



United States
Department of
Agriculture

Natural
Resources
Conservation
Service

In cooperation with Kansas
Agricultural Experiment
Station

Soil Survey of Reno County, Kansas



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.

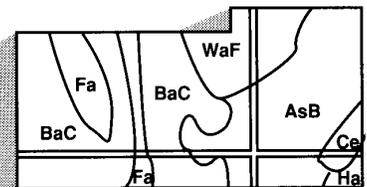
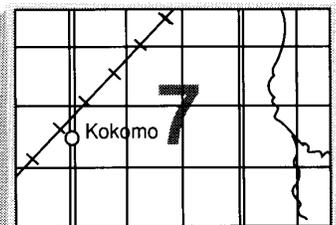
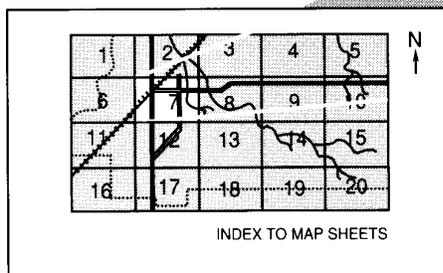
Detailed Soil Maps

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.

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.

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.



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.

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 Stations, 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 between 1987 and 1998. Soil names and descriptions were approved in August 1999. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1999. This survey was made cooperatively by the Natural Resources Conservation Service and the Kansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Reno 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. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

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Cover: Aerial view of cropland and rangeland near the Ninnescah River, east of Arlington, Kansas, in Reno County. Photo by Richard Slifer, sandhills farmer, Plevna, Kansas.

Additional information about the Nation's natural resources is available on the Natural Resources Conservation Service home page on the World Wide Web. The address is <http://www.nrcs.usda.gov> (click on "Technical Resources").

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Foreword

This soil survey contains information that affects land use planning in this survey area. It contains predictions of soil behavior for selected land uses. The survey also highlights soil limitations, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

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.

Various land use regulations of Federal, State, and local governments may impose special restrictions on land use or land treatment. The information in this report is intended to identify soil properties that are used in making various land use or land treatment decisions. Statements made in this report are intended to help the land users identify and reduce the effects of soil limitations that affect various land uses. The landowner or user is responsible for identifying and complying with existing laws and regulations.

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 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.

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Soil Survey of Reno County, Kansas

By John Warner, Natural Resources Conservation Service

Fieldwork by John Warner, Larry Gray, Robert Murphy, Gary Parks, James McDowell, Pete Fahnestock, and Bruce Hoffman, Natural Resources Conservation Service

United States Department of Agriculture, Natural Resources Conservation Service,
in cooperation with
Kansas Agricultural Experiment Station

General Nature of the County

RENO COUNTY is in south-central Kansas (fig. 1). It has a total land area of 813,465 acres, or about 1,255 square miles. In 1990, the population of the county was 62,146. Hutchinson, the county seat and largest city, has a population of 39,308. The county is bounded on the south by Kingman and Sedgwick Counties, on the west by Pratt and Stafford Counties, on the north by Rice and McPherson Counties, and on the east by Harvey and Sedgwick Counties.

There are two state parks in Reno County. Cheney Lake State Park is in the southeast corner of the county. The lake provides recreational opportunities and is a primary drinking water supply for the city of Wichita. The Sandhills State Park is northeast of the city of Hutchinson. The park highlights the vegetation and wildlife native to the sand prairie region in south-central Kansas.

There are three major land resource areas in the county. These are the Central Loess Plains, the Great Bend Sand Plains, and the Central Rolling Red Prairies. All of these are in the Central Great Plains Winter Wheat and Range Land Resource Region.

Most of the soils in the county are very deep. They are generally well suited to cultivated crops and to pasture, hay, and range. Unfavorable soil characteristics lower the potential of some soils for crops. Wind erosion is a hazard on many of the soils. This hazard is most severe on soils that have a surface layer of sand or sandy loam. The county has about 60,000 acres of saline-sodic soils.

This soil survey updates the survey of Reno

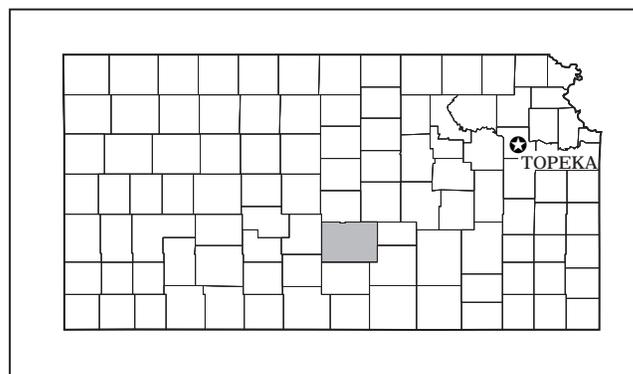


Figure 1.—Location of Reno County in Kansas.

County, Kansas, published in March 1966 (Rockers and others, 1966). It provides additional information and has larger maps, which show the soils in greater detail.

Climature

Table 1 gives data on temperature and precipitation for the survey area as recorded at Hutchinson in the period 1961 to 1990. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on the length of the growing season.

In winter, the average temperature is 32.5 degrees F and the average daily minimum temperature is 21.2 degrees. The lowest temperature on record, which occurred at Hutchinson on February 6, 1982, was -19

degrees. In summer, the average temperature is 78.4 degrees and the average daily maximum temperature is 91.3 degrees. The highest temperature, which occurred at Hutchinson on August 6, 1964, was 111 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that 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 is 29.11 inches. Of this, 20.7 inches, or about 71 percent, usually falls in April through September. The growing season for most crops falls within this period. The heaviest 1-day rainfall during the period of record was 6.35 inches at Hutchinson on April 20, 1974. Thunderstorms occur on about 54 days each year, and most occur between May and September.

The average seasonal snowfall is 14.4 inches. The greatest snow depth at any one time during the period of record was 12 inches recorded on March 20, 1984. An average of 20 days per year have at least 1 inch of snow on the ground. The heaviest 1-day snowfall on record was 12 inches recorded on March 16, 1970.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines about 74 percent of the time possible in summer and 60 percent in winter. The prevailing wind is from the south. Average windspeed is highest, around 14 miles per hour, in March and April.

History

The settlement of Reno County began in 1860. The current county seat, Hutchinson, was founded in 1871. The area was settled as a result of the westward expansion of the Santa Fe Railroad. The first settlers in the area were cattlemen.

In the 1880's, the county experienced a booming expansion based on agriculture and the newly discovered salt industry. In the late 1880's, the first salt mine was discovered accidentally during an attempt to drill for oil. By the early 1900's, Hutchinson had become a large salt mining community. Simultaneously, immigrants were introducing Russian wheat into the county, and Hutchinson became a major trading center for the area. Agriculture remains the major industry in the county, and several salt mines are operating in the area.

In 1881, the population of Reno County was 12,384.

The population increased until the late 1980's. In 1980, the population of the county was 64,983. In 1994, the population was 62,146. Of this total, 41,708 were residents of the cities of Hutchinson and South Hutchinson. The rest were in rural areas or smaller communities.

Geology

Richard Sleezer, associate professor, Earth Science Department, Emporia State University, helped prepare this section.

The surficial geology of Reno County is at once simple and complex, depending on the spatial scale of observation. On a broad scale, Holocene and Late Pleistocene alluvial terrace deposits that have varying thicknesses of eolian sand cover most of Reno County. Upon closer inspection, the alluvial and eolian stratigraphy is highly complex and variable. The alluvial terrace deposits consist of stratified loamy, clayey, and sandy fluvial sediments that commonly occur in stacked, fining-upward sequences. The terrace surfaces themselves represent past flood-plain levels for the Arkansas, Ninnescah, and Little Arkansas Rivers or their paleo equivalents. The eolian sand cover is the result of multiple periods of eolian activity, probably associated with periods of time when the vegetative cover was not sufficient to prevent winds from mobilizing sands originally transported into the area by the aforementioned rivers. There are three notable exceptions to this general pattern. First, in the southern part of Reno County, Permian bedrock is exposed along the North Fork of the Ninnescah River. These Permian exposures consist of shale, siltstone, sandstone, and thin limestone and evaporite beds within the Upper Sumner Group or the Lower Nippewalla Group. The most common strata are brick red and gray-green shales from the Ninnescah Formation (Sumner Group) and red siltstone, fine silty sandstone, or thinly bedded red shale of the Harper Formation (Nippewalla Group). Where they are not exposed at the surface as a result of downcutting by the Ninnescah River and its tributaries, these and similar Permian formations subcrop below the overlying Quaternary alluvial and eolian sediments throughout Reno County. Second, small exposures along the Ninnescah River appear to be Tertiary sediments of Ogallala-like sands and gravels. These sediments may have been deposited contemporaneously with the Ogallala, or they could represent secondary reworking of Ogallala sediments by the Paleo-Ninnescah and Paleo-Arkansas River systems. Third, a deep mantle of late-Quaternary loess overlying older alluvium blankets the extreme

northeastern part of the county in the Buhler area. This loess mantle is generally 8 feet or more thick.

In general, the land surface of Reno County slopes downward from west to east in the direction of major drainage by the Ninnescah, Arkansas, and Little Arkansas Rivers. The topography is subdued, and most of the local relief is attributable to changes in elevation associated with a variety of alluvial terrace surfaces, local incision by tributary streams, and sand dunes. The greatest relief is associated with dune fields that stretch across the northeast and northwest corners of the county. Many of the individual dunes in these fields are as much as 40 feet higher than the surrounding landscape.

Three major streams and their tributaries drain much of Reno County. The Little Arkansas River system drains a small area in the northeastern part of the county. The Arkansas River and its tributaries drain the north-central and central parts of the county. The North Fork of the Ninnescah River drains most of the southern half of the county. A small area in the south-central part of the county is within the drainage basin of the South Fork of the Ninnescah River.

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 their location and a discussion of their suitability, limitations, and management 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 into 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 other biological activity.

The 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 of landform or with a segment of the landform. By observing the soils and miscellaneous areas in the survey area and relating their position to specific segments of the landform, a soil scientist develops a concept, or model, of how they were formed. Thus, during mapping, this model enables the soil scientist to predict with a considerable degree of accuracy the

kind of soil or miscellaneous area at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the 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 relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, reaction, and other features that enable them to identify soils. 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 to classify soils systematically. Soil taxonomy, 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 the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that 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 generally are collected for laboratory analyses and for engineering tests. Soil scientists interpret the data from these analyses and tests as well as the field-observed characteristics and the soil properties to determine the expected behavior of the soils under different uses. Interpretations for all of 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 are 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 high 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 that 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 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.

Table 1.--Temperature and Precipitation
(Recorded in the period 1961-90 at Hutchinson, Kansas)

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average	2 years in 10 will have--		Average number of growing degree days*	Average	2 years in 10 will have--		Average number of days with 0.10 inch or more	Average snowfall
				Maximum temperature higher than--	Minimum temperature lower than--			Less than--	More than--		
°F	°F	°F	°F	°F	Units	In	In	In	In	In	
January-----	41.0	18.4	29.7	70	-10	27	0.59	0.17	0.96	1	3.8
February-----	46.9	23.0	34.9	78	-5	69	.91	.21	1.52	2	4.0
March-----	57.6	32.5	45.1	84	7	226	2.15	.46	3.48	3	2.0
April-----	68.5	43.0	55.7	90	22	476	2.65	.89	4.10	4	.8
May-----	77.1	52.9	65.0	95	33	775	3.89	2.02	5.51	6	.0
June-----	88.0	62.7	75.4	103	46	1,059	4.29	1.94	6.31	6	.0
July-----	94.1	67.9	81.0	107	52	1,270	3.35	1.26	5.09	4	.0
August-----	91.9	65.8	78.8	107	50	1,204	3.15	.93	4.95	4	.0
September---	82.4	57.4	69.9	101	36	897	3.40	1.18	5.23	4	.0
October-----	71.4	45.3	58.4	92	27	570	2.44	.64	3.87	3	.1
November----	55.6	32.9	44.2	79	11	189	1.37	.32	2.45	2	.7
December----	43.7	22.2	33.0	69	-5	42	.93	.27	1.46	2	3.0
Yearly:											
Average----	68.2	43.7	55.9	---	---	---	---	---	---	---	---
Extreme----	111	-19	---	108	-13	---	---	---	---	---	---
Total-----	---	---	---	---	---	6,805	29.11	23.45	34.23	41	14.4

* 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 (40 degrees F).

Table 2.--Freeze Dates in Spring and Fall

(Recorded in the period 1961-90 at Hutchinson, Kansas)

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	Apr. 11	Apr. 17	May 3
2 years in 10 later than--	Apr. 4	Apr. 12	Apr. 27
5 years in 10 later than--	Mar. 23	Apr. 2	Apr. 17
First freezing temperature in fall:			
1 year in 10 earlier than--	Oct. 31	Oct. 20	Oct. 2
2 years in 10 earlier than--	Nov. 5	Oct. 24	Oct. 7
5 years in 10 earlier than--	Nov. 13	Nov. 2	Oct. 17

Table 3.--Growing Season

(Recorded in the period 1961-90 at Hutchinson, Kansas)

Probability	Daily minimum temperature during growing season		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	209	192	159
8 years in 10	218	199	167
5 years in 10	234	213	181
2 years in 10	251	227	196
1 year in 10	260	235	204

General Soil Map Units

The general soil map in this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. These areas are called associations. Each association on the general soil map is a unique natural landscape. Typically, it consists of one or more major soils or miscellaneous areas and some minor soils or miscellaneous areas. It is named for the major soils or miscellaneous areas. The components of one association can occur in another but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

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 or other structure. The soils in any one association differ from place to place in slope, depth, drainage, and other characteristics that affect management.

KS343—Crete-Smolan-Geary Association

This association consists of very deep, nearly level to moderately sloping, moderately well drained and well drained soils that have a silty or clayey subsoil. These soils formed in loess. They are in the uplands on broad ridgetops and side slopes that are drained by intermittent streams. Slopes range from 0 to 7 percent.

This association makes up about 2 percent of the survey area. It is about 40 percent Crete soils, 30 percent Smolan soils, 15 percent Geary soils, and 15 percent soils of minor extent (fig. 2).

The moderately well drained, slowly permeable Crete soils formed in loess. They are nearly level to gently sloping and are in the highest positions on the landscape.

The moderately well drained and well drained,

slowly permeable Smolan soils formed in loess. They are gently sloping and are on side slopes.

The moderately well drained, slowly permeable Geary soils formed in loess. They are nearly level to moderately sloping and are on side slopes.

About 90 percent of this association is used for cultivated crops. The rest is used mainly as rangeland. Wheat, grain sorghum, and alfalfa are the main crops. Controlling erosion, conserving moisture, and maintaining tilth and fertility are the main concerns affecting cropland management.

KS674—Shellabarger-Albion-Nalim Association

This association consists of very deep, nearly level to moderately sloping, well drained soils that have a loamy or sandy subsoil. These soils are on paleoterraces in river valleys. Slopes range from 0 to 15 percent.

This association makes up about 28 percent of the survey area. It is about 35 percent Shellabarger soils, 30 percent Albion soils, 25 percent Nalim soils, and 10 percent soils of minor extent (fig. 3).

The moderately permeable Shellabarger soils formed in loamy alluvium. They are generally on the moderately sloping side slopes.

The moderately rapidly permeable Albion soils formed in loamy alluvium. They are generally on the nearly level to moderately sloping plains and knolls.

The moderately permeable Nalim soils formed in loamy alluvium. They are most commonly on the nearly level side slopes.

About 90 percent of this association is used for cultivated crops. The rest is used mainly as rangeland. Wheat, grain sorghum, and alfalfa are the main crops. Controlling erosion, conserving moisture, and maintaining tilth and fertility are the main concerns affecting cropland management.

