Amor-Arnegard loams, 0 to 3 percent slopes	Amor	No	rise	---	---	---	---
	Reeder	No	rise	---	---	---	---
	Arnegard	No	alluvial flat, swale	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
	Stady	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
	Parshall	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
11B:							
Amor-Shambo loams, 3 to 6 percent slopes	Amor	No	rise	---	---	---	---
	Shambo	No	alluvial fan	---	---	---	---
	Morton	No	rise	---	---	---	---
	Chama	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Arnegard	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
12C:							
Amor-Cabba loams, 6 to 9 percent slopes	Amor	No	hill, ridge	---	---	---	---
	Cabba	No	hill, ridge	---	---	---	---
	Amor, gently sloping	No	rise	---	---	---	---
	Shambo	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Savage	No	---	---	---	---	---
13D:							
Amor-Cabba loams, 9 to 15 percent slopes	Amor	No	ridge	---	---	---	---
	Cabba	No	ridge	---	---	---	---
	Amor, moderately sloping	No	---	---	---	---	---
	Shambo	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
	Arnegard	No	---	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Savage	No	---	---	---	---	---
15B:							
Chama-Cabba silt loams, 3 to 6 percent slopes	Chama	No	rise	---	---	---	---
	Cabba	No	rise	---	---	---	---
	Sen	No	---	---	---	---	---
	Farland	No	---	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Grassna	No	---	---	---	---	---
	Wayden	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
15C:							
Chama-Cabba-Sen silt loams, 6 to 9 percent slopes	Chama	No	hill	---	---	---	---
	Cabba	No	ridge	---	---	---	---
	Sen	No	ridge	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Chama, gently sloping	No	---	---	---	---	---
	Golva	No	---	---	---	---	---
	Grail	No	---	---	---	---	---
	Janesburg	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
15D:							
Cabba-Chama-Sen silt loams, 9 to 15 percent slopes	Cabba	No	hill, ridge	---	---	---	---
	Chama	No	hill, ridge	---	---	---	---
	Sen	No	hill, ridge	---	---	---	---
	Vebar	No	---	---	---	---	---
	Arnegard	No	---	---	---	---	---
	Cabba, gently sloping	No	---	---	---	---	---
	Janesburg	No	---	---	---	---	---
	Golva	No	---	---	---	---	---
	Maschetah	No	---	---	---	---	---
15F:							
Cabba-Chama-Arnegard silt loams, 15 to 70 percent slopes	Cabba	No	ridge	---	---	---	---
	Chama	No	ridge	---	---	---	---
	Arnegard	No	swale	---	---	---	---
	Amor	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Arnegard, moderately steep	No	swale	---	---	---	---
	Flasher	No	---	---	---	---	---
	Wayden	No	---	---	---	---	---
	Janesburg	No	---	---	---	---	---
16D:							
Ringling-Daglum loams, 6 to 15 percent slopes	Ringling	No	ridge	---	---	---	---
	Daglum	No	ridge	---	---	---	---
	Searing	No	---	---	---	---	---
	Brandenburg	No	---	---	---	---	---
	Janesburg	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
16F:							
Brandenburg-Cabba-Savage complex, 6 to 70 percent slopes	Brandenburg	No	ridge	---	---	---	---
	Cabba	No	ridge	---	---	---	---
	Savage	No	ridge	---	---	---	---
	Ringling	No	---	---	---	---	---
	Searing	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Rock outcrop	No	---	---	---	---	---
	Wayden	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
17B:							
Sen-Chama silt loams, 3 to 6 percent slopes	Sen	No	rise	---	---	---	---
	Chama	No	rise	---	---	---	---
	Amor	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Farland	No	---	---	---	---	---
	Grassna	No	---	---	---	---	---
	Moreau	No	---	---	---	---	---
18B:							
Reeder-Farnuf loams, 3 to 6 percent slopes	Reeder	No	rise	---	---	---	---
	Farnuf	No	rise	---	---	---	---
	Amor	No	---	---	---	---	---
	Arnegard	No	alluvial flat, swale	---	---	---	---
	Daglum	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Savage	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
19:							
Farland silt loam, 0 to 2 percent slopes	Farland	No	alluvial flat, terrace	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Golva	No	---	---	---	---	---
	Grail	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Sen	No	---	---	---	---	---
19B:							
Farland silt loam, 2 to 6 percent slopes	Farland	No	alluvial fan	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Grassna	No	---	---	---	---	---
	Morton	No	---	---	---	---	---
	Grail	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
19C:							
Farland silt loam, 6 to 9 percent slopes	Farland	No	hill	---	---	---	---
	Golva	No	---	---	---	---	---
	Farland, strongly sloping	No	---	---	---	---	---
	Farland, gently sloping	No	---	---	---	---	---
	Grail	No	---	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Morton	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
19D:							
Farland silt loam, 9 to 15 percent slopes	Farland	No	ridge	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Farland, moderately steep	No	---	---	---	---	---
	Shambo	No	---	---	---	---	---
	Tally	No	---	---	---	---	---
	Grail	No	---	---	---	---	---
	Savage	No	alluvial fan	---	---	---	---
	Amor	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
20:							
Shambo loam, 0 to 2 percent slopes	Shambo	No	alluvial flat, terrace	---	---	---	---
	Shambo, gravelly substratum	No	terrace	---	---	---	---
	Arnegard	No	alluvial flat	---	---	---	---
	Farnuf	No	flat, terrace	---	---	---	---
	Stady	No	terrace	---	---	---	---
	Amor	No	rise	---	---	---	---
	Parshall	No	swale	---	---	---	---
	Tally	No	alluvial fan, rise, terrace	---	---	---	---
20B:							
Shambo loam, 2 to 6 percent slopes	Shambo	No	alluvial fan	---	---	---	---
	Arnegard	No	alluvial flat, swale	---	---	---	---
	Farnuf	No	flat, terrace	---	---	---	---
	Shambo, gravelly substratum	No	terrace	---	---	---	---
	Stady	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Arnegard, level	No	---	---	---	---	---
	Parshall	No	---	---	---	---	---
21B:							
Morton-Farland silt loams, 3 to 6 percent slopes	Morton	No	rise	---	---	---	---
	Farland	No	rise	---	---	---	---
	Sen	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Cedarpan	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Heil	Yes	depression	2B3	Yes	No	No
	Ringling	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
22F:							
Cabba-Rock outcrop-Chama complex, 15 to 70 percent slopes	Cabba	No	butte, escarpment, hill	---	---	---	---
	Rock outcrop	No	butte, escarpment, hill	---	---	---	---
	Chama	No	butte, escarpment, hill	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Savage	No	---	---	---	---	---
	Wayden	No	---	---	---	---	---
23C:							
Morton-Cabba silt loams, 3 to 9 percent slopes	Morton	No	ridge	---	---	---	---
	Morton, gently sloping	No	---	---	---	---	---
	Cabba	No	ridge	---	---	---	---
	Chama	No	---	---	---	---	---
	Reeder	No	---	---	---	---	---
	Farland	No	---	---	---	---	---
	Grail	No	---	---	---	---	---
	Regan	Yes	flat	---	---	---	---
26:							
Grail silty clay loam, 0 to 2 percent slopes	Grail	No	alluvial flat	---	---	---	---
	Grail, silt loam	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Lawther	No	---	---	---	---	---
	Savage	No	---	---	---	---	---
	Farland	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
27:							
Belfield-Grail silty clay loams, 0 to 2 percent slopes	Belfield	No	alluvial flat	---	---	---	---
	Grail	No	alluvial flat	---	---	---	---
	Savage	No	alluvial flat	---	---	---	---
	Daglum	No	---	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Arnegard	No	---	---	---	---	---
	Lawther	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Straw	No	---	---	---	---	---
27B:							
Grail-Belfield silty clay loams, 2 to 6 percent slopes	Belfield	No	alluvial fan, terrace	---	---	---	---
	Grail	No	alluvial fan, terrace	---	---	---	---
	Savage	No	---	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Belfield, fine sandy loam	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
28:							
Belfield-Daglum silt loams, 0 to 2 percent slopes	Belfield	No	alluvial flat, terrace	---	---	---	---
	Daglum	No	alluvial flat, terrace	---	---	---	---
	Daglum, silty clay	No	---	---	---	---	---
	Grail	No	swale, terrace	---	---	---	---
	Savage	No	alluvial flat	---	---	---	---
	Rhoades	No	alluvial flat	---	---	---	---
	Regent	No	flat, rise	---	---	---	---
28B:							
Belfield-Daglum silt loams, 2 to 6 percent slopes	Belfield	No	alluvial fan	---	---	---	---
	Daglum	No	alluvial fan	---	---	---	---
	Farland	No	---	---	---	---	---
	Grail	No	swale, terrace	---	---	---	---
	Rhoades	No	alluvial flat	---	---	---	---
	Reeder	No	flat, rise	---	---	---	---
	Slickspots	No	alluvial fan, alluvial flat	---	---	---	---
29:							
Savage silty clay loam, 0 to 2 percent slopes	Savage	No	alluvial flat	---	---	---	---
	Grail	No	alluvial flat	---	---	---	---
	Belfield	No	alluvial flat	---	---	---	---
	Farnuf	No	alluvial fan, terrace	---	---	---	---
	Regent	No	rise	---	---	---	---
	Daglum	No	alluvial flat	---	---	---	---
	Lawther	No	---	---	---	---	---
	Parshall	No	swale	---	---	---	---
29B:							
Savage silty clay loam, 2 to 6 percent slopes	Savage	No	alluvial fan	---	---	---	---
	Grail	No	alluvial flat	---	---	---	---
	Farland	No	alluvial fan, terrace	---	---	---	---
	Regent	No	---	---	---	---	---
	Shambo	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Stady	No	---	---	---	---	---
29C:							
Savage silty clay loam, 6 to 9 percent slopes	Savage	No	ridge	---	---	---	---
	Savage, gently sloping	No	---	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Farland	No	---	---	---	---	---
	Reeder	No	---	---	---	---	---
	Grail	No	---	---	---	---	---
	Maschetah	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
30:							
Regent-Savage silty clay loams, 0 to 3 percent slopes	Regent	No	rise	---	---	---	---
	Savage	No	flat	---	---	---	---
	Reeder	No	---	---	---	---	---
	Grail	No	alluvial flat	---	---	---	---
	Moreau	No	---	---	---	---	---
	Belfield	No	alluvial flat	---	---	---	---
	Janesburg	No	---	---	---	---	---
30B:							
Regent-Savage silty clay loams, 3 to 6 percent slopes	Regent	No	rise	---	---	---	---
	Savage	No	rise	---	---	---	---
	Moreau	No	ridge	---	---	---	---
	Cabba	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
	Wayden	No	---	---	---	---	---
30C:							
Regent-Savage silty clay loams, 6 to 9 percent slopes	Regent	No	ridge	---	---	---	---
	Reeder	No	---	---	---	---	---
	Savage	No	ridge	---	---	---	---
	Cabba	No	---	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Grail	No	---	---	---	---	---
	Moreau	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Janesburg	No	---	---	---	---	---
31B:							
Regent-Janesburg complex, 0 to 6 percent slopes	Regent	No	rise	---	---	---	---
	Janesburg	No	rise	---	---	---	---
	Belfield	No	---	---	---	---	---
	Reeder	No	---	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Moreau	No	---	---	---	---	---
	Savage	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
31C:							
Regent-Janesburg complex, 6 to 9 percent slopes	Regent	No	hill	---	---	---	---
	Janesburg	No	hill	---	---	---	---
	Regent, gently sloping	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Moreau	No	---	---	---	---	---
	Savage	No	---	---	---	---	---
	Wayden	No	---	---	---	---	---
	Chama	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
35B:							
Moreau silty clay, 0 to 6 percent slopes	Moreau	No	rise	---	---	---	---
	Moreau, silty clay loam	No	---	---	---	---	---
	Wayden	No	---	---	---	---	---
	Savage	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Lawther	No	---	---	---	---	---
	Janesburg	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
35C:							
Moreau-Wayden silty clays, 6 to 9 percent slopes	Moreau	No	ridge	---	---	---	---
	Wayden	No	ridge	---	---	---	---
	Lawther	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Janesburg	No	---	---	---	---	---
	Moreau, strongly sloping	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Savage	No	---	---	---	---	---
	Dogtooth	No	---	---	---	---	---
35D:							
Moreau-Wayden silty clays, 9 to 15 percent slopes	Moreau	No	ridge	---	---	---	---
	Wayden	No	ridge	---	---	---	---
	Regent	No	---	---	---	---	---
	Janesburg	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Farland	No	---	---	---	---	---
	Lawther	No	---	---	---	---	---
	Wabek	No	---	---	---	---	---
	Reeder	No	---	---	---	---	---
36:							
Lawther silty clay, 0 to 2 percent slopes	Lawther	No	alluvial flat, terrace	---	---	---	---
	Savage	No	alluvial fan	---	---	---	---