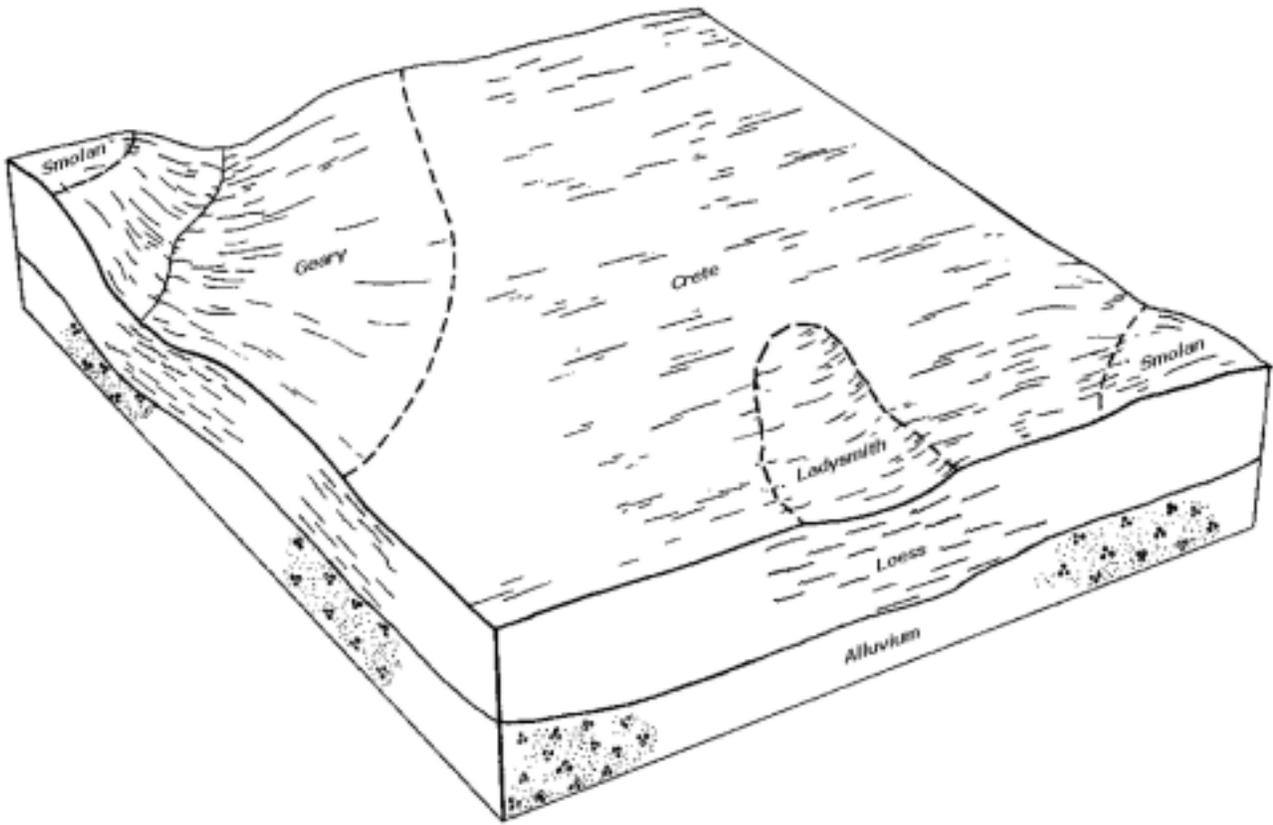


Figure 2.—Typical pattern of soils and parent material in the Crete-Smolan-Geary association.

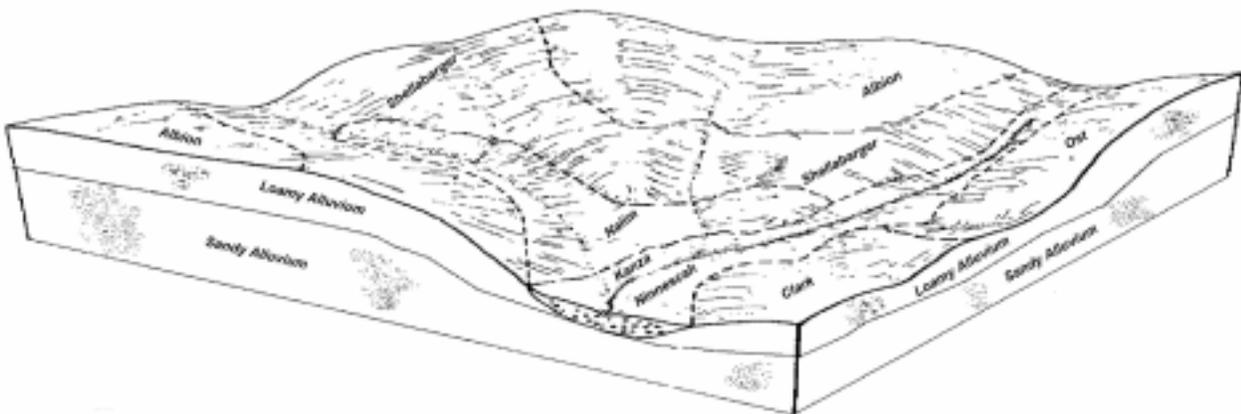


Figure 3.—Typical pattern of soils and parent material in the Shellabarger-Albion-Nalim association.

KS675—Tivin-Hayes-Pratt Association

This association consists of very deep, moderately sloping to steep, somewhat excessively drained and well drained soils on sand dunes and in interdunal depressions. These soils have a sandy or clayey subsoil. They are on paleoterraces in river valleys. Slopes range from 0 to 30 percent.

This association makes up about 25 percent of the survey area. It is about 35 percent Tivin soils, 25 percent Hayes soils, 20 percent Pratt soils, and 20 percent soils of minor extent (fig. 4).

The somewhat excessively drained, rapidly permeable Tivin soils formed in sandy eolian sediments. They are strongly sloping to moderately steep and are on the uppermost parts of the sand dunes.

The well drained Hayes soils formed in sandy eolian sediments over clayey alluvium. They are nearly level to strongly sloping and are on the less steep sand dunes. Permeability is rapid in the upper part and slow in the lower part.

The well drained, rapidly permeable Pratt soils formed in sandy eolian sediments. They are nearly

level to strongly sloping and are higher on the sand dunes than the Hayes soils.

About 30 percent of this association is used for cultivated crops. About 25 percent is in the Conservation Reserve Program. The rest is used mainly as rangeland. Wheat, grain sorghum, and alfalfa are the main crops. Controlling erosion, conserving moisture, and maintaining tilth and fertility are the main concerns affecting cropland management.

KS676—Funmar-Saltcreek-Taver Association

This association consists of very deep, nearly level to gently sloping, well drained and moderately well drained soils that have loamy sediments over a buried clayey subsoil. These soils are on paleoterraces in river valleys. Slopes range from 0 to 3 percent.

This association makes up about 20 percent of the survey area. It is about 40 percent Funmar soils, 30 percent Saltcreek soils, 15 percent Taver soils, and 15 percent soils of minor extent (fig. 5).

The nearly level, well drained Funmar soils formed

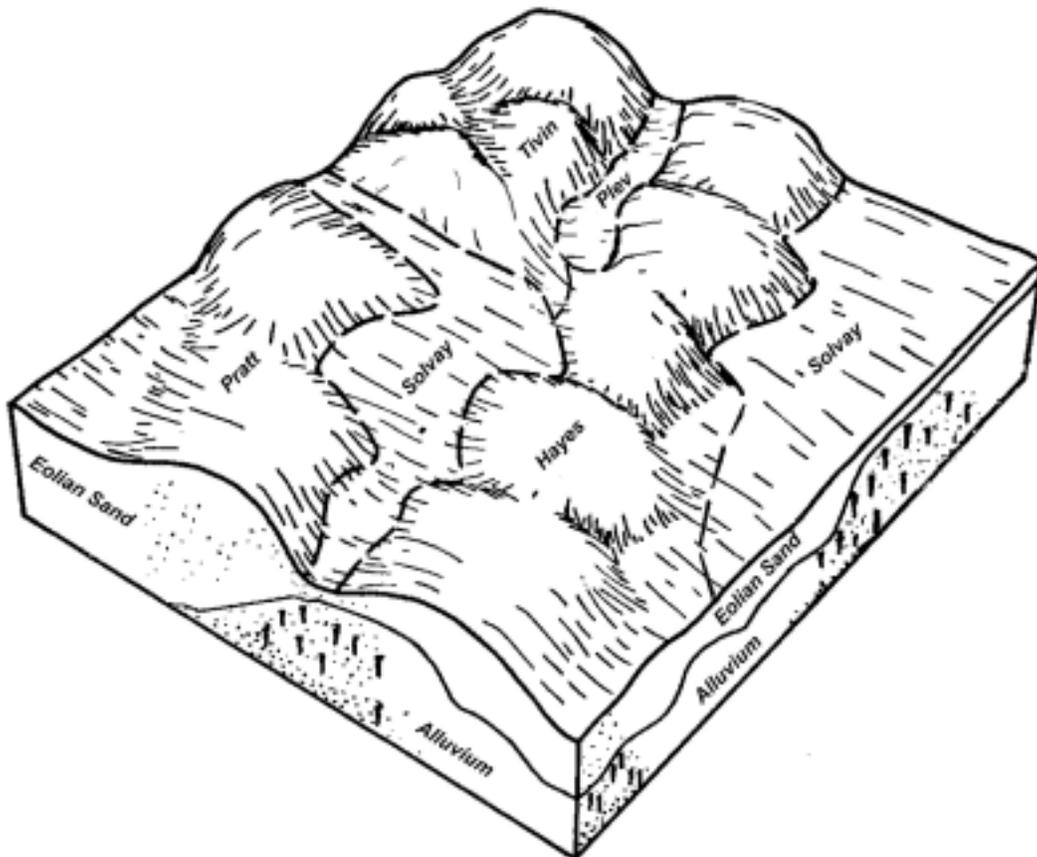


Figure 4.—Typical pattern of soils and parent material in the Tivin-Hayes-Pratt association.

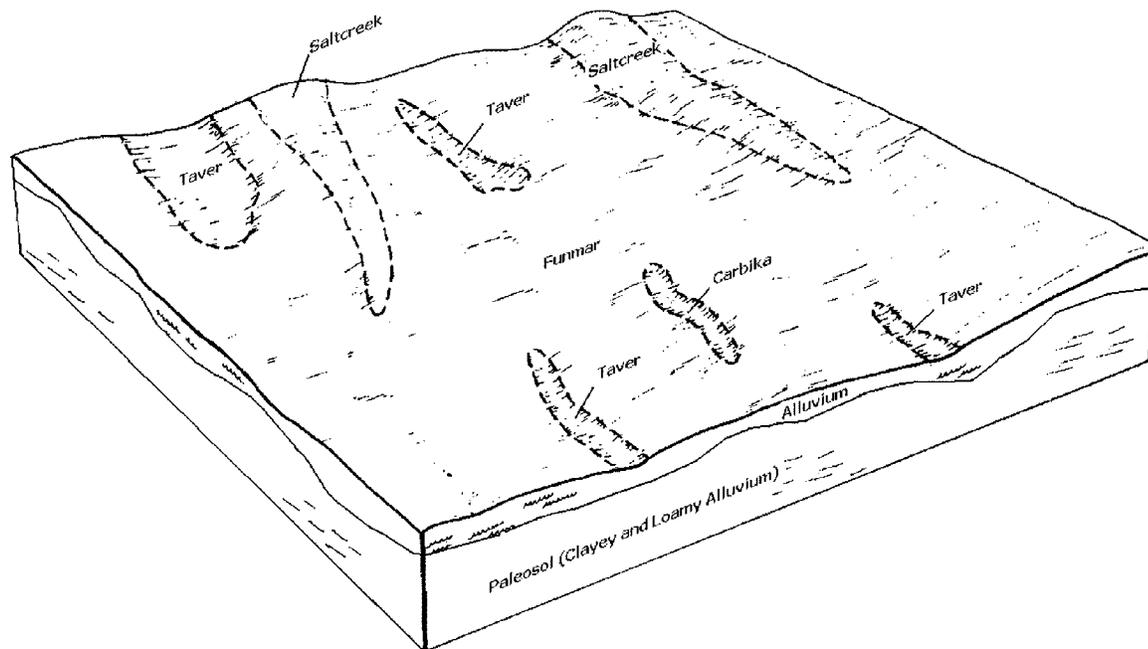


Figure 5.—Typical pattern of soils and parent material in the Funmar-Saltcreek-Taver association.

in alluvium. Permeability is moderate in the upper part and slow in the lower part.

The well drained Saltcreek soils formed in alluvium. They are nearly level to gently sloping and are on low-relief dunes. Permeability is moderately rapid in the upper part and slow in the lower part.

The moderately well drained, slowly permeable Taver soils formed in alluvium. They are nearly level and are in the slightly lower depressions on the paleoterrace.

About 95 percent of this association is used for cultivated crops. The rest is used mainly as rangeland. Wheat, grain sorghum, and alfalfa are the main crops. Controlling erosion, conserving moisture, and maintaining tilth and fertility are the main concerns affecting cropland management.

KS677—Punkin-Darlow-Nickerson Association

This association consists of very deep, nearly level to gently sloping, moderately well drained to somewhat poorly drained soils that have sodic and saline properties and a loamy or clayey subsoil. These soils are on terraces in river valleys. Slopes range from 0 to 2 percent.

This association makes up about 10 percent of the

survey area. It is about 40 percent Punkin soils, 30 percent Darlow soils, 20 percent Nickerson soils, and 10 percent soils of minor extent (fig. 6).

The moderately well drained, slowly permeable Punkin soils formed in saline and sodic alluvium. They are in the lower areas on the terraces.

The somewhat poorly drained, slowly permeable Darlow soils formed in saline and sodic alluvium. They are in low areas on the terraces.

The moderately well drained, moderately permeable Nickerson soils formed in alluvium. They are in the higher positions on the terraces.

About 75 percent of this association is used for cultivated crops. The rest is used mainly as rangeland. Wheat, grain sorghum, and alfalfa are the main crops. Controlling erosion, conserving moisture, and maintaining tilth and fertility are the main concerns affecting cropland management.

KS678—Jamash-Piedmont Association

This association consists of shallow and moderately deep, nearly level to strongly sloping, well drained soils that have a clayey subsoil. These soils are on pediments in the uplands. Slopes range from 0 to 12 percent.

This association makes up about 5 percent of the

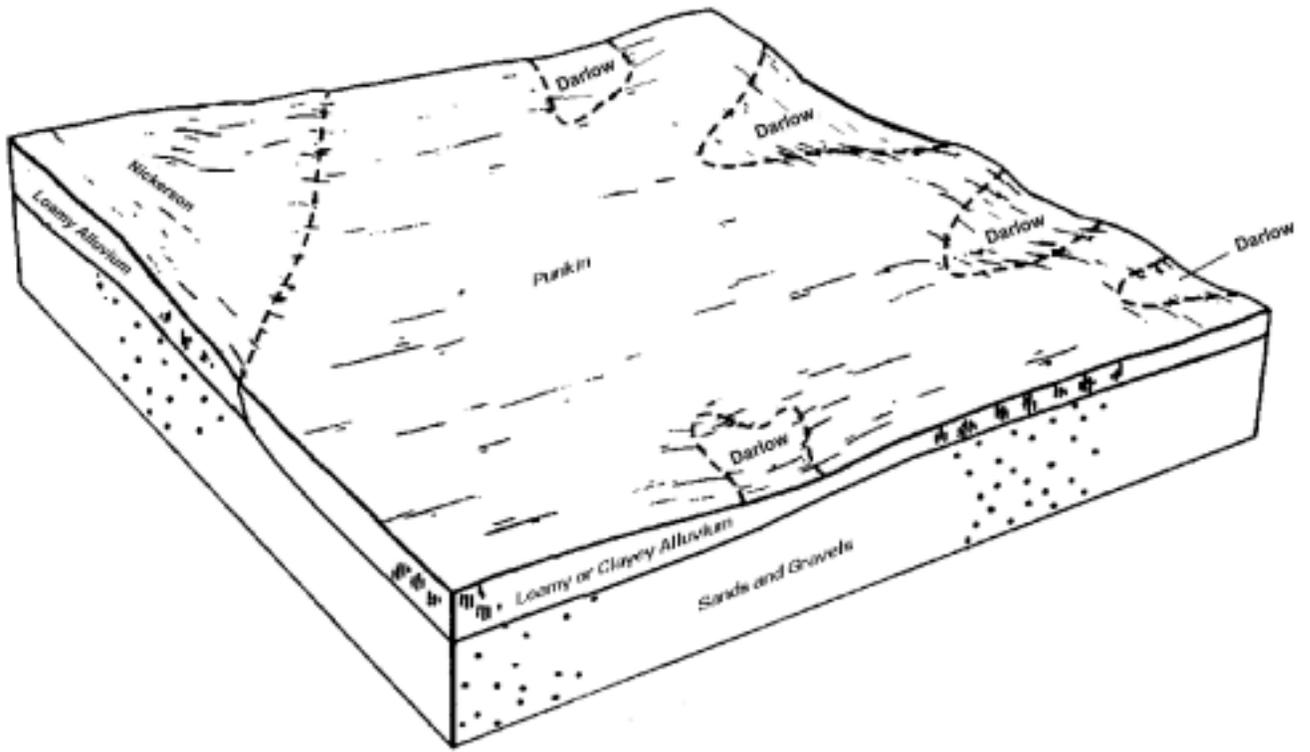


Figure 6.—Typical pattern of soils and parent material in the Punkin-Darlow-Nickerson association.

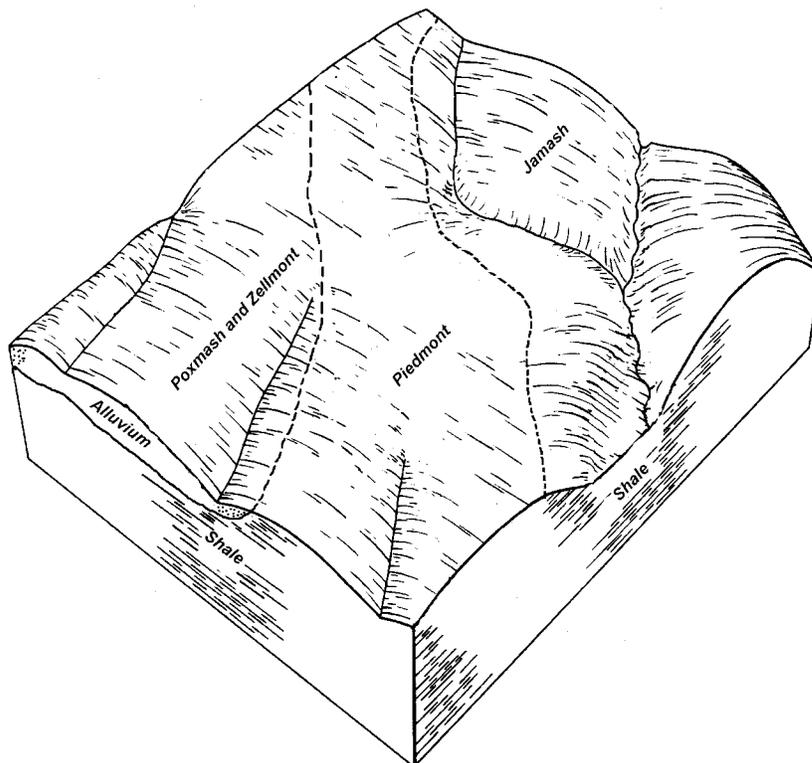


Figure 7.—Typical pattern of soils and parent material in the Jamash-Piedmont association.

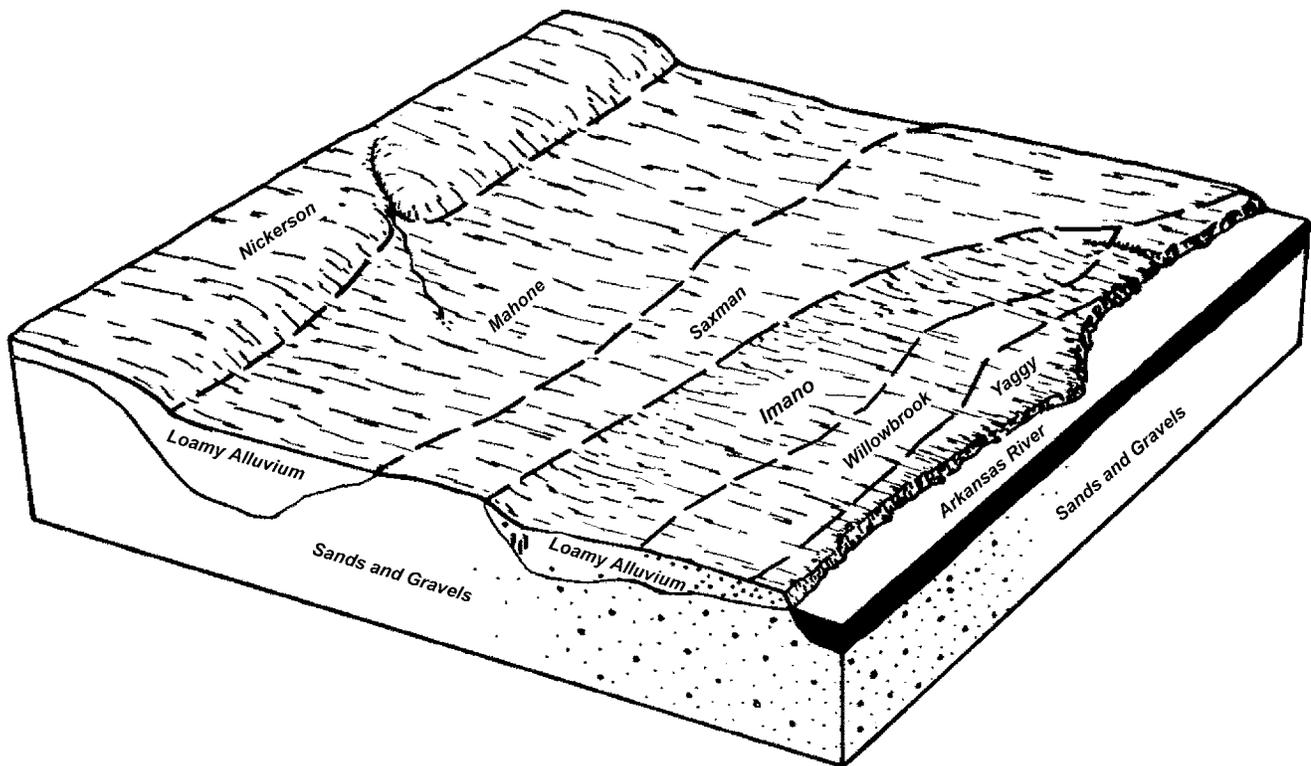


Figure 8.—Typical pattern of soils and parent material in the Yaggy-Willowbrook-Saxman association.

survey area. It is about 50 percent Jamash soils, 40 percent Piedmont soils, and 10 percent soils of minor extent (fig. 7).

The shallow, slowly permeable Jamash soils formed in residuum derived from shale. They are on side slopes.

The moderately deep, slowly permeable Piedmont soils formed in residuum derived from shale. They are in the highest positions on the landscape.

About 50 percent of this association is used for cultivated crops. About 25 percent is in the Conservation Reserve Program. The rest is used mainly as rangeland. Wheat, grain sorghum, and alfalfa are the main crops. Controlling erosion, conserving moisture, and maintaining tilth and fertility are the main concerns affecting cropland management.

KS679—Kanza-Ninnescah Association

This association consists of very deep, nearly level, poorly drained soils that have a sandy subsoil. These soils are on flood plains in river valleys. Slopes range from 0 to 2 percent.

This association makes up about 5 percent of the survey area. It is about 50 percent Kanza soils, 30

percent Ninnescah soils, and 20 percent soils of minor extent.

Kanza and Ninnescah soils are rapidly permeable. They formed in alluvium.

About 95 percent of this association is used as rangeland.

KS680—Yaggy-Willowbrook-Saxman Association

This association consists of very deep, nearly level, moderately well drained and somewhat poorly drained soils that have a sandy subsoil. These soils are on flood plains in river valleys. Slopes range from 0 to 2 percent.

This association makes up about 5 percent of the survey area. It is about 40 percent Yaggy soils, 25 percent Willowbrook soils, 20 percent Saxman soils, and 15 percent soils of minor extent (fig. 8).

The somewhat poorly drained, rapidly permeable Yaggy soils formed in alluvium. They are adjacent to the river.

The somewhat poorly drained, rapidly permeable Willowbrook soils formed in alluvium. They are adjacent to the river.

The moderately well drained, rapidly permeable Saxman soils formed in alluvium. They are higher on the flood plain than the Willowbrook and Yaggy soils.

About 75 percent of this association is used as

rangeland. The rest is used as cropland. Wheat and alfalfa are the main crops. Controlling erosion, conserving moisture, and maintaining tilth and fertility are the main concerns affecting cropland management.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the survey area. The map unit descriptions in this section, along with the maps, can be used to determine the suitability and potential of a unit for specific uses. They also can be used to plan the management needed for those uses. More information about each map unit is provided in tables in the sections "Use and Management of the Soils" and "Soil Properties."

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soils or miscellaneous areas. A map unit is identified and named according to the taxonomic classification of the dominant soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the 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 noncontrasting, or similar, inclusions. 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, inclusions. They generally are in small areas and could not be mapped separately because of the scale used. They are described as additional minor components in the map unit descriptions.

Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The included areas of contrasting soils or miscellaneous areas (additional minor components) are mentioned in the map unit descriptions. 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 landforms or landform segments that have similar use and management requirements. The delineation of such 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.

An identifying symbol precedes the map unit name in the map unit descriptions. Each description includes general facts about the unit and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer, 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, slope, stoniness, salinity, 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, Blazefork silty clay loam, 0 to 1 percent slopes, rarely flooded, is a phase of the Blazefork series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are called complexes or undifferentiated groups.

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. Carway-Dillhut-Solvay complex, 0 to 2 percent slopes, is an example.

An *undifferentiated group* is made up of two or more soils or miscellaneous areas 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 or miscellaneous areas in a mapped area are not uniform. An area can be made up of only one of the major soils or miscellaneous areas, or it can be made up of all of them. Farnum and Funmar loams, 0 to 1 percent slopes, 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. The map unit Sand pits is an example.

Table 4 gives the acreage and proportionate extent of each map unit. 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.

990—Abbyville loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northern and western parts of the county on level or nearly level stream terraces.

Elevation: 1,516 to 1,804 feet

General information: This soil generally has a nonsaline surface layer. The subsoil is very slightly or slightly saline and has a high content of adsorbed sodium.

Component Description

Abbyville and similar soils

Setting

Percentage of the map unit: 95 percent

Geomorphic description: Terraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Saline within a depth of 30 inches

Sodium-affected condition: Sodic within a depth of 30 inches

Available water capacity: About 7.2 inches

Interpretive groups

Land capability classification (nonirrigated): 3s

Land capability classification (irrigated): 3s

Range site: Saline Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Slickspots. In some small areas the surface layer is fine sandy loam or clay loam. In other small areas the surface layer is very slightly or slightly saline.

Additional Minor Components

Kisiwa and similar soils: 5 percent

- This component was formerly mapped as Slickspots. These soils are very deep, poorly drained, very slowly permeable, saline-sodic soils that formed in loamy and clayey alluvium. They are in the lower positions or in depressions. They have a surface layer of loam or clay loam.

Management

Major uses:

- This map unit is poorly suited to the commonly grown crops because of the sodic conditions and wetness. Most areas are used for pasture or range. In areas that are cropped, the hazard of wind erosion or water erosion is slight. Maintaining soil tilth and minimizing soil crusting are management concerns. Adding organic material to the soil can improve tilth and minimize crusting. The high sodium content, the pH, the content of soluble salts, and the water table limit engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

991—Abbyville-Kisiwa complex, 0 to 2 percent slopes, flooded

Map Unit Setting

General location: This map unit is primarily in the western and northwestern parts of the county on

the modern terraces and flood plains along Salt Creek and Peace Creek.

Elevation: 1,201 to 1,804 feet

General information: These soils have a high content of adsorbed sodium. The content of soluble salts in the surface layer is variable in both soils. The minor Saxman soils are sandy and are on natural levees and high flood plains where sandy sediments have accumulated. The Abbyville soil is on high flood plains and is subject to rare flooding. The Kisiwa soil is lower on the landscape and is occasionally flooded.

Component Description

Abbyville and similar soils

Setting

Percentage of the map unit: 45 percent

Geomorphic description: Terraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Saline within a depth of 30 inches

Sodium-affected condition: Sodic within a depth of 30 inches

Available water capacity: About 7.1 inches

Interpretive groups

Land capability classification (nonirrigated): 3s

Land capability classification (irrigated): 3s

Range site: Saline Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Slickspots. In some small areas the surface layer is fine sandy loam or clay loam. In other small areas the surface layer is very slightly or slightly saline. In places the slopes are more than 1 percent.

Kisiwa and similar soils

Setting

Percentage of the map unit: 40 percent

Geomorphic description: Flood plains and terraces in river valleys

Parent material: Loamy alluvium over clayey alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 4.0 percent

Reaction in the surface layer: pH 7.4 to 9.0

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Poorly drained

Native plant cover type: Rangeland

Flooding: Occasional

Depth to water table: See "Water Features" table

Ponding: Occasional

Salt-affected condition: Saline within a depth of 30 inches

Sodium-affected condition: Sodic within a depth of 30 inches

Available water capacity: About 8.7 inches

Interpretive groups

Land capability classification (nonirrigated): 4s

Land capability classification (irrigated): Not typically irrigated

Range site: Saline Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Slickspots. In some small areas the surface layer is fine sandy loam, loam, or loamy fine sand. In other small areas the surface layer is very slightly saline to moderately saline. In places the slopes are more than 1 percent.

Additional Minor Components

Saxman and similar soils: 10 percent

- This component was formerly mapped as Canadian and Wann soils. The Saxman soils are very deep, moderately well drained, and rapidly permeable. They formed in sandy alluvium. Most areas of this component in this map unit have sodic loamy or clayey materials below a depth of 40 inches. In some areas the surface layer is loamy sand or fine sand. Also included are a few small areas of Mahone soils.

Darlow and similar soils: 5 percent

- This component was formerly mapped as Farnum soils and Slickspots. The Darlow soils are very deep, somewhat poorly drained, and slowly permeable. They formed in saline-sodic, loamy alluvium. In places the surface layer is fine sandy loam. In some areas the surface layer is very slightly or slightly saline.

Management*Major uses:*

- This map unit is poorly suited to the commonly grown crops because of the sodic conditions, wetness, and the flooding hazard. Most areas are used for pasture or range. In areas of the Abbyville and Saxman soils that are cropped, the severe hazard of wind erosion is a concern. Maintaining soil tilth and preventing surface crusting also are concerns. Adding organic material to the soils helps to overcome these problems. The potential for ephemeral gully erosion is high in areas of the Abbyville and Kisiwa soils. The high sodium content, the pH, the content of soluble salts, the water table, and the flooding limit engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1004—Albion sandy loam, 0 to 1 percent slopes**Map Unit Setting**

General location: This map unit is in the southern third of the county on level or nearly level paleoterraces.

Elevation: 1,201 to 2,001 feet

Component Description**Albion and similar soils****Setting**

Percentage of the map unit: 90 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is gravelly sandy loam, coarse sandy loam, loamy sand, or loamy coarse sand. In places the soil contains several discontinuous clay lenses between depths of 20 and 80 inches. The clay lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam.

Additional Minor Components**Shellabarger and similar soils: 10 percent**

- These soils are in landscape positions similar to those of the Albion soil. They have a surface layer of sandy loam or coarse sandy loam and contain more clay in the subsoil than the Albion soil. Also included are small areas of Nalim soils. In some places several laterally discontinuous clay lenses occur within the soil profile between depths of 30 and 80 inches. The lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam.

Management*Major uses:*

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the main crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Wind erosion can be controlled by using a system of conservation tillage that maintains a cover of plant residue on the surface. The moderate water-holding capacity can limit production. Increasing the content of organic matter, leaving plant residue on the surface, and applying a system of conservation tillage can minimize this problem. In some places the results of soil tests may show soil reaction (pH) in the strongly

acid range. Additions of lime may be required for optimum nutrient balance. The moderately rapid permeability and relatively shallow depth to sandy textures can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1011—Albion-Shellabarger sandy loams, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the southern third of the county on the gently sloping side slopes of dissected paleoterraces.

Elevation: 1,201 to 2,001 feet

General information: The Albion soil is generally on the steeper upper part of the side slopes. The Shellabarger soil is generally on the less steep lower side slopes.

Component Description

Albion and similar soils

Setting

Percentage of the map unit: 70 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in

characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is gravelly sandy loam, coarse sandy loam, loamy sand, or loamy coarse sand. In places the soil contains several discontinuous clay lenses between depths of 20 and 80 inches. The clay lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam. About 10 to 25 percent of the areas of the Albion soil have been subject to moderate erosion, which results in a thinner surface layer than normal and in a low or very low content of organic matter. The eroded areas generally have a surface layer of loamy sand, loamy coarse sand, or gravelly loamy coarse sand.

Shellabarger and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.1 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.5 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This soil formed in loamy and sandy, old alluvium. It is in landscape positions similar to those of the Albion soil. The surface layer is sandy loam or coarse sandy loam.

The Shellabarger soil contains more clay in the subsoil than the Albion soil. Included in mapping are small areas of Nalim soils. In some places several laterally discontinuous clay lenses occur between depths of 30 and 80 inches. The lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the main crops. The hazard of wind erosion is severe, and the hazard of water erosion is moderate. The potential for ephemeral gully erosion is moderate. Wind erosion and water erosion can be controlled by a system of conservation tillage that maintains a cover of plant residue on the surface, stripcropping, field windbreaks, contour farming, tall grass barriers, terraces, and grassed waterways. The moderate water-holding capacity of these soils can limit production. Increasing the content of organic matter, leaving plant residue on the surface, and applying a system of conservation tillage can minimize this problem. In some places the results of soil tests may show soil reaction (pH) in the strongly acid range. Additions of lime may be required for optimum nutrient balance. The moderately rapid permeability and the relatively shallow depth to sandy textures can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1057—Aquents, frequently ponded

Map Unit Setting

General location: This map unit is in areas across the middle third of the county.

Elevation: 1,201 to 2,402 feet

General information: Areas of this unit were mined for road grade material down to or near the water table. Enough time has elapsed for vegetation to have become well established.

Component Description

Aquents and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Depressions on paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Negligible

Content of organic matter in the surface layer: 0.0 to 4.0 percent

Reaction in the surface layer: pH 5.6 to 6.0

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: Frequent

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 3.5 inches

Interpretive groups

Land capability classification (nonirrigated): 5w

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe24-32)

Management

Major uses:

- Most areas are used for recreation or wildlife habitat. This map unit is unsuited to most agricultural and engineering uses because of the seasonal high water table.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1061—Arents, earthen dam

Setting

Percentage of the map unit: 100 percent

Definition: This map unit consists of small earthen dams constructed from soil material. The dams are used to contain surface water runoff. Typically, they impound less than 10 acres of surface water and are built from soils in the surrounding area.