	Belfield	No	alluvial flat	---	---	---	---
	Moreau	No	rise	---	---	---	---
	Daglum	No	alluvial flat	---	---	---	---
	Cabba	No	knob	---	---	---	---
38B:							
Searing-Ringling loams, 0 to 6 percent slopes	Searing	No	rise	---	---	---	---
	Ringling	No	rise	---	---	---	---
	Farnuf	No	flat, terrace	---	---	---	---
	Belfield	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Brandenburg	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Chama	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
40C:							
Rhoades-Slickspots-Daglum complex, 0 to 9 percent slopes	Rhoades	No	alluvial flat	---	---	---	---
	Slickspots	No	alluvial fan, alluvial flat	---	---	---	---
	Daglum	No	alluvial fan, alluvial flat	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Rhoades	No	alluvial fan, alluvial flat	---	---	---	---
	Belfield	No	---	---	---	---	---
	Ekalaka	No	---	---	---	---	---
	Harriet	Yes	drainageway	2B3	Yes	No	No
41B:							
Daglum-Rhoades complex, 0 to 6 percent slopes	Daglum	No	alluvial flat	---	---	---	---
	Rhoades	No	alluvial flat	---	---	---	---
	Belfield	No	alluvial flat	---	---	---	---
	Savage	No	alluvial fan	---	---	---	---
	Farland	No	alluvial fan, terrace	---	---	---	---
	Grail	No	alluvial flat	---	---	---	---
	Heil	Yes	depression	2B3,3	Yes	No	Yes
41C:							
Daglum-Rhoades complex, bedrock substratum, 6 to 9 percent slopes	Daglum	No	ridge	---	---	---	---
	Rhoades	No	ridge	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Belfield, bedrock substratum	No	---	---	---	---	---
	Janesburg	No	---	---	---	---	---
	Moreau	No	---	---	---	---	---
	Slickspots	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
42F:							
Dogtooth-Janesburg-Cabba complex, 6 to 30 percent slopes	Dogtooth	No	fan, hill	---	---	---	---
	Janesburg	No	fan, hill	---	---	---	---
	Cabba	No	hill	---	---	---	---
	Moreau	No	---	---	---	---	---
	Wayden	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Ekalaka	No	---	---	---	---	---
	Regan	Yes	---	2B3,3	Yes	No	Yes
	Slickspots	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
43C:							
Rhoades-Daglum fine sandy loams, 0 to 9 percent slopes	Rhoades	No	alluvial fan, ridge	---	---	---	---
	Daglum	No	alluvial fan, ridge	---	---	---	---
	Ekalaka	No	---	---	---	---	---
	Desart	No	---	---	---	---	---
	Daglum	No	alluvial fan, ridge	---	---	---	---
	Rhoades	No	alluvial fan, ridge	---	---	---	---
	Banks	No	---	---	---	---	---
	Harriet	Yes	drainageway	2B3	Yes	No	No
	Slickspots	No	---	---	---	---	---
	Heil	No	---	---	---	---	---
	Stirum	No	---	---	---	---	---
44B:							
Ekalaka-Lakota fine sandy loams, 0 to 6 percent slopes	Ekalaka	No	alluvial flat, terrace	---	---	---	---
	Lakota	No	fan, terrace	---	---	---	---
	Desart	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Harriet	Yes	drainageway	2B3	Yes	No	No
45:							
Harriet silt loam, 0 to 2 percent slopes	Harriet	Yes	flood plain	2B3	Yes	No	No
	Regan	Yes	drainageway	3,2B3	Yes	No	Yes
	Slickspots	No	---	---	---	---	---
	Rhoades	No	---	---	---	---	---
	Heil	Yes	---	3,2B3	Yes	No	Yes
	Daglum	No	---	---	---	---	---
46C:							
Lakota-Ekalaka fine sandy loams, gullied, 0 to 9 percent slopes	Lakota	No	fan, terrace	---	---	---	---
	Ekalaka	No	alluvial fan, terrace	---	---	---	---
	Desart	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
	Slickspots	No	---	---	---	---	---
	Telfer	No	---	---	---	---	---
47B:							
Dogtooth-Janesburg silt loams, 0 to 6 percent slopes	Dogtooth	No	fan	---	---	---	---
	Janesburg	No	fan	---	---	---	---
	Daglum	No	---	---	---	---	---
	Regent	No	rise	---	---	---	---
	Savage	No	---	---	---	---	---
	Slickspots	No	alluvial fan, alluvial flat	---	---	---	---
	Wayden	No	---	---	---	---	---
	Chama	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
48B:							
Desart-Ekalaka-Telfer complex, 0 to 6 percent slopes	Desart	No	alluvial fan, alluvial flat	---	---	---	---
	Ekalaka	No	alluvial fan, alluvial flat	---	---	---	---
	Telfer	No	rise	---	---	---	---
	Parshall	No	---	---	---	---	---
	Lakota	No	---	---	---	---	---
	Lihen	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
49B:							
Lefor fine sandy loam, 0 to 6 percent slopes	Lefor	No	rise	---	---	---	---
	Parshall	No	alluvial flat, terrace	---	---	---	---
	Vebar	No	rise	---	---	---	---
	Belfield	No	---	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Lihen	No	---	---	---	---	---
	Heil	Yes	depression	2B3	Yes	No	No
51D:							
Vebar-Flasher-Tally complex, 9 to 15 percent slopes	Vebar	No	hill, ridge	---	---	---	---
	Flasher	No	hill, ridge	---	---	---	---
	Tally	No	hill	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Vebar, moderately sloping	No	---	---	---	---	---
	Beisigl	No	---	---	---	---	---
	Parshall	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Telfer	No	---	---	---	---	---
51F:							
Flasher-Vebar-Parshall complex, 9 to 35 percent slopes	Flasher	No	ridge	---	---	---	---
	Vebar	No	ridge	---	---	---	---
	Parshall	No	ridge	---	---	---	---
	Beisigl	No	---	---	---	---	---
	Telfer	No	---	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Rock outcrop	No	drainageway	---	---	---	---
52B:							
Vebar-Parshall fine sandy loams, 0 to 6 percent slopes	Vebar	No	rise	---	---	---	---
	Parshall	No	swale	---	---	---	---
	Tally	No	---	---	---	---	---
	Beisigl	No	---	---	---	---	---
	Arnegard	No	---	---	---	---	---
	Flasher	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Cohagen	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
53B:							
Tally-Parshall fine sandy loams, 0 to 6 percent slopes	Tally	No	alluvial fan, terrace	---	---	---	---
	Parshall	No	alluvial fan, swale, terrace	---	---	---	---
	Shambo	No	---	---	---	---	---
	Arnegard	No	---	---	---	---	---
	Lihen	No	---	---	---	---	---
	Krem	No	---	---	---	---	---
	Ekalaka	No	---	---	---	---	---
	Lefor	No	---	---	---	---	---
53C:							
Tally-Parshall fine sandy loams, 6 to 9 percent slopes	Tally	No	ridge	---	---	---	---
	Parshall	No	ridge	---	---	---	---
	Parshall, gently sloping	No	---	---	---	---	---
	Tally, strongly sloping	No	---	---	---	---	---
	Telfer	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Grail	No	---	---	---	---	---
	Manning	No	---	---	---	---	---
54C:							
Vebar-Flasher complex, 6 to 9 percent slopes	Vebar	No	ridge	---	---	---	---
	Tally	No	---	---	---	---	---
	Flasher	No	ridge	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Beisigl	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Arnegard	No	---	---	---	---	---
	Zahl	No	---	---	---	---	---
	Peta, fine sandy loam	No	alluvial flat	---	---	---	---
55B:							
Beisigl-Lihen loamy fine sands, 0 to 6 percent slopes	Beisigl	No	rise	---	---	---	---
	Lihen	No	rise	---	---	---	---
	Seroco	No	---	---	---	---	---
	Flasher	No	---	---	---	---	---
	Parshall	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
56:							
Parshall fine sandy loam, 0 to 2 percent slopes	Parshall	No	alluvial flat, terrace	---	---	---	---
	Tally	No	---	---	---	---	---
	Arnegard	No	---	---	---	---	---
	Lihen	No	---	---	---	---	---
	Manning	No	---	---	---	---	---
	Stady	No	---	---	---	---	---
	Ekalaka	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
57D:							
Beisigl-Flasher loamy fine sands, 6 to 15 percent slopes	Beisigl	No	ridge	---	---	---	---
	Flasher	No	ridge	---	---	---	---
	Telfer	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
	Parshall	No	---	---	---	---	---
58B:							
Lihen-Parshall complex, 0 to 6 percent slopes	Lihen	No	rise	---	---	---	---
	Parshall	No	swale	---	---	---	---
	Telfer	No	alluvial fan, rise	---	---	---	---
	Tally	No	---	---	---	---	---
	Stady	No	---	---	---	---	---
	Lihen, fine sandy loam	No	---	---	---	---	---
	Seroco	No	---	---	---	---	---
	Shambo	No	---	---	---	---	---
	Beisigl	No	---	---	---	---	---
	Manning	No	---	---	---	---	---
59F:							
Flasher-Rock outcrop-Vebar complex, 9 to 70 percent slopes	Flasher	No	ridge	---	---	---	---
	Rock outcrop	No	ridge	---	---	---	---
	Vebar	No	ridge	---	---	---	---
	Beisigl	No	---	---	---	---	---
	Tally	No	---	---	---	---	---
	Cohagen	No	---	---	---	---	---
	Telfer	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
60D:							
Wabek-Manning complex, 6 to 15 percent slopes	Wabek	No	ridge, terrace	---	---	---	---
	Manning	No	ridge, terrace	---	---	---	---
	Wabek, sandy loam	No	---	---	---	---	---
	Wabek, very gravelly loam	No	---	---	---	---	---
	Tally	No	---	---	---	---	---
	Williams	No	---	---	---	---	---
	Bowdle	No	---	---	---	---	---
	Lehr	No	---	---	---	---	---
	Telfer	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
62B:							
Manning fine sandy loam, 0 to 6 percent slopes	Manning	No	terrace	---	---	---	---
	Parshall	No	alluvial fan, terrace	---	---	---	---
	Stady	No	terrace	---	---	---	---
	Shambo, gravelly substratum	No	---	---	---	---	---
	Wabek	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
63B:							
Lehr-Stady loams, 0 to 6 percent slopes	Lehr	No	terrace	---	---	---	---
	Stady	No	terrace	---	---	---	---
	Bowdle	No	---	---	---	---	---
	Shambo	No	---	---	---	---	---
	Manning	No	---	---	---	---	---
	Wanagan	No	---	---	---	---	---
	Wabek	No	---	---	---	---	---
64:							
Stady loam, 0 to 3 percent slopes	Stady	No	terrace	---	---	---	---
	Bowdle	No	flat, outwash plain, terrace	---	---	---	---
	Arnegard	No	alluvial flat, swale	---	---	---	---
	Lehr	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Manning	No	terrace	---	---	---	---
	Marysland	Yes	---	2B3	Yes	No	No
	Amor	No	---	---	---	---	---
65:							
Wanagan loam, 0 to 3 percent slopes	Wanagan	No	stream terrace	---	---	---	---
	Shambo, gravelly substratum	No	---	---	---	---	---
	Lehr	No	---	---	---	---	---
	Stady	No	---	---	---	---	---
66F:							
Wabek-Cabba-Shambo complex, 6 to 35 percent slopes	Wabek	No	ridge	---	---	---	---
	Cabba	No	ridge	---	---	---	---
	Shambo	No	ridge	---	---	---	---
	Lehr	No	---	---	---	---	---
	Flasher	No	---	---	---	---	---
	Parshall	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Manning	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
	Telfer	No	---	---	---	---	---
67B:							
Virgelle fine sandy loam, 0 to 6 percent slopes	Virgelle	No	stream terrace	---	---	---	---
	Virgelle, loamy fine sand	No	---	---	---	---	---
	Lihen	No	---	---	---	---	---
	Parshall	No	---	---	---	---	---
	Krem	No	---	---	---	---	---
	Telfer	No	---	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Flaxton	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
68D:							
Telfer loamy fine sand, 6 to 15 percent slopes	Telfer	No	ridge	---	---	---	---
	Lihen	No	---	---	---	---	---
	Beisigl	No	---	---	---	---	---
	Schaller	No	---	---	---	---	---
	Tally	No	---	---	---	---	---
	Telfer, fine sandy loam	No	---	---	---	---	---
	Vebar	No	---	---	---	---	---
	Ekalaka	No	---	---	---	---	---
68E:							
Telfer loamy fine sand, 15 to 25 percent slopes	Telfer	No	ridge	---	---	---	---
	Parshall	No	---	---	---	---	---
	Schaller	No	---	---	---	---	---
	Shambo	No	---	---	---	---	---
	Tally	No	---	---	---	---	---
	Linton	No	---	---	---	---	---
	Seroco	No	---	---	---	---	---
	Whitebird	No	---	---	---	---	---
70:							
Bowbells loam, 0 to 3 percent slopes	Bowbells	No	flat, swale	---	---	---	---
	Grail	No	---	---	---	---	---
	Williams	No	---	---	---	---	---
	Tonka	Yes	depression	3,2B3	Yes	No	Yes
	Bowdle	No	---	---	---	---	---
	Hamerly	No	---	---	---	---	---
	Parnell	Yes	depression	2B3,3	Yes	No	Yes
	Regan	Yes	flat	---	---	---	---
71:							
Williams-Bowbells loams, 0 to 3 percent slopes	Williams	No	rise	---	---	---	---
	Bowbells	No	swale	---	---	---	---
	Max	No	---	---	---	---	---
	Temvik	No	---	---	---	---	---
	Tonka	Yes	depression	3,2B3	Yes	No	Yes
	Heil	Yes	depression	3,2B3	Yes	No	Yes
	Manning	No	---	---	---	---	---
	Reeder	No	---	---	---	---	---
71B:							
Williams-Bowbells loams, 3 to 6 percent slopes	Williams	No	rise	---	---	---	---
	Bowbells	No	swale	---	---	---	---
	Max	No	---	---	---	---	---
	Zahl	No	---	---	---	---	---
	Reeder	No	---	---	---	---	---
	Tonka	Yes	depression	3,2B3	Yes	No	Yes
	Vebar	No	---	---	---	---	---
73B:							
Williams-Reeder loams, 3 to 6 percent slopes	Williams	No	flat, till plain	---	---	---	---
	Reeder	No	rise	---	---	---	---
	Bowbells	No	---	---	---	---	---
	Farnuf	No	---	---	---	---	---
	Amor	No	---	---	---	---	---
	Zahl	No	---	---	---	---	---
	Krem	No	---	---	---	---	---
	Stady	No	---	---	---	---	---
	Tonka	Yes	depression	3,2B3	Yes	No	Yes