1062—Arents, loamy

Setting

Percentage of the map unit: 100 percent

Definition: This map unit consists of areas of landfill on

the Reno County Municipal Solid Waste site. The site is southwest of the city of Hutchinson. The source materials used in this landfill consist of soils of the Naron, Avans, and Farnum series. A previous characterization sample was taken at this location prior to its conversion to a landfill.

Management

Major uses:

- This area has been used as the county landfill for several years. The area is poorly suited to cropland and to most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1070—Avans loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the east-central and southeastern parts of the county on level or nearly level interfluvies on paleoterraces.

Elevation: 1,201 to 1,601 feet

Component Description

Avans and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.1 to 6.0

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 11.8 inches

Interpretive groups

Land capability classification (nonirrigated): 1

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vanoss soils. In some small areas the surface layer is silt loam. In a few places the dark colors of the surface layer and the upper part of the subsoil extend to a depth of more than 20 inches. Included are a few small areas of Penalosa soils and small areas of a soil that has moderately slow permeability.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops (fig. 9). A few areas are planted to irrigated corn. The hazard of water erosion is slight, and the hazard of wind erosion is moderate. Erosion can be overcome by using a system of conservation tillage and properly managing crop residue. This map unit is moderately well suited to most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1071—Avans loam, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the east-central and southeastern parts of the county on gently sloping side slopes of dissected paleoterraces.

Elevation: 1,201 to 1,601 feet

Component Description

Avans and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.1 to 6.0

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 11.8 inches

Interpretive groups

Land capability classification (nonirrigated): 1
Land capability classification (irrigated): Not typically irrigated
Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vanoss soils. In some small areas the surface layer is silt loam. In a few places the dark colors of the surface layer and the upper part of the subsoil extend to a depth of more than 20 inches. Included are a few small areas of Penalosa soils, small areas of a soil that has moderately slow permeability, and small areas that have slopes of less than 1 percent.

Additional Minor Components

Ost and similar soils: 15 percent

- The Ost soils are very deep, well drained, and moderately slowly permeable. They formed in old loamy alluvium. They are in landscape positions similar to those of the Avans soil. They contain more sand in the subsoil than the Avans soil and have secondary carbonates within 25 inches of the surface. Also included are a few areas of Saltcreek soils.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. A few areas are planted to irrigated corn. The hazard of water erosion or wind erosion is moderate. The potential for ephemeral gully erosion is moderate in most areas. This problem can be overcome by conservation tillage, tall grass barriers, contour farming, terraces and waterways, and crop residue management. This map unit is moderately well suited to most engineering uses.

General and detailed information about soil properties and interpretations needed for managing

this map unit is included in subsequent sections of this publication.

1072—Avans loam, 3 to 7 percent slopes

Map Unit Setting

General location: This map unit is in the east-central and southeastern parts of the county on moderately sloping side slopes of dissected paleoterraces.

Elevation: 1,201 to 1,601 feet

Component Description

Avans and similar soils

Setting

Percentage of the map unit: 85 percent
Geomorphic description: Paleoterraces in river valleys
Parent material: Loamy alluvium

Component properties and qualities

Slope: 3 to 7 percent
Rate of surface runoff: Medium
Content of organic matter in the surface layer: 1.0 to 3.0 percent
Reaction in the surface layer: pH 5.1 to 6.0
Slowest permeability class: Moderate
Depth to restrictive feature: No restrictive feature noted
Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 11.8 inches

Interpretive groups

Land capability classification (nonirrigated): 2e
Land capability classification (irrigated): Not typically irrigated
Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vanoss soils. In some small areas the surface layer is silt loam. In a few small areas the slopes are less than 3 percent. About 10 to 30 percent of the areas of the Avans soil have been subject to moderate erosion. The soil in these eroded areas has a thinner, lighter colored surface layer than normal and has a low or very low content of organic matter.

Additional Minor Components

Ost and similar soils: 15 percent

- The Ost soils are very deep, well drained, and moderately slowly permeable. They formed in old loamy alluvium. They are in landscape positions similar to those of the Avans soil. They contain more sand in the subsoil than the Avans soil and have secondary carbonates within 25 inches of the surface.

Management

Major uses:

- Most areas are used as cropland, but some are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. The hazard of water erosion is severe, and the hazard of wind erosion is moderate. The potential for ephemeral gully erosion is severe. This problem can be overcome by conservation tillage, tall grass barriers, contour farming, terraces and waterways, and crop residue management. This map unit is moderately well suited to most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1191—Blazefork silty clay loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

General location: This map unit is in the northern part of the county on the flood plains along the Little Arkansas River and Cow Creek.

Elevation: 1,099 to 1,499 feet

Component Description

Blazefork and similar soils

Setting

Percentage of the map unit: 90 percent

Geomorphic description: Flood plains in river valleys

Parent material: Silty alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 4.5 to 6.5

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.3 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): 2s

Range site: Clay Lowland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tabler soils. In some small areas the surface layer is silt loam.

Additional Minor Components

Tobin and similar soils: 10 percent

- This component was formerly mapped as Vanoss soils. The Tobin soils are very deep, moderately well drained, and moderately slowly permeable. They formed in alluvium on flood plains. They are generally in or adjacent to small intermittent drainageways. The Tobin soils contain more silt and less clay throughout than the Blazefork soil.

Management

Major uses:

- This map unit is well suited to the commonly grown crops, such as wheat and grain sorghum. Most areas are cropped. The hazard of wind erosion or water erosion is slight. The water table and a high shrink-swell potential limit engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1192—Blazefork-Kaskan complex, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

General location: This map unit is primarily in the northeastern part of the county on level or nearly level flood plains.

Elevation: 1,099 to 1,601 feet

General information: The Blazefork soil is higher on the flood plain than the Kaskan soil.

Component Description

Blazefork and similar soils

Setting

Percentage of the map unit: 60 percent

Geomorphic description: Flood plains in river valleys

Parent material: Silty alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 4.5 to 6.5

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.3 inches

Interpretive groups

Land capability classification (nonirrigated): 2s

Land capability classification (irrigated): 2s

Range site: Clay Lowland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tabler soils. In some small areas the surface layer is silt loam.

Kaskan and similar soils

Setting

Percentage of the map unit: 40 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.7 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Lowland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Dale soils. In some small areas the surface layer is silty clay loam.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to most of the commonly grown crops. Wheat and grain sorghum are the major crops. The hazard of wind erosion or water erosion is slight. The water table and a high shrink-swell potential limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1200—Buhler-Blazefork silty clay loams, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

General location: This map unit is in the northern part of the county on the flood plains along the Little Arkansas River and Cow Creek.

Elevation: 1,099 to 1,601 feet

General information: The Buhler soil has a nonsaline to moderately saline surface layer. The subsoil is slightly or moderately saline and has a high content of adsorbed sodium. The Blazefork soil is not affected by salts or sodium.

Component Description

Buhler and similar soils

Setting

Percentage of the map unit: 65 percent

Geomorphic description: Flood plains in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 6.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Sodic within a depth of 30 inches

Available water capacity: About 10.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): 2w

Range site: Saline Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Slickspots or as a Farnum-Slickspots complex. In some small areas the surface layer is silt loam or loam. In other small areas the subsoil contains more than 35 percent clay. Included in mapping are small areas of a soil that has more sand in the subsoil than the Buhler soil.

Blazefork and similar soils**Setting**

Percentage of the map unit: 30 percent

Geomorphic description: Flood plains in river valleys

Parent material: Silty alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 4.5 to 6.5

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.3 inches

Interpretive groups

Land capability classification (nonirrigated): 2s

Land capability classification (irrigated): 2s

Range site: Clay Lowland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tabler soils. In some small areas the surface layer is loam or silty clay loam.

Additional Minor Components**Tobin and similar soils: 5 percent**

- This component was formerly mapped as Vanoss soils. The Tobin soils are very deep, moderately well drained, and moderately slowly permeable. They formed in alluvium on flood plains. They are not salt affected or sodium affected. The soils are generally in or adjacent to small intermittent drainageways. They contain more silt and less clay throughout than the Buhler and Blazefork soils. Also included are a few small areas of Kaskan soils.

Management

Major uses:

- This map unit is somewhat poorly suited to the commonly grown crops, such as wheat and grain sorghum, because of the sodic conditions and soluble salts. Most areas are cropped. The hazard of wind erosion or water erosion is slight. Maintaining soil tilth and preventing surface crusting are concerns in areas of the Buhler soil, but these concerns can be overcome by adding organic material to the soil. The high sodium content, the soluble salts, the water table, and a high shrink-swell potential limit most engineering uses, particularly in areas of the Buhler soil.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1324—Carway and Carbika soils, 0 to 1 percent slopes**Map Unit Setting**

General location: This map unit is primarily in the northwestern part of the county in level or nearly level interdune areas and depressions on paleoterraces.

Elevation: 1,516 to 1,804 feet

General information: The Carway soil is in higher positions in the depressions than those of the Carbika soil.

Component Description

Carway and similar soils

Setting

Percentage of the map unit: 25 to 70 percent

Geomorphic description: Interdune areas in depressions on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: Frequent

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.0 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile soils. In some small areas the surface layer is loamy fine sand.

Carbika and similar soils

Setting

Percentage of the map unit: 10 to 60 percent

Geomorphic description: Interdune areas in depressions on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: Frequent

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.6 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile soils.

Additional Minor Components

Solvay and similar soils: 0 to 40 percent

- This component was formerly mapped as Carwile and Farnum soils. The Solvay soils are very deep, somewhat poorly drained, and moderately permeable. They formed in loamy eolian deposits over alluvium. In some places the surface layer is loamy fine sand.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is poorly suited to the most commonly grown crops. Wheat and grain sorghum are the major crops. The hazard of wind erosion or water erosion is slight. The water table and a high shrink-swell potential limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1357—Carway-Dillhut-Solvay complex, 0 to 2 percent slopes

Map Unit Setting

General location: This map unit is primarily in the

northwestern part of the county on level to gently sloping dunes and in interdune areas on paleoterraces.

Elevation: 1,480 to 1,804 feet

General information: The Carway and Solvay soils are in the interdune areas below the Dillhut soil, which is on the dunes.

Component Description

Carway and similar soils

Setting

Percentage of the map unit: 40 percent

Geomorphic description: Depressions in interdune areas on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: Frequent

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.6 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile soils. In some small areas the surface layer is fine sandy loam.

Dillhut and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 6.1 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Elsmere soils. In some small areas the surface layer is fine sand.

Solvay and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Interdune areas on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 2.0 percent

Reaction in the surface layer: pH 6.1 to 6.5

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.2 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile and Farnum soils. In some small areas the surface layer is loamy fine sand.

Management

Major uses:

- Most areas are used for pasture or range. Some areas are used as cropland. This map unit is poorly suited to the most commonly grown crops. Wheat, grain sorghum, and alfalfa are the main crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Plant residue management, conservation tillage, and tall grass barriers can help to control wind erosion. The high water table limits most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1359—Clark-Ost loams, 3 to 7 percent slopes

Map Unit Setting

General location: This map unit is primarily in the south-central and southeastern parts of the county on moderately sloping side slopes of paleoterraces.

Elevation: 1,201 to 2,500 feet

General information: The Ost soil is slightly higher on the paleoterrace than the Clark soil.

Component Description

Clark and similar soils

Setting

Percentage of the map unit: 70 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 3 to 7 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): Not typically irrigated

Range site: Limy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is fine sandy loam. In other small areas the slopes are less than 3 percent.

Ost and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 3 to 6 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 8.4

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.0 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some areas the surface layer is fine sandy loam. In places the slopes are less than 3 percent.

Management

Major uses:

- Most areas are used for pasture or range. Some areas are used as cropland. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. The hazard of wind erosion or water erosion is moderately severe. This map unit is well suited to most engineering uses. The slope and the calcium carbonates can limit some uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1428—Crete silt loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the northeastern part of the county in level or nearly level areas on uplands.

Elevation: 1,001 to 2,001 feet

Component Description

Crete and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Plains on uplands

Parent material: Loess

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 5.6 to 6.0

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.9 inches

Interpretive groups

Land capability classification (nonirrigated): 2s

Land capability classification (irrigated): 2s

Range site: Clay Upland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Bethany soils. In some small areas the surface layer is silty clay loam.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. A few areas are planted to irrigated corn. The hazard of water erosion is slight, and the hazard of wind erosion is moderate. Erosion can be overcome by using a conservation tillage system and by properly managing crop residue. This map unit is moderately well suited to most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1429—Crete silt loam, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the northeastern part of the county on gently sloping side slopes of uplands.

Elevation: 1,001 to 2,001 feet

General information: In some delineations, a small percentage of the Crete soil has been moderately eroded. In these eroded areas the surface layer has a low or very low content of organic matter.

Component Description

Crete and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Interfluvial on uplands

Parent material: Loess

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 5.6 to 6.0

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.9 inches

Interpretive groups

Land capability classification (nonirrigated): 2s

Land capability classification (irrigated): 2s

Range site: Clay Upland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Bethany soils. In some small areas the surface layer is silty clay loam.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. A few areas are planted to irrigated corn. The hazard of water erosion or wind erosion is moderate. The potential for ephemeral gully erosion is moderate in most areas. This problem can be overcome by conservation tillage, tall grass barriers, contour farming, terraces and waterways, and crop residue management. This map unit is moderately well suited to most engineering uses. The high clay content and the shrink-swell potential may limit some practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1553—Darlow-Elmer complex, 0 to 2 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northern half of the county on level or nearly level paleoterraces.

Elevation: 1,450 to 1,804 feet

General information: The Darlow soil is generally in the lower areas on the paleoterrace. The soils in this map unit generally have a nonsaline surface layer. The subsoil of both soils is very slightly or

slightly saline and has a high content of adsorbed sodium.

Component Description

Darlow and similar soils

Setting

Percentage of the map unit: 70 percent

Geomorphic description: Terraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 4.5 to 7.8

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.6 inches

Interpretive groups

Land capability classification (nonirrigated): 4s

Land capability classification (irrigated): 4s

Range site: Claypan (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Farnum soils and Slickspots. In some small areas the surface layer is fine sandy loam. In other small areas the surface layer is very slightly or slightly saline. In places the slopes are more than 1 percent.

Elmer and similar soils

Setting

Percentage of the map unit: 20 percent

Geomorphic description: Terraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 4.5 to 7.3
Slowest permeability class: Slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Moderately well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Sodic within a depth of 30 inches
Available water capacity: About 9.1 inches

Interpretive groups

Land capability classification (nonirrigated): 3s
Land capability classification (irrigated): 3s
Range site: Loamy Terrace (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Farnum soils and Slickspots. The Elmer soil is saline-sodic. In some places the surface layer is loam. In other places the surface layer is very slightly or slightly saline. In some areas the slopes are more than 1 percent.

Additional Minor Components

Punkin and similar soils: 10 percent

- This component was formerly mapped as Slickspots and as Tabler soils. The Punkin soils are very deep, moderately well drained, and very slowly permeable. They formed in saline-sodic, clayey alluvium. In places the surface layer is fine sandy loam. In some areas the surface layer is very slightly or slightly saline.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to the most commonly grown crops. Wheat and grain sorghum are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Maintaining soil tilth and preventing surface crusting are concerns. These concerns can be addressed by adding organic material to the soil. The high sodium content, the pH, and soluble salts can limit engineering uses.

General and detailed information about soil properties and interpretations needed for managing

this map unit is included in subsequent sections of this publication.

1554—Dillhut fine sand, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northern half of the county on gently sloping dunes on paleoterraces.

Elevation: 1,480 to 1,781 feet

Component Description

Dillhut and similar soils

Setting

Percentage of the map unit: 70 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Eolian deposits over alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 6.1 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Elsmere soils. In some small areas the surface layer is fine sand.

Additional Minor Components

Dillwyn and similar soils: 30 percent

- This component was formerly mapped as Elsmere

or Plevna soils. The Dillwyn soils are very deep, somewhat poorly drained, and very rapidly permeable. They formed in eolian deposits. In some places the surface layer is loamy fine sand.

Management

Major uses:

- Most areas are used for pasture or range. Some areas are used as cropland. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. The water table and the sandy textures limit many engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1555—Dillhut-Plev complex, 0 to 2 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northern half of the county on level to gently sloping dunes and in depressions on paleoterraces.

Elevation: 1,480 to 1,781 feet

General information: The Dillhut soil is on the upper or mid part of the dunes. The Plev soil is in depressions between the dunes.

Component Description

Dillhut and similar soils

Setting

Percentage of the map unit: 35 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 6.0 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Elsmere soils. In some small areas the surface layer is fine sand.

Plev and similar soils

Setting

Percentage of the map unit: 35 percent

Geomorphic description: Depressions between dunes on paleoterraces in river valleys

Parent material: Sandy eolian deposits over loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 3.9 inches

Interpretive groups

Land capability classification (nonirrigated): 5w

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Plevna soils. In some small areas the surface layer is fine sand.

Additional Minor Components

Dillwyn and similar soils: 20 percent

- This component was formerly mapped as Elsmere

or Plevna soils. The Dillwyn soils are very deep, somewhat poorly drained, and very rapidly permeable. They formed in eolian deposits. In some places the surface texture is loamy fine sand.

Warnut and similar soils: 10 percent

- This component was formerly mapped as Carwile soils. The Warnut soils are very deep, poorly drained, and moderately permeable. They formed in loamy alluvium.

Management

Major uses:

- Most areas are used for pasture or range. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. The water table and the sandy textures limit many engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1556—Dillhut-Solvay complex, 0 to 3 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on level to gently sloping dunes and in interdune areas on paleoterraces.

Elevation: 1,480 to 1,804 feet

General information: The Dillhut soil is on the upper dunes, and the Solvay soil is in the lower interdune areas.

Component Description

Dillhut and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 3 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 6.0 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Elsmere soils. In some small areas the surface layer is fine sand.

Solvay and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Interdune areas on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 2.0 percent

Reaction in the surface layer: pH 6.1 to 6.5

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.2 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile or Farnum soils. In some small areas the surface layer is loamy fine sand.

Additional Minor Components

Dillwyn and similar soils: 25 percent

• This component was formerly mapped as Elsmere or Plevna soils. The Dillwyn soils are very deep, somewhat poorly drained, and very rapidly permeable. They formed in eolian deposits. In some places the surface layer is loamy fine sand.

Carway and similar soils: 15 percent

• This component was formerly mapped as Carwile soils. The Carway soils are very deep and somewhat poorly drained. Permeability is moderate in the upper part and slow in the lower part. The soils formed in loamy eolian deposits over alluvium. In some areas the surface layer is fine sandy loam.

Management

Major uses:

• Most areas are used for pasture or range. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. The water table and sandy textures limit many engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1725—Farnum and Funmar loams, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on level or nearly level paleoterraces.

Elevation: 1,549 to 1,759 feet

General information: The Farnum and Funmar soils are intermixed on the landscape.

Component Description

Farnum and similar soils

Setting

Percentage of the map unit: 20 to 60 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.7 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): 1

Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is fine sandy loam.

Funmar and similar soils

Setting

Percentage of the map unit: 20 to 60 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium over alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.3 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): 1

Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Farnum and Tabler soils. In some small areas the surface layer is fine sandy loam. A buried soil, which varies in

thickness, is below a depth of 32 inches. The texture of the buried soil ranges from sandy clay loam to silty clay, and the content of sand increases with increasing depth.

Additional Minor Components

Naron and similar soils: 0 to 30 percent

- These soils are very deep, well drained, and moderately permeable. They formed in loamy eolian deposits.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is well suited to the most commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the major crops. The hazard of wind erosion or water erosion is slight. A high shrink-swell potential may limit some engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1727—Funmar-Taver loams, 0 to 2 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on level to gently sloping paleoterraces.

Elevation: 1,473 to 1,795 feet

General information: The Funmar soil is in convex positions and is slightly higher on the landscape than the Taver soil, which is in concave positions.

Component Description

Funmar and similar soils

Setting

Percentage of the map unit: 55 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium over alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.3 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): 1

Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Farnum and Tabler soils. In some small areas the surface layer is fine sandy loam. A buried soil, which varies in thickness, is below a depth of 32 inches. The texture of the buried soil ranges from sandy clay loam to silty clay, and the content of sand increases with increasing depth. In places the slopes are more than 1 percent.

Taver and similar soils

Setting

Percentage of the map unit: 45 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Clayey alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2s

Land capability classification (irrigated): Not typically irrigated

Range site: Clay Upland (pe21-28)

A typical soil series description with range in

characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tabler soils.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is well suited to the most commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the major crops. The hazard of wind erosion or water erosion is slight. A high shrink-swell potential may limit some engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1804—Geary silt loam, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the northeastern part of the county on gently sloping side slopes in the uplands.

Elevation: 1,201 to 1,699 feet

Component Description

Geary and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Interfluvies on plains

Parent material: Loess

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 4.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 11.0 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): 2e

Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vanoss soils. In some small areas the surface layer is silty clay loam.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. A few areas are planted to irrigated corn. The hazard of water erosion or wind erosion is moderate. The potential for ephemeral gully erosion is moderate in most areas. This problem can be overcome by conservation tillage, tall grass barriers, contour farming, terraces and waterways, and crop residue management. This map unit is moderately well suited to most engineering uses, but the high clay content and the shrink-swell potential may limit some practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1807—Geary silty clay loam, 3 to 7 percent slopes, moderately eroded

Map Unit Setting

General location: This map unit is in the northeastern part of the county and is on moderately sloping side slopes in the uplands.

Elevation: 1,201 to 1,699 feet

General information: The eroded Geary soil is on the steeper side slopes.

Component Description

Geary and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Interfluvies on plains

Parent material: Loess

Component properties and qualities

Slope: 3 to 7 percent

Rate of surface runoff: Medium
Content of organic matter in the surface layer: 1.0 to 2.0 percent
Reaction in the surface layer: pH 5.6 to 6.5
Slowest permeability class: Moderately slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 11.7 inches

Interpretive groups

Land capability classification (nonirrigated): 3e
Land capability classification (irrigated): 3e
Range site: Loamy Upland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vanoss soils. In some small areas the surface layer is silty clay. The Geary soil has been subject to moderate erosion. As a result, the surface layer is thinner than normal and the content of organic matter is low or very low.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. The hazard of water erosion is severe, and the hazard of wind erosion is moderate. The potential for ephemeral gully erosion is severe. This problem can be overcome by conservation tillage, tall grass barriers, contour farming, terraces and waterways, and crop residue management. This map unit is moderately well suited to most engineering uses, but the high clay content and the shrink-swell potential limit some practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1985—Hayes fine sandy loam, 1 to 5 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on gently sloping and moderately sloping dunes on paleoterraces.
Elevation: 1,470 to 1,804 feet
General information: The Hayes soil is generally in the higher areas on the dunes.

Component Description

Hayes and similar soils

Setting

Percentage of the map unit: 60 percent
Geomorphic description: Dunes on paleoterraces in river valleys
Parent material: Loamy eolian deposits over clayey alluvium

Component properties and qualities

Slope: 1 to 5 percent
Rate of surface runoff: Low
Content of organic matter in the surface layer: 0.5 to 1.0 percent
Reaction in the surface layer: pH 5.1 to 7.3
Slowest permeability class: Slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 8.1 inches

Interpretive groups

Land capability classification (nonirrigated): 3e
Land capability classification (irrigated): 3e
Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Naron or Pratt soils. A buried soil is below a depth of 40 inches. The buried soil varies in thickness and ranges from sandy clay loam to silty clay. The content of sand in the buried soil generally increases with

increasing depth. In some small areas the slopes are more than 2 percent.

Additional Minor Components

Attica and similar soils: 25 percent

- This component was formerly mapped as Naron or Pratt soils. The Attica soils are very deep, well drained, and moderately rapidly permeable. They formed in eolian deposits. In some places the surface layer is loamy fine sand.

Saltcreek and similar soils: 15 percent

- This component was formerly mapped as Naron soils. The Saltcreek soils are very deep and are well drained. Permeability is moderately rapid in the upper part and slow in the lower part. These soils formed in loamy eolian sediments over clayey alluvium. The paleosol varies laterally in thickness and in texture. The texture ranges from sandy clay loam to silty clay. The texture of the paleosol generally gets coarser with increasing depth. In some areas the soils contain more sand.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to most of the commonly grown crops. Wheat, grain sorghum, and irrigated corn are the major crops. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. A high shrink-swell potential may limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1986—Hayes-Solvay loamy fine sands, 0 to 5 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on gently sloping and moderately sloping dunes on paleoterraces.

Elevation: 1,470 to 1,804 feet

General information: The Hayes soil is on the middle and upper parts of the dunes. The Solvay soil is in interdune areas on the paleoterraces.

Component Description

Hayes and similar soils

Setting

Percentage of the map unit: 55 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits over clayey alluvium

Component properties and qualities

Slope: 0 to 5 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.8 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Naron or Pratt soils. A buried soil is below a depth of 40 inches. The buried soil varies in thickness and ranges from sandy clay loam to silty clay. The content of sand in the buried soil generally increases with increasing depth. In some areas the slopes are more than 2 percent.

Solvay and similar soils

Setting

Percentage of the map unit: 20 percent

Geomorphic description: Interdune areas on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low
Content of organic matter in the surface layer: 0.5 to 1.0 percent
Reaction in the surface layer: pH 6.1 to 6.5
Slowest permeability class: Moderately slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Somewhat poorly drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: See "Water Features" table
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 9.0 inches

Interpretive groups

Land capability classification (nonirrigated): 2e
Land capability classification (irrigated): Not typically irrigated
Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile and Farnum soils. In some small areas the surface layer is loamy fine sand.

Additional Minor Components

Carway and similar soils: 15 percent

- This component was formerly mapped as Carwile soils. The Carway soils are very deep and are somewhat poorly drained. Permeability is moderate in the upper part and slow in the lower part. These soils formed in loamy eolian deposits over alluvium. They are in interdune areas and also in depressions on the paleoterrace. In some places the surface layer is fine sandy loam.

Farnum and similar soils: 10 percent

- These soils are very deep, well drained, and moderately permeable. They formed in alluvium. In some places the surface layer is fine sandy loam.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is somewhat poorly suited to most of the commonly grown crops. Wheat and grain sorghum are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Crop residue management, conservation tillage, and tall grass barriers can help to control wind erosion. The high

water table, a high shrink-swell potential, and the sandy textures limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

1987—Hayes-Turon complex, 0 to 5 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on gently sloping and moderately sloping dunes on paleoterraces.

Elevation: 1,470 to 1,804 feet

General information: The Hayes soil is on the middle and upper parts of the dunes. The Turon soil is generally in the higher areas on the dunes.

Component Description

Hayes and similar soils

Setting

Percentage of the map unit: 40 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits over clayey alluvium

Component properties and qualities

Slope: 0 to 5 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.8 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Naron or Pratt soils. A buried soil is below a depth of 40 inches. The buried soil varies in thickness and ranges from sandy clay loam to silty clay. The content of sand in the buried soil generally increases with increasing depth. In some areas the slopes are more than 5 percent.

Turon and similar soils

Setting

Percentage of the map unit: 35 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Sandy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 5 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.1 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Pratt soils. A buried soil is below a depth of 40 inches. The buried soil varies in thickness and ranges from sandy clay loam to silty clay. The content of sand in the buried soil generally increases with increasing depth.

Additional Minor Components

Naron and similar soils: 15 percent

- These soils are very deep, well drained, and moderately permeable. They formed in loamy eolian deposits. They are on the flatter parts of the dunes.

Solvay and similar soils: 10 percent

- This component was formerly mapped as Carwile

and Farnum soils. The Solvay soils are very deep, somewhat poorly drained, and moderately permeable. They formed in loamy eolian deposits over alluvium. In some places the surface layer is loamy fine sand.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is somewhat poorly suited to most of the commonly grown crops. Wheat and grain sorghum are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Crop residue management, conservation tillage, and tall grass barriers can help to control wind erosion. A high shrink-swell potential and the sandy textures limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2204—Jamash-Piedmont clay loams, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the southeastern part of the county on level or nearly level pediments.

Elevation: 801 to 1,601 feet

Mean annual precipitation: 28 to 36 inches

Component Description

Jamash and similar soils

Setting

Percentage of the map unit: 50 percent

Geomorphic description: Pediments on uplands

Parent material: Residuum derived from shale

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.8

Slowest permeability class: Impermeable

Depth to restrictive feature: Bedrock (paralithic) at a depth of 14 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 2.3 inches

Interpretive groups

Land capability classification (nonirrigated): 4e
Land capability classification (irrigated): Not typically irrigated
Range site: Shallow Prairie (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vernon or Renfrow soils. In some small areas the surface layer is silt loam.

Piedmont and similar soils

Setting

Percentage of the map unit: 50 percent
Geomorphic description: Pediments on uplands
Parent material: Residuum derived from clayey shale

Component properties and qualities

Slope: 0 to 1 percent
Rate of surface runoff: Very low
Content of organic matter in the surface layer: 1.0 to 3.0 percent
Reaction in the surface layer: pH 6.1 to 7.3
Slowest permeability class: Impermeable
Depth to restrictive feature: Bedrock (paralithic) at a depth of 33 inches
Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 5.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2e
Land capability classification (irrigated): Not typically irrigated
Range site: Clay Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Renfrow soils. In some small areas the surface layer is silty clay loam or silt loam.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is poorly suited to the commonly grown crops, such as wheat and grain sorghum. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Wind erosion can be controlled by using a system of conservation tillage. The shallow depth to bedrock and the restricted permeability can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2205—Jamash-Piedmont clay loams, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the southeastern part of the county on gently sloping side slopes of dissected pediments.

Elevation: 801 to 1,601 feet

Mean annual precipitation: 28 to 36 inches

General information: The Jamash and Piedmont soils are intermingled on the landscape. Small areas of these soils have been moderately eroded. In these eroded areas the content of organic matter is low or very low in the surface layer.

Component Description

Jamash and similar soils

Setting

Percentage of the map unit: 60 percent
Geomorphic description: Pediments on uplands
Parent material: Residuum derived from shale

Component properties and qualities

Slope: 1 to 3 percent
Rate of surface runoff: Low
Content of organic matter in the surface layer: 1.0 to 3.0 percent
Reaction in the surface layer: pH 6.1 to 7.8
Slowest permeability class: Impermeable
Depth to restrictive feature: Bedrock (paralithic) at a depth of 14 inches
Drainage class: Well drained
Native plant cover type: Rangeland (fig. 10)
Flooding: None
Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 2.7 inches

Interpretive groups

Land capability classification (nonirrigated): 4e

Land capability classification (irrigated): Not typically irrigated

Range site: Shallow Prairie (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vernon or Renfrow soils. In some small areas the surface layer is silt loam.

Piedmont and similar soils

Setting

Percentage of the map unit: 40 percent

Geomorphic description: Pediments on uplands

Parent material: Residuum derived from clayey shale

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Impermeable

Depth to restrictive feature: Bedrock (paralithic) at a depth of 33 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 5.4 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): Not typically irrigated

Range site: Clay Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Renfrow soils. In some small areas the surface layer is silty clay loam or silt loam.

Management

Major uses:

- Some areas are used as cropland, but most areas are used for pasture or range. Many areas of this map unit are in the Conservation Reserve Program. This map unit is poorly suited to the commonly grown crops, such as wheat and grain sorghum. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Wind erosion can be controlled by using a system of conservation tillage. The shallow depth to bedrock and the restricted permeability can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2206—Jamash-Piedmont clay loams, 3 to 12 percent slopes

Map Unit Setting

General location: This map unit is in the southeastern part of the county on moderate or moderately steep slopes on pediments.

Elevation: 801 to 1,601 feet

Mean annual precipitation: 28 to 36 inches

General information: The Jamash and Piedmont soils are intermingled on the landscape. In some places, the soils have been subject to severe erosion and the bedrock is at the surface.

Component Description

Jamash and similar soils

Setting

Percentage of the map unit: 60 percent

Geomorphic description: Pediments on uplands

Parent material: Residuum derived from shale

Component properties and qualities

Slope: 3 to 12 percent

Rate of surface runoff: High

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.8

Slowest permeability class: Impermeable

Depth to restrictive feature: Bedrock (paralithic) at a depth of 14 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 2.3 inches

Interpretive groups

Land capability classification (nonirrigated): 6e

Land capability classification (irrigated): Not typically irrigated

Range site: Shallow Prairie (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vernon or Renfrow soils. In some small areas the surface layer is silt loam.

Piedmont and similar soils

Setting

Percentage of the map unit: 40 percent

Geomorphic description: Pediments on uplands

Parent material: Residuum derived from clayey shale

Component properties and qualities

Slope: 3 to 12 percent

Rate of surface runoff: High

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Impermeable

Depth to restrictive feature: Bedrock (paralithic) at a depth of 33 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 5.4 inches

Interpretive groups

Land capability classification (nonirrigated): 4e

Land capability classification (irrigated): Not typically irrigated

Range site: Clay Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Renfrow soils. In some small areas the surface layer is silty clay loam or silt loam.

Management

Major uses:

- Most areas are used for pasture or range, but some areas are used as cropland. This map unit is poorly suited to the commonly grown crops, such as wheat and grain sorghum. The hazard of wind erosion or water erosion is severe. The shallow depth to bedrock, the restricted permeability, and the slope severely limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2207—Jamash clay loam, 0 to 8 percent slopes

Map Unit Setting

General location: This map unit is in the southeastern part of the county in nearly level to strongly sloping drainageways on pediments.

Elevation: 801 to 1,601 feet

General information: The Jamash soil is generally in the lower areas on the side slopes.

Component Description

Jamash and similar soils

Setting

Percentage of the map unit: 80 percent

Geomorphic description: Pediments on uplands

Parent material: Residuum derived from shale

Component properties and qualities

Slope: 0 to 8 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.8

Slowest permeability class: Impermeable

Depth to restrictive feature: Bedrock (paralithic) at a depth of 14 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 2.3 inches

Interpretive groups

Land capability classification (nonirrigated): 6e

Land capability classification (irrigated): Not typically irrigated

Range site: Shallow Prairie (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vernon or Renfrow soils. In some small areas the surface layer is silt loam.