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
76C:							
Williams-Zahl loams, 6 to 9 percent slopes	Williams	No	ridge	---	---	---	---
	Zahl	No	ridge	---	---	---	---
	Bowbells	No	---	---	---	---	---
	Cabba	No	hill, ridge	---	---	---	---
	Amor	No	hill, ridge	---	---	---	---
	Max	No	---	---	---	---	---
	Williams, undulating	No	---	---	---	---	---
	Zahl, rolling	No	---	---	---	---	---
	Noonan	No	---	---	---	---	---
76D:							
Zahl-Williams loams, 9 to 15 percent slopes	Zahl	No	ridge	---	---	---	---
	Williams	No	ridge	---	---	---	---
	Max	No	---	---	---	---	---
	Bowbells	No	---	---	---	---	---
	Reeder	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Wabek	No	---	---	---	---	---
76F:							
Zahl-Williams loams, dissected, 15 to 45 percent slopes	Zahl	No	ridge	---	---	---	---
	Williams	No	ridge	---	---	---	---
	Shambo	No	---	---	---	---	---
	Bowbells	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Rhoades	No	---	---	---	---	---
	Wabek	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
77:							
Temvik-Wilton silt loams, 0 to 3 percent slopes	Temvik	No	till plain, rise	---	---	---	---
	Wilton	No	swale, till plain, flat	---	---	---	---
	Williams	No	---	---	---	---	---
	Grassna	No	---	---	---	---	---
77B:							
Temvik-Williams silt loams, 3 to 6 percent slopes	Temvik	No	flat, till plain	---	---	---	---
	Wilton	No	---	---	---	---	---
	Williams	No	rise, till plain	---	---	---	---
	Max	No	---	---	---	---	---
	Bryant	No	---	---	---	---	---
	Zahl	No	---	---	---	---	---
	Flaxton	No	---	---	---	---	---
80:							
Breien fine sandy loam, 0 to 2 percent slopes	Breien	No	flood plain, terrace	---	---	---	---
	Velva	No	---	---	---	---	---
	Banks	No	flood plain	---	---	---	---
	Channel	No	---	---	---	---	---
	Banks, loamy fine sand	No	levee, flood plain	---	---	---	---
	Breien, loam	No	---	---	---	---	---
	Ekalaka	No	alluvial flat, terrace	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
82:							
Mckeen loam, 0 to 1 percent slopes	Mckeen	Yes	flood plain, flat	2B3,4	Yes	Yes	No
	Lallie	Yes	flood plain, oxbow	3,2B3	Yes	No	Yes
	Scorio, saline	No	flood plain	---	---	---	---
	Scorio, silty clay loam	No	flood plain	---	---	---	---
83:							
Mckeen loam, ponded, 0 to 1 percent slopes	Mckeen	Yes	flood plain, oxbow	2B3	Yes	No	No
	Mckeen, fine sandy loam	Yes	flood plain	2B3	Yes	No	No
	Lallie	Yes	oxbow	3,2B3,4	Yes	Yes	Yes
85B:							
Banks loamy fine sand, 0 to 6 percent slopes	Banks	No	flat, flood plain, levee	---	---	---	---
	Banks, fine sandy loam	No	---	---	---	---	---
	Banks, silty clay loam	No	---	---	---	---	---
	Trembles	No	---	---	---	---	---
	Havrelon	No	---	---	---	---	---
86:							
Havrelon fine sandy loam, 0 to 2 percent slopes	Havrelon	No	flat, flood plain	---	---	---	---
	Havrelon, loamy fine sand	No	---	---	---	---	---
	Channel	---	---	---	---	---	---
	Banks	No	---	---	---	---	---
	Trembles	No	---	---	---	---	---
	Banks, loamy fine sand	No	---	---	---	---	---
87:							
Minnewaukan fine sandy loam, 0 to 2 percent slopes	Minnewaukan	Yes	flat, flood plain, river valley	2B2	Yes	No	No
	Minnewaukan, loamy fine sand	Yes	flood plain	2B2	Yes	No	No
	Banks	No	---	---	---	---	---
	Mckeen	Yes	flood plain	2B3	Yes	No	No

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
88:							
Havrelon silt loam, 0 to 2 percent slopes	Havrelon	No	flat, flood plain	---	---	---	---
	Havrelon, fine sandy loam	No	---	---	---	---	---
	Channel	---	---	---	---	---	---
	Banks	No	---	---	---	---	---
	Havrelon, silty clay loam	No	---	---	---	---	---
	Ridgelawn	No	---	---	---	---	---
	Trembles	No	---	---	---	---	---
	Lallie	Yes	flood plain	2B3	Yes	No	No
91:							
Lohler silty clay, 0 to 2 percent slopes	Lohler	No	---	---	---	---	---
	Lohler, silty clay loam	No	---	---	---	---	---
	Havrelon	No	---	---	---	---	---
	Lallie	Yes	drainageway	2B3	Yes	No	No
	Ridgelawn	No	---	---	---	---	---
	Harriet	Yes	flood plain	2B3	Yes	No	No
	Heil	Yes	depression	2B3,3	Yes	No	Yes
98:							
Mandan-Linton silt loams, 0 to 3 percent slopes	Mandan	No	flat, rise	---	---	---	---
	Linton	No	flat, swale	---	---	---	---
	Grassna	No	---	---	---	---	---
	Bryant	No	---	---	---	---	---
	Belfield	No	---	---	---	---	---
	Parshall	No	---	---	---	---	---
	Omio	No	---	---	---	---	---
98B:							
Linton-Mandan silt loams, 3 to 6 percent slopes	Linton	No	rise	---	---	---	---
	Mandan	No	swale	---	---	---	---
	Omio	No	---	---	---	---	---
	Grassna	No	---	---	---	---	---
	Bryant	No	---	---	---	---	---
	Sutley	No	---	---	---	---	---
	Stady	No	---	---	---	---	---
99F:							
Badland, outcrop-Cabba complex, 9 to 70 percent slopes	Badland, outcrop	No	escarpment	---	---	---	---
	Cabba	No	ridge	---	---	---	---
	Dogtooth	No	---	---	---	---	---
	Brandenburg	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Lambert	No	---	---	---	---	---
	Rock outcrop	No	---	---	---	---	---
100:							
Pits, gravel and sand	Pits	No	terrace	---	---	---	---
	Wabek	No	ridge	---	---	---	---
	Lehr	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
105:							
Dumps and Pits, mine	Dumps and Pits	No	---	---	---	---	---
	Cabba	No	hill	---	---	---	---
	Flasher	No	ridge	---	---	---	---
110:							
Ustorthents, loamy, 0 to 6 percent slopes	Ustorthents	No	rise	---	---	---	---
	Ustipsamments	No	---	---	---	---	---
115:							
Riverwash	Riverwash	Yes	bar, channel, flood plain, river valley	4,2B2	Yes	Yes	No
	Minnewaukan	Yes	flood plain	2B2	Yes	No	No
	Lallie	Yes	oxbow	4,2B3,3	Yes	Yes	Yes
	Mckeen, ponded	Yes	depression	2B3,3,4	Yes	Yes	Yes
154F:							
Arikara-Shambo-Cabba loams, 9 to 70 percent slopes	Arikara	No	ridge	---	---	---	---
	Cabba	No	ridge	---	---	---	---
	Shambo	No	alluvial fan	---	---	---	---
	Lambert	No	---	---	---	---	---
	Shambo, strongly sloping	No	---	---	---	---	---
	Chama	No	---	---	---	---	---
	Tally	No	---	---	---	---	---
	Badland, outcrop	No	---	---	---	---	---
	Daglum	No	---	---	---	---	---
	Regent	No	---	---	---	---	---
161F:							
Beisigl-Flasher-Arikara complex, 15 to 70 percent slopes	Beisigl	No	escarpment, ridge	---	---	---	---
	Flasher	No	escarpment, ridge	---	---	---	---
	Arikara	No	escarpment, ridge	---	---	---	---
	Vebar	No	---	---	---	---	---
	Cabba	No	---	---	---	---	---
	Telfer	No	---	---	---	---	---
	Regan	Yes	drainageway	2B3	Yes	No	No
185B:							
Banks loamy fine sand, slightly wet, 0 to 6 percent slopes	Banks, slightly wet	No	flat, flood plain, levee, river valley	---	---	---	---
	Banks, fine sandy loam	No	---	---	---	---	---
	Banks, silty clay loam	No	---	---	---	---	---
	Trembles	No	---	---	---	---	---
	Havrelon	No	---	---	---	---	---