Additional Minor Components

Piedmont and similar soils: 20 percent

- This component was formerly mapped as Renfrow soils. The Piedmont soils are moderately deep, well drained, and slowly permeable. They formed in clayey shale residuum. In some areas the surface layer is silty clay loam or silt loam.

Management

Major uses:

- Most areas are used for pasture or range. This map unit is poorly suited to the commonly grown crops, such as wheat and grain sorghum. The hazard of wind erosion is severe, and the hazard of water erosion is moderate. The shallow depth to bedrock and the restricted permeability can limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2381—Kanza-Ninnescah sandy loams, 0 to 2 percent slopes, commonly flooded

Map Unit Setting

General location: This map unit is primarily in the southern part of the county on level to gently sloping flood plains (fig. 11).

Elevation: 1,401 to 2,201 feet

Mean annual precipitation: 24 to 35 inches

General information: The Kanza and Ninnescah soils are intermingled on the flood plains.

Component Description

Kanza and similar soils

Setting

Percentage of the map unit: 50 percent

Geomorphic description: Flood plains in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Poorly drained

Native plant cover type: Rangeland

Flooding: Frequent

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 5.7 inches

Interpretive groups

Land capability classification (nonirrigated): 5w

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Plevna soils or as wet alluvial land.

Ninnescah and similar soils

Setting

Percentage of the map unit: 50 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 4.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Poorly drained

Native plant cover type: Rangeland

Flooding: Occasional

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.4 inches

Interpretive groups

Land capability classification (nonirrigated): 5w

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Plevna soils. In some places the slopes are more than 1 percent.

Management

Major uses:

- Most areas are used for pasture or range. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion or water erosion is slight. The water table, the flooding, and the depth to sand limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2390—Kaskan loam, 0 to 1 percent slopes, rarely flooded

Map Unit Setting

General location: This map unit is primarily in the northern part of the county on level or nearly level flood plains.

Elevation: 1,401 to 1,601 feet

Component Description

Kaskan and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.7 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Lowland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Dale soils. In some areas the surface layer is silty clay loam.

Additional Minor Components

Tobin and similar soils: 15 percent

- This component was formerly mapped as Vanoss soils. The Tobin soils are very deep, well drained, and moderately permeable. They formed in alluvium.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to most of the commonly grown crops. Wheat and grain sorghum are the major crops. The hazard of wind erosion or water erosion is slight. The water table and the flooding may limit some engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2391—Kaskan silty clay loam, 0 to 1 percent slopes, frequently flooded, channeled

Map Unit Setting

General location: This map unit is primarily in the northern part of the county on level or nearly level flood plains.

Elevation: 1,401 to 1,601 feet

Component Description

Kaskan and similar soils

Setting

Percentage of the map unit: 75 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: Frequent

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.8 inches

Interpretive groups

Land capability classification (nonirrigated): 5w

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Lowland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Dale soils. In some small areas the surface layer is silty clay loam.

Additional Minor Components

Tobin and similar soils: 25 percent

- This component was formerly mapped as Vanoss soils. The Tobin soils are very deep, well drained, and moderately permeable. They formed in alluvium.

Management

Major uses:

- Most areas are used for pasture or range. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion or water erosion is slight. The water table and the flooding may limit some engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2395—Kisiwa loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily in the

northern and western parts of the county on level or nearly level flood plains.

Elevation: 1,201 to 1,699 feet

General information: The Kisiwa soil generally has a nonsaline surface layer. The subsoil is very slightly or slightly saline and has a high content of adsorbed sodium.

Component Description

Kisiwa and similar soils

Setting

Percentage of the map unit: 90 percent

Geomorphic description: Flood plains and terraces in river valleys

Parent material: Loamy alluvium over clayey alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 4.0 percent

Reaction in the surface layer: pH 7.4 to 9.0

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Poorly drained

Native plant cover type: Rangeland (fig. 12)

Flooding: None

Depth to water table: See "Water Features" table

Ponding: Occasional

Salt-affected condition: Saline within a depth of 30 inches

Sodium-affected condition: Sodic within a depth of 30 inches

Available water capacity: About 8.7 inches

Interpretive groups

Land capability classification (nonirrigated): 4s

Land capability classification (irrigated): Not typically irrigated

Range site: Saline Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Slickspots. In some small areas the surface layer is fine sandy loam, loam, or loamy fine sand. In other small areas the surface layer is very slightly saline to moderately saline.

Additional Minor Components

Punkin and similar soils: 10 percent

- This component was formerly mapped as Slickspots and Tabler soils. The Punkin soils are very deep,

moderately well drained, and very slowly permeable. They formed in saline-sodic, clayey alluvium. In places the surface layer is fine sandy loam. In some areas the surface layer is very slightly or slightly saline.

Management

Major uses:

- This map unit is poorly suited to the commonly grown crops because of the sodic conditions and the wetness. Most areas are used for pasture or range. In areas that are cropped, the hazard of wind erosion or water erosion is slight. Maintaining soil tilth and preventing surface crusting are concerns. These concerns can be addressed by adding organic material to the soil. The high sodium content, the pH, the content of soluble salts, a high shrink-swell potential, and the water table limit engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2509—Ladysmith silty clay loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the northeastern part of the county in level or nearly level areas on uplands.

Elevation: 1,201 to 1,801 feet

Component Description

Ladysmith and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Depressions on uplands

Parent material: Loess

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.9 inches

Interpretive groups

Land capability classification (nonirrigated): 2s

Land capability classification (irrigated): Not typically irrigated

Range site: Clay Upland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Bethany or Tabler soils.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. A few areas are planted to irrigated corn. The hazard of water erosion is slight, and the hazard of wind erosion is moderate. The hazard of erosion can be overcome by conservation tillage and crop residue management. This map unit is somewhat poorly suited to most engineering uses because of the high water table and a high shrink-swell potential.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2556—Langdon fine sand, 0 to 15 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on level to moderately steep dunes on paleoterraces.

Elevation: 1,526 to 1,791 feet

General information: The Langdon soil is on the middle and upper parts of the dunes.

Component Description

Langdon and similar soils

Setting

Percentage of the map unit: 50 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Sandy eolian deposits

Component properties and qualities

Slope: 0 to 15 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat excessively drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 3.2 inches

Interpretive groups

Land capability classification (nonirrigated): 6e

Land capability classification (irrigated): Not typically irrigated

Range site: Choppy Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tivoli or Pratt soils.

Additional Minor Components

Tivin and similar soils: 25 percent

- This component was formerly mapped as Tivoli soils. The Tivin soils are very deep, somewhat excessively drained, and very rapidly permeable. They formed in eolian deposits. They are on the upper parts of the dunes.

Turon and similar soils: 25 percent

- This component was formerly mapped as Pratt soils. The Turon soils are on the lower part of the dunes. They have a paleosol below a depth of 40 inches. The paleosol varies laterally in thickness and in texture. The texture ranges from sandy clay loam to silty clay. The texture of the paleosol generally is coarser with increasing depth. In some areas the soils contain more sand.

Management

Major uses:

- This map unit is typically not used as cropland, but some areas that are on the lower part of the dunes are cultivated. Most areas are used for pasture or range. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion is severe, and the hazard of water erosion is moderate. The sandy textures limit most engineering practices.

General and detailed information about soil properties and interpretations needed for managing

this map unit is included in subsequent sections of this publication.

2587—Imano clay loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

General location: This map unit is on the flood plains along the Arkansas River.

Elevation: 1,401 to 2,402 feet

Component Description

Imano and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium over sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: Occasional

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 6.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3w

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is silty clay loam.

Additional Minor Components

Willowbrook and similar soils: 15 percent

- This component was formerly mapped as Wann soils. The Willowbrook soils are very deep, somewhat poorly drained, and rapidly permeable. They formed in loamy alluvium over sandy alluvium.

Management

Major uses:

- Most areas are used for pasture or range, but some areas are used for the production of hay. This map unit is poorly suited to most of the commonly grown crops. Wheat and alfalfa are the major crops. The hazard of water erosion is slight, and the hazard of wind erosion is severe. Conservation tillage and crop residue management can help to control wind erosion. The depth to sand and the water table limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2588—Longford silty clay loam, 3 to 7 percent slopes, moderately eroded

Map Unit Setting

General location: This map unit is in the northeastern part of the county on moderately sloping side slopes in the uplands.

Elevation: 1,001 to 2,001 feet

Component Description

Longford and similar soils

Setting

Percentage of the map unit: 90 percent

Geomorphic description: Terraces on uplands

Parent material: Silty alluvium or loess

Component properties and qualities

Slope: 3 to 7 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.3 inches

Interpretive groups

Land capability classification (nonirrigated): 4e

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Upland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Smolan and Bethany soils. The Longford soil has been subject to moderate erosion. As a result, the surface layer is thinner than normal and the content of organic matter is low or very low. In some small areas the surface layer is silt loam.

Additional Minor Components

Geary and similar soils: 10 percent

- This component was formerly mapped as Vanoss soils. The Geary soils are very deep, well drained, and slowly permeable. They formed in loess. In some places the surface layer is silty clay. These soils are moderately eroded. As a result, the surface layer is thinner than normal and the content of organic matter is low or very low.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. The hazard of water erosion is severe, and the hazard of wind erosion is moderate. The potential for ephemeral gully erosion is severe. This problem can be overcome by conservation tillage, tall grass barriers, contour farming, terraces and waterways, and crop residue management. This map unit is moderately well suited to most engineering uses, but the high content of clay and the shrink-swell potential are limitations.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2812—Mahone loamy fine sand, 0 to 2 percent slopes, rarely flooded

Map Unit Setting

General location: This map unit is in the eastern half of the county in level to gently sloping areas on high flood plains.

Elevation: 1,401 to 1,650 feet

Component Description

Mahone and similar soils

Setting

Percentage of the map unit: 95 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.9 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Lowland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Canadian soils.

Additional Minor Components

Yaggy and similar soils: 5 percent

- This component was formerly mapped as Platte soils. The Yaggy soils are very deep, somewhat poorly drained, and rapidly permeable. They formed in sandy alluvium. In some places the surface layer is loamy fine sand.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. Some areas are in the Conservation Reserve Program. This map unit is somewhat poorly suited to most of the commonly grown crops. Wheat and grain sorghum are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. The high water table

and the depth to sand limit many engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2948—Nalim loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the southern third of the county on level or nearly level paleoterraces.

Elevation: 751 to 1,499 feet

Mean annual precipitation: 23 to 36 inches

Component Description

Nalim and similar soils

Setting

Percentage of the map unit: 80 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): 2e

Range site: Loamy Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Farnum soils. In some small areas the surface layer is fine sandy loam. In a few small areas the slopes are more than 1 percent. In places several discontinuous clay

lenses are between the depths of 40 and 80 inches. The clay lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam.

Additional Minor Components

Farnum and similar soils: 20 percent

- These soils are very deep, well drained, and moderately permeable. They formed in loamy, old alluvium. In some areas the surface layer is sandy loam.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. A few areas are planted to irrigated corn. The hazard of water erosion is slight, and the hazard of wind erosion is moderate. The hazard of erosion can be reduced by conservation tillage and crop residue management. This map unit is moderately well suited to most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2949—Naron fine sandy loam, 3 to 7 percent slopes, moderately eroded

Map Unit Setting

General location: This map unit is primarily in the northern half of the county on moderately sloping side slopes on paleoterraces.

Elevation: 1,201 to 2,001 feet

Component Description

Naron and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits

Component properties and qualities

Slope: 3 to 7 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.8 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional Minor Components

Saltcreek and similar soils: 15 percent

- This component was formerly mapped as Naron soils. The Saltcreek soils are very deep and are well drained. Permeability is moderately rapid in the upper part and slow in the lower part. The soils formed in loamy eolian sediments over clayey alluvium. The paleosol varies laterally in thickness and in texture. It ranges from sandy clay loam to silty clay. The texture of the paleosol generally is coarser with increasing depth. In some areas the soils contain more sand.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to most of the commonly grown crops. Wheat and grain sorghum are the major crops. The hazard of wind erosion or water erosion is moderate. Terraces, plant residue management, conservation tillage, and tall grass barriers can help to control erosion. The slope may limit some engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2950—Naron fine sandy loam, 7 to 15 percent slopes, moderately eroded

Map Unit Setting

General location: This map unit is primarily in the northern half of the county on strongly sloping to moderately steep side slopes on paleoterraces.

Elevation: 1,201 to 2,001 feet

Component Description

Naron and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits

Component properties and qualities

Slope: 7 to 15 percent

Rate of surface runoff: High

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.8 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the slopes are less than 6 percent.

Additional Minor Components

Avans and similar soils: 15 percent

- This component was formerly mapped as Vanoss soils. The Avans soils are very deep, well drained, and moderately permeable. They formed in loamy, old alluvium. In some areas the surface layer is silt loam. In a few small areas the slopes are less than 6 percent. About 10 to 30 percent of the areas of these soils are moderately eroded. As a result, the surface layer is thinner and lighter colored than normal and the content of organic matter is low or very low.

Management

Major uses:

- Most areas are used for range or pasture. Some areas are used as cropland. This map unit is somewhat poorly suited to most of the commonly grown crops. Wheat and grain sorghum are the major

crops. The hazard of wind erosion or water erosion is severe. Building terraces, managing plant residue, using a system of conservation tillage, and planting tall grass barriers can help to control erosion. The slope may limit some engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2951—Nash silt loam, 1 to 3 percent slopes

Map Unit Setting

General location: This soil is in the south-central part of the county on gently sloping, dissected side slopes in the uplands.

Elevation: 1,001 to 1,499 feet

General information: The Nash soil is generally in the lower areas on the side slopes.

Component Description

Nash and similar soils

Setting

Percentage of the map unit: 90 percent

Geomorphic description: Interfluves on uplands

Parent material: Residuum derived from sandstone and siltstone

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: Bedrock (paralithic) at a depth of 28 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 5.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Upland (pe24-32)

A typical soil series description with range in

characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: About 10 to 25 percent of the areas of the Nash soil have been subject to moderate erosion. In these eroded areas the surface layer generally is very fine sandy loam or sandy loam, is thinner than normal, and has a low or very low content of organic matter.

Additional Minor Components

Lucien and similar soils: 10 percent

- These soils are shallow, well drained, and moderately permeable. They formed in residuum derived from sandstone and siltstone. About 10 to 25 percent of the areas of the Lucien soils have been moderately eroded. In these eroded areas the surface layer generally is very fine sandy loam or sandy loam, is thinner than normal, and has a low or very low content of organic matter.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is somewhat poorly suited to the commonly grown crops, such as wheat and grain sorghum. The hazard of wind erosion or water erosion is severe. The potential for ephemeral gully erosion also is severe. Wind erosion and water erosion can be controlled by a system of conservation tillage that leaves plant residue on the surface, stripcropping, field windbreaks, contour farming, tall grass barriers, terraces, and grassed waterways. The shallow depth to bedrock can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2952—Nash-Lucien silt loams, 3 to 7 percent slopes

Map Unit Setting

General location: These soils are in the south-central part of the county on moderately and strongly sloping, dissected side slopes in the uplands.

Elevation: 899 to 1,499 feet

General information: The Nash soil is generally lower on the side slopes than the Lucien soil.

Component Description

Nash and similar soils

Setting

Percentage of the map unit: 60 percent

Geomorphic description: Hillsides on uplands

Parent material: Residuum derived from sandstone and siltstone

Component properties and qualities

Slope: 3 to 7 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: Bedrock (paralithic) at a depth of 28 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 5.3 inches

Interpretive groups

Land capability classification (nonirrigated): 4e

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: About 10 to 25 percent of the areas of the Nash soil have been subject to moderate erosion. In these eroded areas the surface layer generally is very fine sandy loam or sandy loam, is thinner than normal, and has a low or very low content of organic matter.

Lucien and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Hillsides on uplands

Parent material: Residuum derived from sandstone and siltstone

Component properties and qualities

Slope: 3 to 7 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 0.0 to 2.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: Bedrock (paralithic) at a depth of 13 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 2.2 inches

Interpretive groups

Land capability classification (nonirrigated): 6e

Land capability classification (irrigated): Not typically irrigated

Range site: Shallow Prairie (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: About 10 to 25 percent of the areas of the Lucien soil have been subject to moderate erosion. In these eroded areas the surface layer generally is very fine sandy loam or sandy loam, is thinner than normal, and has a low or very low content of organic matter.

Additional Minor Components

Ost and similar soils: 10 percent

- The Ost soils are very deep, well drained, and moderately slowly permeable. They formed in loamy alluvium. They are typically in the higher areas on the landscape.

Management

Major uses:

- Most areas are used for pasture or range, but some areas are used as cropland. Some areas are in the Conservation Reserve Program. This map unit is poorly suited to the commonly grown crops, such as wheat and grain sorghum. The hazard of wind erosion or water erosion is severe. The potential for ephemeral gully erosion is severe. Wind erosion and water erosion can be controlled by a system of conservation tillage that leaves a cover of plant residue on the surface, stripcropping, field windbreaks, contour farming, tall grass barriers, terraces, and grassed waterways. The shallow depth to bedrock and the slope can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2953—Nash-Lucien silt loams, 7 to 15 percent slopes, moderately eroded

Map Unit Setting

General location: These soils are in the south-central part of the county on strongly sloping to steep, dissected side slopes on uplands.