Table 24.--Hydric Soils List--Continued

Map symbol and map unit name	Component	Hydric	Local landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
186:							
Havrelon fine sandy loam, slightly wet, 0 to 2 percent slopes	Havrelon, slightly wet	No	flat, flood plain, river valley	---	---	---	---
	Havrelon, loamy fine sand	No	---	---	---	---	---
	Banks	No	---	---	---	---	---
	Banks, loamy fine sand	No	---	---	---	---	---
188:							
Havrelon silt loam, slightly wet, 0 to 2 percent slopes	Havrelon	No	flat, flood plain, river valley	---	---	---	---
	Havrelon, silty clay loam	No	flood plain	---	---	---	---
	Lallie	Yes	flood plain	2B3	Yes	No	No
	Lohler	No	flood plain	---	---	---	---
	Trembles	No	---	---	---	---	---
M-W:							
Miscellaneous water	Miscellaneous water	Yes	depression	2B3,3	Yes	No	Yes
W:							
Water	Water	Yes	depression	2B3,3	Yes	No	Yes
	Dimmick	Yes	depression	2B3,3	Yes	No	Yes

HYDRIC SOILS CRITERIA CODES AND DEFINITIONS

1. All Histosols except Folists, or

2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Aquisalids, Pachic subgroups, or Cumulic subgroups that are:

   a. Somewhat poorly drained with a water table equal to 0.0 foot (ft) from the surface during the growing season, or

   b. poorly drained or very poorly drained and have either:

      (1) water table equal to 0.0 ft during the growing season if textures are coarse sand, sand, or fine sand in all layers within 20 inches (in),

      or for other soils

      (2) water table at less than or equal to 0.5 ft from the surface during the growing season if permeability is equal to or greater than 6.0 in/hour (h) in all layers within 20 in, or

      (3) water table at less than or equal to 1.0 ft from the surface during the growing season if permeability is less than 6.0 in/h in any layer within 20 in, or

3. Soils that are frequently ponded for long duration or very long duration during the growing season, or

4. Soils that are frequently flooded for long duration or very long duration during the growing season.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.
Ablation till. Loose, permeable till deposited during the final downwasting of glacial ice. Lenses of crudely sorted sand and gravel are common.
AC soil. A soil having only an A and a C horizon. Commonly, such soil formed in recent alluvium or on steep, rocky slopes.
Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.
Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.
Alkali (sodic) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.
Alluvial fan. The fanlike deposit of a stream where it issues from a gorge upon a plain or of a tributary stream near or at its junction with its main stream.
Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.
Alpha, alpha-dipyridyl. A dye that when dissolved in 1N ammonium acetate is used to detect the presence of reduced iron (Fe II) in the soil. A positive reaction indicates a type of redoximorphic feature.
Animal-unit month (AUM). The amount of forage required by one mature cow weighing approximately 1,000 pounds, with or without a calf, for 1 month.
Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.
Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.
Argillic horizon. A subsoil horizon characterized by an accumulation of illuvial clay.
Aspect. The direction in which a slope faces.
Association, soil. A group of soils or miscellaneous areas geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.
Atterberg Limits. A general term that encompasses liquid limit, plastic limit, and shrinkage limit. It is used as an integral part of several engineering classification systems.
Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as:

Very low	0 to 3
Low	3 to 6
Moderate	6 to 9

High	9 to 12
Very high	More than 12

Badland. Moderately steep to very steep, commonly nonstony, barren land dissected by many intermittent drainage channels. Badland is most common in semiarid and arid regions where streams are entrenched in soft geologic material. Local relief generally ranges from 25 to 500 feet. Runoff potential is very high, and geologic erosion is active.

Basal till. Compact glacial till deposited beneath the ice.

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface. It may be either **lithic** (digging with a hand spade impractical) or **paralithic** (dug with difficulty with a spade).

Blowout. A shallow depression from which all or most of the soil material has been removed by the wind. A blowout has a flat or irregular floor formed by a resistant layer or by an accumulation of pebbles or cobbles. In some blowouts the water table is exposed.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Breaks. The steep and very steep broken land at the border of an upland summit that is dissected by ravines.

Brush management. Use of mechanical, chemical, or biological methods to make conditions favorable for reseeding or to reduce or eliminate competition from woody vegetation and thus allow understory grasses and forbs to recover. Brush management increases forage production and thus reduces the hazard of erosion. It can improve the habitat for some species of wildlife.

Butte. An isolated small mountain or hill with steep or precipitous sides and a top variously flat, rounded, or pointed that may be a residual mass isolated by erosion.

$CaCO_3$ Equivalent. The quantity of carbonate (CO_3) in the soil expressed as $CaCO_3$. This material is important to the fertility, erosion, available water holding capacity, and genesis of a soil.

Calcareous soil. A soil containing enough calcium carbonate (commonly combined with magnesium carbonate) to effervesce visibly when treated with cold, dilute hydrochloric acid.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Catena. A sequence, or “chain,” of soils on a landscape that formed in similar kinds of parent material but have different characteristics as a result of differences in relief and drainage.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity but is more precise in meaning.

Channery soil material. Soil material that is, by volume, 15 to 35 percent thin, flat fragments of sandstone, shale, slate, limestone, or schist as much as 6 inches (15 centimeters) along the longest axis. A single piece is called a channer.

Chemical treatment. Control of unwanted vegetation through the use of chemicals.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard, compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay depletions. Low-chroma zones having a low content of iron, manganese, and clay because of the chemical reduction of iron and manganese and the removal of iron, manganese, and clay. A type of redoximorphic depletion.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax plant community. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse textured soil. Sand or loamy sand.

Cobble (or cobblestone). A rounded or partly rounded fragment of rock 3 to 10 inches (7.6 to 25 centimeters) in diameter.

Cobbly soil material. Material that is 15 to 35 percent, by volume, rounded or partially rounded rock fragments 3 to 10 inches (7.6 to 25 centimeters) in diameter. Very cobbly soil material has 35 to 60 percent of these rock fragments, and extremely cobbly soil material has more than 60 percent.

Collapsed lake plain. A previously nearly level surface marking the floor of an extinct lake, filled in by well-sorted deposits from inflowing streams and underlain by glacial ice, now having the surface configuration of the underlying topography as a result of melting of the glacial ice.

Collapsed outwash plain. A previously broad, flat, or gently sloping alluvial sheet of outwash deposited by meltwater streams and underlain by glacial ice, now having the surface configuration of the underlying topography as a result of melting of the glacial ice.

Colluvium. Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or establishing terraces, diversions, and other water-control structures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil or miscellaneous areas in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas.

Concretions. Cemented bodies with crude internal symmetry organized around a point, a line, or a plane. They typically take the form of concentric layers visible to the naked eye. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up concretions. If formed in place, concretions of iron oxide or manganese oxide are generally considered a type of redoximorphic concentration.

Conglomerate. A coarse grained, clastic rock composed of rounded or subangular rock fragments more than 2 millimeters in diameter. It commonly has a matrix of sand and finer textured material. Conglomerate is the consolidated equivalent of gravel.

Conservation cropping system. Growing crops in combination with needed cultural and management practices. In a good conservation cropping system, the soil-improving crops and practices more than offset the effects of the soil-depleting crops and practices. Cropping systems are needed on all tilled soils. Soil-improving practices in a conservation cropping system include the use of rotations that contain grasses and legumes and the return of crop residue to the soil. Other practices include the use of green manure crops of grasses and legumes, proper tillage, adequate fertilization, and weed and pest control.