Elevation: 899 to 1,499 feet

General information: The Nash soil is generally lower on the side slopes than the Lucien soil.

Component Description

Nash and similar soils

Setting

Percentage of the map unit: 70 percent

Geomorphic description: Hillsides on uplands

Parent material: Residuum derived from sandstone and siltstone

Component properties and qualities

Slope: 7 to 15 percent

Rate of surface runoff: Very high

Content of organic matter in the surface layer: 0.5 to 1.5 percent

Reaction in the surface layer: pH 6.1 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: Bedrock (paralithic) at a depth of 28 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.4 inches

Interpretive groups

Land capability classification (nonirrigated): 4e

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: About 10 to 25 percent of the areas of the Nash soil have been



Figure 9.—Grain sorghum under low-impact sprinkler irrigation in an area of Avans loam, 0 to 1 percent slopes.



Figure 10.—Rangeland in an area of Jamash-Piedmont clay loams, 1 to 3 percent slopes.



Figure 11.—The Ninnescah River flowing through an area of Kanza-Ninnescah sandy loams, 0 to 2 percent slopes, commonly flooded.



Figure 12.—Cattle grazing on native range in an area of Kisiwa loam, 0 to 1 percent slopes.



Figure 13.—A Conservation Reserve Program field planted to native grasses in an area of Punkin-Taver loams, 0 to 1 percent slopes.



Figure 14.—Sand dunes covered by native rangeland vegetation in an area of Tivin-Dillhut fine sands, 0 to 15 percent slopes.



Figure 15.—Urban development in an area of Urban land-Darlow-Elmer complex, 0 to 1 percent slopes.



Figure 16.—A levee system protects the city of Hutchinson from flooding by the Arkansas River.

subject to moderate erosion. In these eroded areas the surface layer generally is very fine sandy loam or sandy loam, is thinner than normal, and has a low or very low content of organic matter.

Lucien and similar soils

Setting

Percentage of the map unit: 20 percent

Geomorphic description: Hillsides on uplands

Parent material: Residuum derived from sandstone and siltstone

Component properties and qualities

Slope: 8 to 15 percent

Rate of surface runoff: Very high

Content of organic matter in the surface layer: 0.0 to 2.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: Bedrock (paralithic) at a depth of 13 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 2.2 inches

Interpretive groups

Land capability classification (nonirrigated): 6e

Land capability classification (irrigated): Not typically irrigated

Range site: Shallow Prairie (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional Minor Components

Clark and similar soils: 10 percent

- The Clark soils are very deep, well drained, and moderately permeable. They formed in loamy, calcareous alluvium. They are typically on the highest parts of the landscape.

Management

Major uses:

- Most areas are used for pasture or range. The shallow depth to bedrock and the slope limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing

this map unit is included in subsequent sections of this publication.

2955—Nickerson fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily in the north-central part of the county on level or nearly level terraces.

Elevation: 1,601 to 2,201 feet

Component Description

Nickerson and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Terraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 0.8 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.4 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile or Farnum soils. In some small areas the surface layer is loamy fine sand.

Management

Major uses:

- Most areas are used as cropland. Some areas are used for pasture or range. This map unit is moderately well suited to most of the commonly grown crops.

Wheat, grain sorghum, and irrigated corn are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Conservation tillage, crop residue management, and tall grass barriers can help to control wind erosion. This map unit is somewhat poorly suited to most engineering practices because of the depth to sand and the water table.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2956—Nickerson loamy fine sand, 0 to 2 percent slopes

Map Unit Setting

General location: This map unit is primarily in the north-central part of the county on level to gently sloping terraces.

Elevation: 1,601 to 2,201 feet

Component Description

Nickerson and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Terraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 0.8 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.2 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sandy (pe21-28)

A typical soil series description with range in

characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile or Farnum soils. In some small areas the surface layer is fine sandy loam.

Additional Minor Components

Carway and similar soils: 15 percent

- This component was formerly mapped as Carwile soils. The Carway soils are very deep and are somewhat poorly drained. Permeability is moderate in the upper part and slow in the lower part. The soils formed in loamy eolian deposits over alluvium. In some areas the surface layer is loamy fine sand. In this map unit the Carway soils are generally in depressions on the terraces.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to most of the commonly grown crops. Wheat, grain sorghum, and irrigated corn are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Conservation tillage, crop residue management, and tall grass barriers can help to control wind erosion. This map unit is somewhat poorly suited to most engineering practices because of the depth to sand and the water table.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2957—Nickerson-Punkin fine sandy loams, 0 to 2 percent slopes

Map Unit Setting

General location: This map unit is primarily in the north-central part of the county on level to gently sloping terraces.

Elevation: 1,201 to 2,201 feet

General information: The Nickerson soil is higher on the terraces than the Punkin soil.

Component Description

Nickerson and similar soils

Setting

Percentage of the map unit: 50 percent

Geomorphic description: Terraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 0.8 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.4 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile or Farnum soils. In some small areas the surface layer is loamy fine sand.

Punkin and similar soils

Setting

Percentage of the map unit: 50 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Clayey alluvium over sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.6 to 7.8

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.0 inches

Interpretive groups

Land capability classification (nonirrigated): 3s

Land capability classification (irrigated): 3s

Range site: Saline Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Slickspots or as Tabler soils. In some small areas the surface layer is loam. In places the surface layer is very slightly or slightly saline.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to most of the commonly grown crops. Wheat, grain sorghum, and irrigated corn are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Conservation tillage, crop residue management, and tall grass barriers can help to control wind erosion. This map unit is somewhat poorly suited to most engineering practices because of the depth to sand, the water table, the shrink-swell potential, and the content of soluble salts.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2958—Ninnescah fine sandy loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

General location: This map unit is primarily in the northern part of the county on level or nearly level flood plains.

Elevation: 1,480 to 1,880 feet

Component Description

Ninnescah and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 4.0 percent
Reaction in the surface layer: pH 7.4 to 8.4
Slowest permeability class: Moderate
Depth to restrictive feature: No restrictive feature noted
Drainage class: Poorly drained
Native plant cover type: Rangeland
Flooding: Occasional
Depth to water table: See "Water Features" table
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 7.4 inches

Interpretive groups

Land capability classification (nonirrigated): 5w
Land capability classification (irrigated): Not typically irrigated
Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Plevna soils.

Additional Minor Components

Kanza and similar soils: 15 percent

- This component was formerly mapped as Plevna soils and as wet alluvial land. The Kanza soils are very deep, poorly drained, and rapidly permeable. They formed in alluvium. They are interfingering on the landscape with areas of the Ninnescah soil.

Management

Major uses:

- Most areas are used for pasture or range. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion or water erosion is slight. The water table, the flooding, and the depth to sand limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

2959—Ninnescah fine sandy loam, 0 to 1 percent slopes, occasionally flooded, saline

Map Unit Setting

General location: This map unit is primarily in the

northern part of the county on level or nearly level flood plains.

Elevation: 1,480 to 1,880 feet

Mean annual precipitation: 24 to 35 inches

General information: The surface layer is generally nonsaline. The subsoil is very slightly or slightly saline and has a high content of adsorbed sodium.

Component Description

Ninnescah and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 4.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Poorly drained

Native plant cover type: Rangeland

Flooding: Occasional

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Saline within a depth of 30 inches

Sodium-affected condition: Not affected

Available water capacity: About 6.4 inches

Interpretive groups

Land capability classification (nonirrigated): 5s

Land capability classification (irrigated): Not typically irrigated

Range site: Saline Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Plevna soils. Some small areas of saline and nonsaline soils are interfingering on the landscape.

Management

Major uses:

- This map unit is poorly suited to the commonly grown crops because of the sodic conditions and the wetness. Most areas are used for pasture or range. In areas that are cropped, the hazard of wind erosion or

water erosion is slight. Maintaining soil tilth and preventing surface crusting are concerns. These concerns can be addressed by adding organic material to the soil. The high sodium content, the pH, the content of soluble salts, and the water table limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3051—Ost loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily in the south-central and southeastern parts of the county on level or nearly level slopes on paleoterraces.

Elevation: 1,201 to 2,500 feet

Component Description

Ost and similar soils

Setting

Percentage of the map unit: 90 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 8.4

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.0 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some areas the surface layer is fine sandy loam.

Additional Minor Components

Clark and similar soils: 10 percent

- These soils are very deep, well drained, and moderately permeable. They formed in loamy, calcareous alluvium. In some areas the surface layer is fine sandy loam.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. The hazard of wind erosion or water erosion is slight. This map unit is well suited to most engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3052—Ost-Clark loams, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is primarily in the south-central and southeastern parts of the county on gently sloping side slopes of paleoterraces.

Elevation: 1,201 to 2,500 feet

General information: The Ost soil is slightly higher on the paleoterraces than the Clark soil.

Component Description

Ost and similar soils

Setting

Percentage of the map unit: 55 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 8.4

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.0 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is fine sandy loam. In other small areas the slopes are less than 1 percent.

Clark and similar soils

Setting

Percentage of the map unit: 45 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): Not typically irrigated

Range site: Limy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is fine sandy loam. In other small areas the slopes are less than 1 percent.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. The hazard of wind erosion is moderate, and the hazard of water erosion is slight. This map unit is well suited to most engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3170—Penalosa silt loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the southeastern part of the county on level or nearly level paleoterraces.

Elevation: 1,201 to 2,001 feet

Component Description

Penalosa and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.9 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): 1

Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Bethany and Vanoss soils. In some small areas the surface layer is silty clay loam. In places the dark colors of the surface layer extend below a depth of 20 inches.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture. This map unit is well suited to most of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the major crops. The hazard of wind erosion or water erosion is slight. The slow permeability and a high shrink-swell potential can limit engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3171—Penalosa silt loam, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the southeastern part of the county on gently sloping paleoterraces.
Elevation: 1,201 to 2,001 feet

Component Description

Penalosa and similar soils

Setting

Percentage of the map unit: 100 percent
Geomorphic description: Paleoterraces in river valleys
Parent material: Loamy alluvium

Component properties and qualities

Slope: 1 to 3 percent
Rate of surface runoff: Low
Content of organic matter in the surface layer: 1.0 to 3.0 percent
Reaction in the surface layer: pH 5.1 to 7.3
Slowest permeability class: Slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Moderately well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 10.9 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): 1

Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Bethany and Vanoss soils. In some small areas the surface layer is silty clay loam. In places the dark colors of the surface layer extend below a depth of 20 inches. Some small areas have slopes of less than 1 percent.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture. This map unit is well suited to most of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the major crops. The hazard of wind erosion or water erosion is slight. The slow permeability and a high shrink-swell potential can limit engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3180—Pratt fine sand, 5 to 10 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on moderately sloping to moderately steep dunes on paleoterraces.
Elevation: 751 to 1,549 feet

Component Description

Pratt and similar soils

Setting

Percentage of the map unit: 85 percent
Geomorphic description: Dunes on paleoterraces in river valleys
Parent material: Sandy eolian deposits

Component properties and qualities

Slope: 5 to 10 percent
Rate of surface runoff: Low
Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 7.3
Slowest permeability class: Moderately rapid
Depth to restrictive feature: No restrictive feature noted
Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 6.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3e
Land capability classification (irrigated): 3e
Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is loamy fine sand. In other small areas the slopes are less than 5 percent.

Additional Minor Components

Attica and similar soils: 15 percent

- This component was formerly mapped as Naron or Pratt soils. The Attica soils are very deep, well drained, and moderately rapidly permeable. They formed in eolian deposits. In some places the surface layer is fine sandy loam. In places the slopes are less than 5 percent.

Management

Major uses:

- Most areas are used for pasture or range, but some areas are used as cropland. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion is severe, and the hazard of water erosion is moderate. This map unit is poorly suited to most engineering practices because of the sandy textures.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3181—Pratt-Turon fine sands, 1 to 5 percent slopes

Map Unit Setting

General location: This map unit is primarily in the

northwestern part of the county on gently sloping and moderately sloping dunes on paleoterraces.
Elevation: 751 to 1,804 feet
General information: The Pratt and Turon soils are in similar positions on dunes. The Turon soil has a paleosol below a depth of 40 inches.

Component Description

Pratt and similar soils

Setting

Percentage of the map unit: 45 percent
Geomorphic description: Dunes on paleoterraces in river valleys
Parent material: Sandy eolian deposits

Component properties and qualities

Slope: 1 to 5 percent
Rate of surface runoff: Low
Content of organic matter in the surface layer: 0.5 to 1.0 percent
Reaction in the surface layer: pH 5.6 to 7.3
Slowest permeability class: Moderately rapid
Depth to restrictive feature: No restrictive feature noted
Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 6.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3e
Land capability classification (irrigated): 3e
Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is loamy fine sand.

Turon and similar soils

Setting

Percentage of the map unit: 30 percent
Geomorphic description: Dunes on paleoterraces in river valleys
Parent material: Sandy eolian deposits over alluvium

Component properties and qualities

Slope: 1 to 5 percent
Rate of surface runoff: Low
Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 7.3
Slowest permeability class: Very slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 7.1 inches

Interpretive groups

Land capability classification (nonirrigated): 3e
Land capability classification (irrigated): 3e
Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Pratt soils. A buried soil is below a depth of 40 inches. The buried soil varies in thickness. It ranges from sandy clay loam to silty clay. The content of sand in the buried soil generally increases with increasing depth.

Additional Minor Components

Hayes and similar soils: 25 percent

- This component was formerly mapped as Naron or Pratt soils. The Hayes soils are very deep and are well drained. Permeability is rapid in the upper part and slow in the lower part. The soils formed in loamy eolian sediments over clayey alluvium. The paleosol varies laterally in thickness and in texture. The texture ranges from sandy clay loam to silty clay. The texture of the paleosol generally is coarser with increasing depth. In some areas the soils contain more sand. In some places the slopes are more than 2 percent.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. Some areas are in the Conservation Reserve Program. This map unit is somewhat poorly suited to most of the commonly grown crops. Wheat, grain sorghum, and irrigated corn are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Crop residue management, conservation tillage, and tall grass barriers can help to control wind erosion. This map unit is moderately well suited to most engineering practices.

General and detailed information about soil properties and interpretations needed for managing

this map unit is included in subsequent sections of this publication.

3190—Punkin silt loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northern and eastern parts of the county on level or nearly level paleoterraces.

Elevation: 1,201 to 1,699 feet

General information: The surface layer is generally nonsaline. The subsoil is very slightly or slightly saline and has a high content of adsorbed sodium.

Component Description

Punkin and similar soils

Setting

Percentage of the map unit: 90 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Clayey alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.6 to 7.8

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Saline within a depth of 30 inches

Sodium-affected condition: Sodic within a depth of 30 inches

Available water capacity: About 7.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3s

Land capability classification (irrigated): 3s

Range site: Claypan (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Slickspots and Tabler soils. In some places the surface layer is fine sandy loam. In places the surface layer is very slightly or slightly saline.

Additional Minor Components

Darlow and similar soils: 10 percent

• This component was formerly mapped as Farnum soils and Slickspots. The Darlow soils are very deep, somewhat poorly drained, and slowly permeable. They formed in saline-sodic, loamy alluvium. In some areas the surface layer is fine sandy loam. In places the surface layer is very slightly or slightly saline.

Management

Major uses:

• Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to most of the commonly grown crops, such as wheat and grain sorghum. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Maintaining soil tilth and preventing surface crusting are concerns. These concerns can be addressed by adding organic material to the soil. The high content of sodium, the pH, the content of soluble salts, and a high shrink-swell potential can limit many engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3191—Punkin-Taver complex, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northern and eastern parts of the county on level or nearly level paleoterraces.

Elevation: 1,201 to 1,795 feet

General information: The Punkin soil is generally lower on the paleoterraces than the Taver soil. The Punkin soil generally has a nonsaline surface layer. The subsoil is very slightly or slightly saline and has a high content of adsorbed sodium.

Component Description

Punkin and similar soils

Setting

Percentage of the map unit: 70 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Clayey alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.6 to 7.8

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Sodic within a depth of 30 inches

Available water capacity: About 7.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3s

Land capability classification (irrigated): 3s

Range site: Claypan (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Slickspots and Tabler soils. In some small areas the surface layer is fine sandy loam. In places the surface layer is very slightly or slightly saline.

Taver and similar soils

Setting

Percentage of the map unit: 20 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Clayey alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2s

Land capability classification (irrigated): Not typically irrigated

Range site: Clay Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tabler soils.

Additional Minor Components

Darlow and similar soils: 10 percent

- This component was formerly mapped as Farnum soils and Slickspots. The Darlow soils are very deep, somewhat poorly drained, and slowly permeable. They formed in saline-sodic, loamy alluvium. In some areas the surface layer is fine sandy loam. In places the surface layer is very slightly or slightly saline.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to most of the commonly grown crops, such as wheat and grain sorghum. Some areas have been planted to native grasses as part of the Conservation Reserve Program (fig. 13). The hazard of wind erosion is severe, and the hazard of water erosion is slight. Maintaining soil tilth and preventing surface crusting are concerns. These concerns can be addressed by increasing the content of organic matter. The high sodium content, the pH, the soluble salts, and a high shrink-swell potential can limit many engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3403—Sand pits

Map Unit Setting

General location: This map unit is generally scattered throughout the northern and western parts of the county.