Conservation tillage. A tillage system that does not invert the soil and that leaves a protective amount of crop residue on the surface throughout the year.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are:

Loose .... noncoherent when dry or moist; does not hold together in a mass.

Friable .... when moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm .... when moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic .... when wet, readily deformed by moderate pressure but can be pressed into a lump; will form a “wire” when rolled between thumb and forefinger.

Sticky .... when wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard .... when dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft .... when dry, breaks into powder or individual grains under very slight pressure.

Cemented .... hard, little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Contrasting soils (Dissimilar soils). Soils that do not share limits of diagnostic criteria, behave and perform in a similar manner, or have similar conservation needs or management requirements for the major land uses in the survey area.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosion. Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cropping system. Growing crops according to a planned system of rotation and management practices.

Crop residue management. Returning crop residue to the soil, which helps to maintain soil structure, organic matter content, and fertility and helps to control erosion.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazing land for a prescribed period.

Delta. A body of alluvium having a surface that is nearly flat and fan shaped; deposited at or near the mouth of a river or stream where it enters a body of relatively quiet water, generally a sea or lake.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth, soil. Generally, the thickness of the soil over bedrock. Very deep soils are more than 60 inches deep over bedrock; deep soils, 40 to 60 inches; moderately deep, 20 to 40 inches; shallow, 10 to 20 inches; and very shallow, less than 10 inches.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Divided-slope farming. A form of field stripcropping in which crops are grown in a systematic arrangement of two strips, or bands, across the slope to reduce the hazard of water erosion. One strip is in a close-growing crop that provides protection from erosion, and the other strip is in a crop that provides less protection from erosion. This practice is used where slopes are not long enough to permit a full stripcropping pattern to be used.

Drainage class (natural). Refers to the frequency and duration of wet periods under conditions similar to those under which the soil formed. Alterations of the water regime by human activities, either through drainage or irrigation, are not a consideration unless they have significantly changed the morphology of the soil. Seven classes of natural soil drainage are recognized:

Excessively drained .... these soils have very high and high hydraulic conductivity and a low water-holding capacity. They are not suited to crop production unless irrigated.

Somewhat excessively drained .... these soils have high hydraulic conductivity and a low water-holding capacity. Without irrigation, only a narrow range of crops can be grown and yields are low.

Well drained .... these soils have an intermediate water-holding capacity. They retain optimum amounts of moisture, but they are not wet close enough to the surface or long enough during the growing season to adversely affect yields.

Moderately well drained .... these soils are wet close enough to the surface or long enough that planting or harvesting operations or yields of some field crops are adversely affected unless a drainage system is installed. Moderately well drained soils commonly have a layer with low hydraulic conductivity, a wet layer relatively high in the profile, additions of water by seepage, or some combination of these.

Somewhat poorly drained .... these soils are wet close enough to the surface or long enough that planting or harvesting operations or crop growth is markedly restricted unless a drainage system is installed. Somewhat poorly drained soils commonly have a layer with low hydraulic conductivity, a wet layer high in the profile, additions of water through seepage, or a combination of these.

Poorly drained .... these soils commonly are so wet at or near the surface during a considerable part of the year that field crops cannot be grown under natural conditions. Poorly drained conditions are caused by a saturated zone, a layer with low hydraulic conductivity, seepage, or a combination of these.

Very poorly drained .... these soils are wet to the surface most of the time. The wetness prevents the growth of important crops (except rice) unless a drainage system is installed.

Drainage, surface. Runoff, or surface flow of water, from an area.

Drainageway. An area of ground at a lower elevation than the surrounding ground and in which water collects and is drained to a closed depression or lake or to a drainageway at a lower elevation. A drainageway may or may not have distinctly incised channels at its upper reaches or throughout its course.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

Drift. A general term applied to all material transported by a glacier and deposited directly from the ice or by running water coming from the ice. Drift includes unstratified material (till) that forms moraines, and stratified glaciofluvial deposits that form outwash plains, eskers, kames, varves, and glaciolacustrine sediments. The term is generally applied to Pleistocene glacial deposits in areas that no longer contain glaciers.

Drumlin. A low, smooth, elongated oval hill, mound, or ridge of compact glacial till. The longer axis is parallel to the path of the glacier and commonly has a blunt nose pointing in the direction from which the ice approached.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Endosaturation. A type of saturation of the soil in which all horizons between the upper boundary of saturation and a depth of 2 meters are saturated.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Ephemeral stream. A stream, or reach of a stream, that flows only in direct response to precipitation. It receives no long-continued supply from melting snow or other source, and its channel is above the water table at all times.

Episaturation. A type of saturation indicating a perched water table in a soil in which saturated layers are underlain by one or more unsaturated layers within 2 meters of the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

Esker. A narrow, winding ridge of stratified gravelly and sandy drift deposited by a stream flowing in a tunnel beneath a glacier.

Excess fines (in tables). Excess silt and clay in the soil. The soil does not provide a source of gravel or sand for construction purposes.

Excess lime (in tables). Excess carbonates in the soil that restrict the growth of some plants.

Excess salts (in tables). Excess water-soluble salts in the soil that restrict the growth of most plants.

Excess sodium (in tables). Excess exchangeable sodium in the soil. The resulting poor physical properties restrict the growth of plants.

Excess sulfur (in tables). Excessive amount of sulfur in the soil. The sulfur causes extreme acidity if the soil is drained, and the growth of most plants is restricted.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grain is grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fan terrace. A relict alluvial fan, no longer a site of active deposition, incised by younger and lower alluvial surfaces.

Fast intake (in tables). The rapid movement of water into the soil.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Fibric soil material (peat). The least decomposed of all organic soil material. Peat contains a large amount of well preserved fiber that is readily identifiable according to botanical origin. Peat has the lowest bulk density and the highest water content at saturation of all organic soil material.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called normal field capacity, normal moisture capacity, or capillary capacity.

Fill slope. A sloping surface consisting of excavated soil material from a road cut. It commonly is on the downhill side of the road.

Fine textured soil. Sandy clay, silty clay, or clay.

Flaggy soil material. Material that is, by volume, 15 to 35 percent flagstones. Very flaggy soil material has 35 to 60 percent flagstones, and extremely flaggy soil material has more than 60 percent flagstones.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist 6 to 15 inches (15 to 38 centimeters) long.

Flooding. The temporary covering of the soil surface by flowing water from any source.

Flooding frequency classes:

None .... 0 percent chance of flooding in any year.
Rare.. .... .0 to 5 percent chance of flooding in any year.
Occasional .... 5 to 50 percent chance of flooding in any year.
Frequent .... more than 50 percent chance of flooding in any year.

Flooding duration classes:

Extremely brief .... 0.1 to 4.0 hours
Very brief .... 4 to 48 hours
Brief .... 2 to 7 days
Long .... 7 to 30 days
Very long .... more than 30 days

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Fluvial. Of or pertaining to rivers; produced by river action, as a fluvial plain.

Foothill. A steeply sloping upland that has relief of as much as 1,000 feet (300 meters) and fringes a mountain range or high-plateau escarpment.

Foot slope. The bottom of a slope or the lower part of any elevated landform.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

Fragile (in tables). A soil that is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Frost action (in tables). Freezing and thawing of soil moisture. Frost action can damage roads, buildings and other structures, and plant roots.

Genesis, soil. The mode of origin of the soil. Refers especially to the processes or soil-forming factors responsible for the formation of the solum, or true soil, from the unconsolidated parent material.

Gilgai. Commonly, a succession of microbasins and microknolls in nearly level areas or of microvalleys and microridges parallel with the slope. Typically, the microrelief of clayey soils that shrink and swell considerably with changes in moisture content.

Glacial drift. Pulverized and other rock material transported by glacial ice and then deposited. Also, the sorted and unsorted material deposited by streams flowing from glaciers.

Glacial outwash. Gravel, sand, and silt, commonly stratified, deposited by glacial meltwater.

Glacial till. Unsorted, nonstratified glacial drift consisting of clay, silt, sand, and boulders transported and deposited by glacial ice.

Glaciofluvial deposits. Material moved by glaciers and subsequently sorted and deposited by streams flowing from the melting ice. The deposits are stratified and occur as kames, eskers, deltas, and outwash plains.

Glaciolacustrine deposits. Material ranging from fine clay to sand derived from glaciers and deposited in glacial lakes mainly by glacial meltwater. Many deposits are interbedded or laminated.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors.

Graded stripcropping. Growing crops in strips that grade toward a protected waterway.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock as much as 3 inches (2 millimeters to 7.6 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 35 percent, by volume, rounded or angular rock fragments, not prominently flattened, as much as 3 inches (7.6 centimeters) in diameter.

Green manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water. Water filling all the unblocked pores of the material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage. A gullied map unit is one that has numerous gullies.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

Hardpan. A hardened or cemented soil horizon or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Hemic soil material (mucky peat). Organic soil material intermediate in degree of decomposition between the less decomposed fibric material and the more decomposed sapric material.

High-residue crops. Such crops as small grain and corn used for grain. If properly managed, residue from these crops can be used to control erosion until the next crop in the rotation is established. These crops return large amounts of organic matter to the soil.

Hill. A natural elevation of the land surface, rising as much as 1,000 feet above surrounding lowlands, commonly of limited summit area and having a well defined outline; hillsides generally have slopes of more than 15 percent. The distinction between a hill and a mountain is arbitrary and is dependent on local usage.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an uppercase letter represents the major horizons. Numbers or lowercase letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the "Soil Survey Manual." The major horizons of mineral soil are as follows:

O horizon .... an organic layer of fresh and decaying plant residue.

A horizon .... the mineral horizon at or near the surface in which an accumulation of humidified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon .... the mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon .... the mineral horizon below an A horizon. The B horizon is in part a layer of transition from the overlying A to the underlying C horizon. The B horizon also has distinctive characteristics, such as (1) accumulation of clay, sesquioxides, humus, or a combination of these; (2) prismatic or blocky structure; (3) redder or browner colors than those in the A horizon; or (4) a combination of these.

C horizon .... the mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the overlying soil material. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, an Arabic numeral, commonly a 2, precedes the letter C.

Cr horizon .... Soft, consolidated bedrock beneath the soil.

R layer .... Consolidated bedrock beneath the soil. The bedrock commonly underlies a C horizon, but it can be directly below an A or a B horizon.

Hummock. A slight mound or rise of ground above a level surface; generally of equidimensional shape and not ridge-like.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydric soil. Soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions for the upper part.

Hydrologic soil groups. Refers to soils grouped according to their runoff potential. The soil properties that influence this potential are those that affect the minimum rate of water infiltration on a bare soil during periods after prolonged wetting when the soil is not frozen. These properties are depth to a seasonal high water table, the infiltration rate and permeability after prolonged wetting, and depth to a very slowly permeable layer. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff.

Igneous rock. Rock formed by solidification from a molten or partially molten state. Major varieties include plutonic and volcanic rock. Examples are andesite, basalt, and granite.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material, as contrasted with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intermittent stream. A stream, or reach of a stream, that flows for prolonged periods only when it receives ground-water discharge or long, continued contributions from melting snow or other surface and shallow subsurface sources.

Invaders. On range, plants that encroach into an area and grow after the climax vegetation has been reduced by grazing. Generally, plants invade following disturbance of the surface.

Iron depletions. Low-chroma zones having a low content of iron and manganese oxide because of chemical reduction and removal, but having a clay content similar to that of the adjacent matrix. A type of redoximorphic depletion.

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are:

Basin .... Water is applied rapidly to nearly level plains surrounded by levees or dikes.

Border. .... Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.

Controlled flooding .... Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.

Corrugation .... Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.

Drip (or trickle). .... Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.

Furrow .... Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.

Sprinkler .... Water is sprayed over the soil surface through pipes or nozzles from a pressure system.

Subirrigation .... Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.

Wild flooding .... Water, released at high points, is allowed to flow onto an area without controlled distribution.

K Factor. Soil erodibility factor in the Universal Soil Loss Equation.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Knoll. A small, low, rounded hill rising above adjacent landforms.

Ksat. See saturated hydraulic conductivity.

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

Lake plain. A surface marking the floor of an extinct lake, filled in by well sorted, stratified sediments.

Landslide. The rapid downhill movement of a mass of soil and loose rock, generally when wet or saturated. The speed and distance of movement, as well as the amount of soil and rock material, vary greatly.

Large stones (in tables). Rock fragments 3 inches (7.6 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Lime. A soil material that consists of precipitated calcium or magnesium carbonate.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low-residue crops. Such crops as corn used for silage, peas, beans, and potatoes. Residue from these crops is not adequate to control erosion until the next crop in the rotation is established. These crops return little organic matter to the soil.

Low strength. The soil is not strong enough to support loads.

Masses. Concentrations of substances in the soil matrix that do not have a clearly defined boundary with the surrounding soil material and cannot be removed as a discrete unit. Common compounds making up masses are calcium carbonate, gypsum or other soluble salts, iron oxide, and manganese oxide. Masses consisting of iron oxide or manganese oxide generally are considered a type of redoximorphic concentration.

Mechanical treatment. Use of mechanical equipment for seeding, brush management, and other management practices.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Metamorphic rock. Rock of any origin altered in mineralogical composition, chemical composition, or structure by heat, pressure, and movement. Nearly all such rocks are crystalline.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Coarse sandy loam, sandy loam, or fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, or silty clay loam.

Mollic epipedon. A thick, dark, humus-rich surface horizon (or horizons) that has high base saturation and pedogenic soil structure. It may include the upper part of the subsoil.

Moraine. An accumulation of earth, stones, and other debris deposited by a glacier. Some types are terminal, lateral, medial, and ground.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Descriptive terms are as follows: abundance - few, common, and many; size - fine, medium, and coarse; and contrast - faint, distinct, and prominent. The size measurements are of the diameter along the greatest dimension. Fine indicates less than 5 millimeters (about 0.2 inch); medium, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and coarse, more than 15 millimeters (about 0.6 inch).

Mountain. A natural elevation of the land surface, rising more than 1,000 feet above surrounding lowlands, commonly of restricted summit area (relative to a plateau) and generally having steep sides. A mountain can occur as a single, isolated mass or in a group forming a chain or range.

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. A blocky or massive, fine-grained sedimentary rock that consists of a mixture of clay, silt, and sand particles, the proportion of which vary from place to place.

Munsell notation. A designation of color by degrees of three simple variables - hue, value, and chroma. For example, a notation of 10YR 6/4 is a color with hue of 10YR, value of 6, and chroma of 4.

Natric horizon. A special kind of argillic horizon that contains enough exchangeable sodium to have an adverse effect on the physical condition of the subsoil.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

Nodules. Cemented bodies lacking visible internal structure. Calcium carbonate, iron oxide, and manganese oxide are common compounds making up nodules. If formed in place, nodules of iron oxide or manganese oxide are considered types of redoximorphic concentrations.

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition. The content of organic matter in the surface layer is described as follows:

Very low	less than 0.5 percent
Low	0.5 to 1.0 percent
Moderately low	1.0 to 2.0 percent
Moderate	2.0 to 4.0 percent
High	4.0 to 8.0 percent
Very high	more than 8.0 percent

Outwash, glacial. Stratified sand and gravel produced by glaciers and carried, sorted, and deposited by glacial meltwater.

Outwash plain. A landform of mainly sandy or coarse textured material of glaciofluvial origin. An outwash plain is commonly smooth; where pitted, it generally is low in relief.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, hardpan, fragipan, claypan, plowpan, and traffic pan.

Parent material. The unconsolidated organic and mineral material in which soil forms.

Peat. Unconsolidated material, largely undecomposed organic matter, that has accumulated under excess moisture. (See Fibric soil material.)

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. See saturated hydraulic conductivity (Ksat).

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Formation of subsurface tunnels or pipelike cavities by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plateau. An extensive upland mass with relatively flat summit area that is considerably elevated (more than 100 meters) above adjacent lowlands and separated from them on one or more sides by escarpments.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Very brief	less than 2 days
Brief	2 to 7 days
Long	7 to 30 days
Very long	more than 30 days

Poor filter (in tables). Because of rapid or very rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor outlets (in tables). Refers to areas where surface or subsurface drainage outlets are difficult or expensive to install.

Porcelanite (scoria). Shale and clay that are fused as a result of their proximity to a burning coal vein.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

Prescribed burning. Deliberately burning an area for specific management purposes, under the appropriate conditions of weather and soil moisture and at the proper time of day.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Proper grazing use. Grazing at an intensity that maintains enough cover to protect the soil and maintain or improve the quantity and quality of the desirable vegetation. This practice increases the vigor and reproduction capacity of the key plants and promotes the accumulation of litter and mulch necessary to conserve soil and water.

Range condition. The present composition of the plant community on a range site in relation to the potential natural plant community for that site. Range condition is expressed as excellent, good, fair, or poor on the basis of how much the present plant community has departed from the potential.

Rangeland. Land on which the potential natural vegetation is predominantly grasses, grasslike plants, forbs, or shrubs suitable for grazing or browsing. It includes natural grasslands, savannas, many wetlands, some deserts, tundras, and areas that support certain forb and shrub communities.

Range site. An area of rangeland where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. A range site is the product of all the environmental factors responsible for its development. It is typified by an association of species that differ from those on other range sites in kind or proportion of species or total production.

Reaction, soil. A measure of acidity or alkalinity of a soil, expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degrees of acidity or alkalinity, expressed as pH values, are:

Ultra acid	less than 3.5
Extremely acid	3.5 to 4.4
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Moderately acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Slightly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Red beds. Sedimentary strata that are mainly red and are made up largely of sandstone and shale.

Redoximorphic concentrations. Nodules, concretions, soft masses, pore linings, and other features resulting from the accumulation of iron or manganese oxide. An indication of chemical reduction and oxidation resulting from saturation.

Redoximorphic depletions. Low-chroma (2 or less) zones from which iron and manganese oxide or a combination of iron and manganese oxide and clay has been removed. These zones are indications of the chemical reduction of iron resulting from saturation.

Redoximorphic features. Redoximorphic concentrations, redoximorphic depletions, reduced matrices, a positive reaction to alpha,alpha-dipyridyl, and other features indicating the chemical reduction and oxidation of iron and manganese compounds resulting from saturation.

Reduced matrix. A soil matrix that has low chroma in situ because of chemically reduced iron (Fe II). The chemical reduction results from nearly continuous wetness. The matrix undergoes a change in hue or chroma within 30 minutes after exposure to air as the iron is oxidized (Fe III). A type of redoximorphic feature.

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Retrogression. The process by which rangeland vegetation changes significantly from the natural potential plant community. syn., range deterioration, site deterioration.

Revised Universal Soil Loss Equation (RUSLE). An erosion model designed to predict the long term average soil loss carried by runoff from specific field slopes in specified cropping and management systems.

Rill. A steep-sided channel resulting from accelerated erosion. A rill generally is a few inches deep and not wide enough to be an obstacle to farm machinery.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rock outcrop. Exposures of bare bedrock other than lava flows and rock-lined pits. Most rock outcrops are hard rock.

Root shearing. The cutting, tearing, and disruption of plant roots by the hooves of animals during grazing when the soil is wet and soft.

Rooting depth (in tables). Shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Saline seep. Areas of nonirrigated soils with restricted drainage, where salinity has recently developed.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Saline-sodic soil. A soil containing a combination of soluble salts and exchangeable sodium sufficient to interfere with the growth of plants.

Salty water (in tables). Water that is too salty for consumption by livestock.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

Sapric soil material (muck). The most highly decomposed of all organic soil material. Muck has the least amount of plant fiber, the highest bulk density, and the lowest water content at saturation of all organic soil material.

Saturation. Wetness characterized by zero or positive pressure of the soil water. Under conditions of saturation, the water will flow from the soil matrix into an unlined auger hole.

Saturated hydraulic conductivity (Ksat). The quality of the soil that enables water or air to move downward through the profile. The rate at which a saturated soil transmits water is accepted as a measure of this quality. Terms describing saturated hydraulic conductivity, measured in inches per hour, are as follows:

Extremely slow	0.0 to 0.01 inch
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Scarification. The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil. Seepage adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shoulder slope. The uppermost inclined surface at the top of a hillside. It is the transition zone from the backslope to the summit of a hill or mountain. The surface is dominantly convex in profile and erosional in origin.

Shrink-swell (in tables). The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Similar soils. Soils that share limits of diagnostic criteria, behave and perform in a similar manner, and have similar conservation needs or management requirements for the major land uses in the survey area.

Slickensides. Polished and grooved surfaces produced by one mass sliding past another. In soils, slickensides may occur at the bases of slip surfaces on the steeper slopes; on faces of blocks, prisms, and columns; and in swelling clayey soils, where there is marked change in moisture content.

Slick spot. A small area of soil having a puddled, crusted, or smooth surface and an excess of exchangeable sodium. The soil generally is silty or clayey, is slippery when wet, and is low in productivity.

Slippage (in tables). Soil mass susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance. In this survey, classes for simple slopes are as follows:

Level	0 to 1 percent
Level and nearly level	0 to 3 percent
Nearly level	1 to 3 percent
Gently sloping or undulating	3 to 6 percent
Moderately sloping or gently rolling	6 to 9 percent
Strongly sloping or rolling	9 to 15 percent
Moderately steep or hilly	15 to 25 percent
Steep	25 to 35 percent
Very steep	More than 35 percent

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.6 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Sodic (alkali) soil. A soil having so high a degree of alkalinity (pH 8.5 or higher) or so high a percentage of exchangeable sodium (15 percent or more of the total exchangeable bases), or both, that plant growth is restricted.

Sodicity. The degree to which a soil is affected by exchangeable sodium. Sodicity is expressed as a sodium adsorption ratio (SAR) of a saturation extract, or the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil depth class. The distance from the top of the soil to the underlying bedrock. The distance, in inches, is expressed as:

Very shallow	less than 10 inches
Shallow	10 to 20 inches
Moderately deep	20 to 40 inches
Deep	40 to 60 inches
Very deep	greater than 60 inches

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind erosion and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are - platy (laminated), prismatic (vertical axis of aggregates longer than horizontal), columnar (prisms with rounded tops), blocky (angular or subangular), and granular. Structureless soils are either single grained (each grain by itself, as in dune sand) or massive (the particles adhering without any regular cleavage, as in many hardpans).

Stubble mulch. Stubble or other crop residue left on the soil or partly worked into the soil. It protects the soil from wind erosion and water erosion after harvest, during preparation of a seedbed for the next crop, and during the early growing period of the new crop.

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Tilling a soil below normal plow depth, ordinarily to shatter a hardpan or claypan.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the E horizon. Generally refers to a leached horizon lighter in color and lower in content of organic matter than the overlying surface layer.

Summer fallow. The tillage of uncropped land during the summer to control weeds and allow storage of moisture in the soil for the growth of a later crop. A practice common in semiarid regions, where annual precipitation is not enough to produce a crop every year. Summer fallow is frequently practiced before planting winter grain.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the “plow layer,” or the “Ap horizon.”

Surface soil. The A, E, AB, and EB horizons, considered collectively. It includes all subdivisions of these horizons.

Talus. Fragments of rock and other soil material accumulated by gravity at the foot of cliffs or steep slopes.

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.

Terminal moraine. A belt of thick glacial drift that generally marks the termination of important glacial advances.

Terrace. An embankment, or ridge, constructed across sloping soils on the contour or at a slight angle to the contour. The terrace intercepts surface runoff so that water soaks into the soil or flows slowly to a prepared outlet. A terrace in a field generally is built so that the field can be farmed. A terrace intended mainly for drainage has a deep channel that is maintained in permanent sod.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are - sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying “coarse,” “fine,” or “very fine.”

Thin layer (in tables). Otherwise suitable soil material that is too thin for the specified use.

Till plain. An extensive area of nearly level to undulating soils underlain by glacial till.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toeslope. The lower gentle slope of a hillside. The lowest part of a footslope.

Too arid (in tables). The soil is dry most of the time and vegetation is difficult to establish.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Toxicity (in tables). Excessive amount of toxic substances, such as sodium or sulfur, that severely hinder establishment of vegetation or severely restrict plant growth.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Universal Soil Loss Equation (USLE). An equation used to design water erosion control systems: **A—RKLSPC** where **A** is average annual soil loss in tons per acre per year; **R** is the rainfall factor; **K** is the soil erodibility factor; **L** is the length of slope; **S** is the percent slope; **P** is the conservation practice factor; and **C** is the cropping and management factor.

Unstable fill (in tables). Risk of caving or sloughing on banks of fill material.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley. An elongated depressional area primarily developed by stream action.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variegation. Refers to patterns of contrasting colors assumed to be inherited from the parent material rather than to be the result of poor drainage.

Varve. A sedimentary layer or a lamina or sequence of laminae deposited in a body of still water within a year. Specifically, a thin pair of graded glaciolacustrine layers seasonally deposited, usually by meltwater streams, in a glacial lake or other body of still water in front of a glacier.

Very deep soil. A soil that is more than 60 inches deep over bedrock or to other material that restricts the penetration of plant rows.

Very shallow soil. A soil that is less than 10 inches deep over bedrock or to other material that restricts the penetration of plant roots.

Water table. The upper surface of groundwater or that level below the surface where the soil is saturated with water. For soil survey purposes, the depth the water table is observed is within 60 inches from the surface.

Apparent .... Level at which water stands in a freshly dug, unlined borehole after it has adequate time for adjustments in the surrounding soil.

Perched .... A saturated soil zone above an unsaturated layer in the soil.

Artesian .... A water table under hydrostatic head beneath an impermeable layer.

Seasonal .... A water table within 60 inches of the surface during the growing season.

Weathering. All physical and chemical changes produced in rocks or other deposits at or near the earth's surface by atmospheric agents. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of coarse grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. Contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windsculptured. A land surface of which its form has been changed by action of the wind.

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