General and detailed information about soil properties is included in subsequent sections of this publication.

3469—Smolan silty clay loam, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the northeastern part of the county on gently sloping side slopes in the uplands.

Elevation: 1,201 to 1,401 feet

General information: The Smolan soil is in less sloping areas on side slopes than the minor Longford soils.

Component Description

Smolan and similar soils

Setting

Percentage of the map unit: 90 percent

Geomorphic description: Interfluvies on uplands

Parent material: Loess

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 2.0 to 4.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): 2e

Range site: Loamy Upland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is silt loam.

Additional Minor Components

Longford and similar soils: 10 percent

- This component was formerly mapped as Smolan and Bethany soils. The Longford soils are very deep, well drained, and slowly permeable. They formed in loess. In places the surface layer is silt loam. The soils

have been moderately eroded. As a result, the surface layer is thinner than normal and the content of organic matter is low or very low.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. A few areas are planted to irrigated corn. The hazard of water erosion or wind erosion is moderate. The potential for ephemeral gully erosion is moderate in most areas. This problem can be overcome by conservation tillage, tall grass barriers, contour farming, terraces and waterways, and crop residue management. This map unit is moderately well suited to most engineering uses. The high content of clay and the shrink-swell potential may limit some practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3510—Saltcreek-Funmar-Farnum complex, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on level to gently sloping dunes on paleoterraces.

Elevation: 1,549 to 1,768 feet

General information: The Saltcreek soil is on convex dunes that are slightly higher on the landscape than the Funmar and Farnum soils, which are on the level paleoterraces.

Component Description

Saltcreek and similar soils

Setting

Percentage of the map unit: 50 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 4.5 to 6.6

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.0 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 1

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Naron soils. A buried soil is at a depth of 25 to 60 inches. The buried soil varies in thickness. It ranges from sandy clay loam to silty clay. The content of sand generally increases with increasing depth. In some areas the buried soil has a higher content of sand.

Funmar and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium over alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.3 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): 1

Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component

was formerly mapped as Farnum and Tabler soils. A buried soil is below a depth of 32 inches. It varies in thickness and ranges from sandy clay loam to silty clay. The content of sand increases with increasing depth. In some small areas the surface layer is fine sandy loam.

Farnum and similar soils

Setting

Percentage of the map unit: 20 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.7 inches

Interpretive groups

Land capability classification (nonirrigated): 2c

Land capability classification (irrigated): 1

Range site: Loamy Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is fine sandy loam.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is well suited to most of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the major crops. The hazard of wind erosion or water erosion is slight. A high shrink-swell potential may limit some engineering practices.

General and detailed information about soil properties and interpretations needed for managing

this map unit is included in subsequent sections of this publication.

3511—Saltcreek and Naron fine sandy loams, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on level or nearly level terraces.

Elevation: 1,201 to 1,768 feet

General information: Saltcreek and Naron soils are intermingled on the landscape. The soils are in similar landscape positions.

Component Description

Saltcreek and similar soils

Setting

Percentage of the map unit: 40 to 90 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 4.5 to 6.6

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.0 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 1

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Naron soils. A buried soil is at a depth of 25 to 60 inches. The buried soil varies in thickness and ranges from sandy clay

loam to silty clay. The content of sand generally increases with increasing depth. In some areas the buried soil has a higher content of sand.

Naron and similar soils

Setting

Percentage of the map unit: 10 to 60 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.1 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): 2e

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is well suited to most of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the major crops. The hazard of wind erosion or water erosion is slight. The depth to sand and a high shrink-swell potential may limit some engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3512—Saltcreek and Naron fine sandy loams, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on gently sloping paleoterraces.

Elevation: 1,201 to 2,001 feet

General information: Saltcreek and Naron soils are intermingled on the landscape. The soils are in similar landscape positions.

Component Description

Saltcreek and similar soils

Setting

Percentage of the map unit: 30 to 70 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 4.5 to 6.6

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.0 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 1

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Naron soils. A buried soil varies laterally in thickness and in texture. The buried soil ranges from sandy clay loam to silty clay. The content of sand generally increases with

increasing depth. In some areas the buried soil has a higher content of sand.

Naron and similar soils

Setting

Percentage of the map unit: 30 to 70 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.7 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is well suited to most of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the major crops. The hazard of wind erosion or water erosion is slight. The depth to sand and a high shrink-swell potential may limit some engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3520—Saxman loamy sand, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily on the high flood plains along the Arkansas River.

Elevation: 1,483 to 1,604 feet

Component Description

Saxman and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Flood plains in river valleys

Parent material: Sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.3 percent

Reaction in the surface layer: pH 4.5 to 6.0

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 4.4 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 2e

Range site: Sandy Lowland

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Canadian and Wann soils. In some areas the surface layer is loamy fine sand.

Additional Minor Components

Willowbrook and similar soils: 15 percent

- This component was formerly mapped as Wann soils. The Willowbrook soils are very deep, somewhat poorly drained, and rapidly permeable. They formed in loamy alluvium over sandy alluvium.

Management

Major uses:

- Most areas are used for pasture or range, but some areas are used for the production of hay. This map unit is poorly suited to most of the commonly grown crops. The hazard of water erosion is slight, and the hazard of wind erosion is severe. The depth to sand and the water table can limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3530—Shellabarger, eroded, and Albion soils, 7 to 15 percent slopes

Map Unit Setting

General location: This map unit is primarily in the southern third of the county on strongly sloping and moderately steep side slopes of dissected paleoterraces.

Elevation: 1,201 to 2,001 feet

General information: The Shellabarger soil is on the lower side slopes below the Albion soil.

Component Description

Shellabarger and similar soils

Setting

Percentage of the map unit: 20 to 60 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 7 to 15 percent

Rate of surface runoff: Very high

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.5 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: The surface layer is sandy loam or coarse sandy loam. This soil contains more clay in the subsoil than the Albion soil. In some areas the Shellabarger soil contains several discontinuous clay lenses between the depths of 30 and 80 inches. The lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam. In some small areas the slopes are less than 7 percent.

Albion and similar soils

Setting

Percentage of the map unit: 20 to 60 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 7 to 15 percent

Rate of surface runoff: Very high

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is gravelly sandy loam, coarse sandy loam, loamy sand, or loamy coarse sand. In some areas the soil contains several discontinuous clay lenses between the depths of 20 and 80 inches. The clay lenses range in thickness from 1 to 12 inches and in texture from

silty clay to sandy clay loam. In some small areas the slopes are less than 7 percent.

Additional Minor Components

Clark and similar soils: 5 to 30 percent

- These soils are very deep, well drained, and moderately permeable. They formed in loamy, calcareous alluvium. They are intermingled with the major soils on all parts of the side slopes. In some areas the surface layer is fine sandy loam. In places the slopes are less than 7 percent.

Management

Major uses:

- Most areas are used for pasture or range. This map unit is poorly suited to cropland. The slope limits most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3531—Shellabarger and Nalim soils, 3 to 7 percent slopes

Map Unit Setting

General location: This map unit is in the southern third of the county on steep side slopes of dissected paleoterraces.

Elevation: 751 to 1,749 feet

Mean annual precipitation: 23 to 36 inches

General information: The Shellabarger soil is generally on the steeper, upper parts of the side slopes. The Nalim soil is generally in the less sloping areas on the lower side slopes.

Component Description

Shellabarger and similar soils

Setting

Percentage of the map unit: 30 to 70 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 3 to 7 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 0.2 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.5 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: The surface layer is sandy loam or coarse sandy loam. This soil contains less clay in the subsoil than the Nalim soil. In some places the Shellabarger soil has several laterally discontinuous clay lenses between the depths of 30 and 80 inches. The lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam. About 20 to 45 percent of the areas of the Shellabarger soil have been severely eroded. In these eroded areas the surface layer generally is coarse sandy loam, gravelly sandy loam, gravelly coarse sandy loam, or gravelly loamy coarse sand; is thinner than normal; and has a low or very low content of organic matter.

Nalim and similar soils

Setting

Percentage of the map unit: 30 to 70 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 3 to 7 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 10.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): 2e

Range site: Loamy Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Farnum soils in the southern third of the county. In some areas the surface layer is fine sandy loam. In places the slopes are less than 3 percent. In some areas the soil has several laterally discontinuous clay lenses between the depths of 40 and 80 inches. The clay lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam. Some areas are moderately eroded. As a result, the surface layer is thinner than normal and has a lower content of organic matter.

Management**Major uses:**

- Most areas are used as cropland or hayland, but some areas are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the main crops. The hazard of wind erosion is slight, and the hazard of water erosion is severe. The potential for ephemeral gully erosion is moderate. Wind erosion and water erosion can be controlled by a system of conservation tillage that leaves crop residue on the surface, stripcropping, field windbreaks, contour farming, tall grass barriers, terraces, and grassed waterways. The moderate water-holding capacity of these soils can limit production. Increasing the content of organic matter, leaving crop residue on the surface, and using a system of conservation tillage can help to overcome this limitation. The soils are moderately well suited to most engineering uses, but in some areas the slope can limit some practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3532—Shellabarger loamy sand, 0 to 3 percent slopes**Map Unit Setting**

General location: This map unit is in the southern third

of the county on the gently sloping side slopes of dissected paleoterraces.

Elevation: 1,201 to 1,749 feet

General information: The Shellabarger soil is generally in the less sloping areas on the lower side slopes.

Component Description**Shellabarger and similar soils****Setting**

Percentage of the map unit: 80 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 0 to 3 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 2.0 percent

Reaction in the surface layer: pH 5.1 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.1 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: The surface layer is loamy sand. This soil contains more clay in the subsoil than the minor Albion soils. In some areas the Shellabarger soil contains several discontinuous clay lenses between the depths of 30 and 80 inches. The lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam. About 10 to 25 percent of the areas of the Shellabarger soil have been subject to moderate erosion. In these eroded areas the surface layer generally is thinner than normal and has a low or very low content of organic matter.

Additional Minor Components**Albion and similar soils: 20 percent**

- These soils are very deep, well drained, and

moderately rapidly permeable. They formed in loamy and sandy, old alluvium. They are generally on the steeper, upper parts of the side slopes. In some areas the surface layer is gravelly sandy loam, coarse sandy loam, or loamy coarse sand. In some places the soils have several laterally discontinuous clay lenses between the depths of 20 and 80 inches. The clay lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam. About 10 to 25 percent of the areas of the Albion soils have been moderately eroded. In these eroded areas the surface layer generally is thinner than normal and has a low or very low content of organic matter.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the main crops. The hazard of wind erosion is severe, and the hazard of water erosion is moderate. The potential for ephemeral gully erosion also is moderate. Wind erosion and water erosion can be controlled by a system of conservation tillage that leaves crop residue on the surface, stripcropping, field windbreaks, contour farming, tall grass barriers, terraces, and grassed waterways. The moderate water-holding capacity of the soil can limit production. Increasing the content of organic matter, leaving crop residue on the surface, and using a system of conservation tillage can help to overcome this limitation. In some places the results of soil tests may show soil reaction (pH) in the strongly acid range. Additions of lime may be required for optimum nutrient balance. The moderately rapid permeability and the relatively shallow depth to sandy textures can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3533—Shellabarger sandy loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the southern third of the county on level or nearly level paleoterraces.

Elevation: 1,201 to 1,749 feet

Component Description

Shellabarger and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.1 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.5 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This soil has a lower content of clay in the subsoil than the minor Nalim soils. In some areas the Shellabarger soil contains several discontinuous clay lenses between the depths of 30 and 80 inches. The lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam.

Additional Minor Components

Nalim and similar soils: 15 percent

- This component was formerly mapped as Farnum soils in the southern third of the county. The Nalim soils are very deep, well drained, and moderately permeable. They formed in loamy, old alluvium. They are in landscape positions similar to those of the Shellabarger soil. The Nalim soils typically have a surface layer of sandy loam or coarse sandy loam. In some areas the surface layer is loam. In places the soils have several laterally discontinuous clay lenses

between the depths of 40 and 80 inches. The clay lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the main crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Wind erosion can be controlled by a system of conservation tillage that leaves a cover of crop residue on the surface. The moderate water-holding capacity of the soils can limit production. Increasing the content of organic matter, leaving crop residue on the surface, and using a system of conservation tillage can help to overcome this limitation. In some places the results of soil tests may show soil reaction (pH) in the strongly acid range. Additions of lime may be required for optimum nutrient balance. The moderately rapid permeability and the relatively shallow depth to sandy textures can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3534—Shellabarger sandy loam, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the southern third of the county on the gently sloping side slopes of dissected paleoterraces.

Elevation: 1,201 to 1,749 feet

General information: This soil is generally in the less sloping areas on the lower side slopes.

Component Description

Shellabarger and similar soils

Setting

Percentage of the map unit: 85 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.1 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.5 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This soil is in landscape positions similar to those of the minor Albion soils. The Shellabarger soil has a higher content of clay in the subsoil than the Albion soils. Included in mapping are a few small areas of Nalim soils and soils that contain several discontinuous clay lenses between the depths of 30 and 80 inches. The lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam. About 10 to 25 percent of the areas of the Shellabarger soil have been subject to moderate erosion. In these eroded areas the surface layer generally is coarse sandy loam, gravelly sandy loam, gravelly coarse sandy loam, or gravelly loamy coarse sand; is thinner than normal; and has a low or very low content of organic matter.

Additional Minor Components

Albion and similar soils: 15 percent

- These soils are very deep, well drained, and moderately rapidly permeable. They formed in loamy and sandy, old alluvium. They are generally on the steeper, upper parts of the side slopes. Typically, the surface layer is sandy loam or coarse sandy loam. In some areas the surface layer is gravelly sandy loam, coarse sandy loam, loamy sand, or loamy coarse sand. In places several laterally discontinuous clay lenses are between the depths of 20 and 80 inches. The clay lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam. About 10 to 25 percent of the areas of the Albion soils have been moderately eroded. In these eroded areas the surface layer generally is loamy sand, loamy coarse sand, or gravelly loamy coarse sand; is thinner than

normal; and has a low or very low content of organic matter.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the main crops. The hazard of wind erosion is severe, and the hazard of water erosion is moderate. The potential for ephemeral gully erosion also is moderate. Wind erosion and water erosion can be controlled by a system of conservation tillage that leaves a cover of crop residue on the surface, stripcropping, field windbreaks, contour farming, tall grass barriers, terraces, and grassed waterways. The moderate water-holding capacity of the soil can limit production. Increasing the content of organic matter, leaving crop residue on the surface, and using a system of conservation tillage can help to overcome this limitation. In some places the results of soil tests may show soil reaction (pH) in the strongly acid range. Additions of lime may be required for optimum nutrient balance. The moderately rapid permeability and the relatively shallow depth to sandy textures can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3535—Shellabarger-Nalim complex, 1 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the southern third of the county on the gently sloping side slopes of dissected paleoterraces.

Elevation: 751 to 1,749 feet

Mean annual precipitation: 23 to 36 inches

General information: The Shellabarger soil is generally on the steeper, upper parts of the side slopes. The Nalim soil is generally on the less sloping lower side slopes.

Component Description

Shellabarger and similar soils

Setting

Percentage of the map unit: 55 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.1 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.5 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This soil is in landscape positions similar to those of the Nalim soil. The Shellabarger soil has a lower content of clay in the subsoil than the Nalim soil. In some areas the soil contains several discontinuous clay lenses between the depths of 30 and 80 inches. The lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam.

Nalim and similar soils

Setting

Percentage of the map unit: 45 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Loamy alluvium

Component properties and qualities

Slope: 1 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderately slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected
Available water capacity: About 10.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2e
Land capability classification (irrigated): 2e
Range site: Loamy Upland (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Farnum soils in the southern third of the county. Typically, the surface layer is sandy loam or coarse sandy loam. In some small areas the surface layer is fine sandy loam. In a few small areas the slopes are less than 1 percent. In places the soil contains several discontinuous clay lenses between the depths of 40 and 80 inches. The clay lenses range in thickness from 1 to 12 inches and in texture from silty clay to sandy clay loam.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the main crops. The hazard of wind erosion or water erosion is moderate. The potential for ephemeral gully erosion also is moderate. Wind erosion and water erosion can be controlled by a system of conservation tillage that leaves a cover of crop residue on the surface, stripcropping, field windbreaks, contour farming, tall grass barriers, terraces, and grassed waterways. The moderate water-holding capacity of these soils can limit production. Increasing the content of organic matter, leaving crop residue on the surface, and using a system of conservation tillage can help to overcome this limitation. This map unit is moderately well suited to most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3540—Solvay loamy fine sand, 0 to 2 percent slopes

Map Unit Setting

General location: This map unit is in the western half

of the county in level to gently sloping interdune areas on paleoterraces.

Elevation: 1,516 to 1,804 feet

Component Description

Solvay and similar soils

Setting

Percentage of the map unit: 90 percent
Geomorphic description: Interdune areas on paleoterraces in river valleys
Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 2 percent
Rate of surface runoff: Very low
Content of organic matter in the surface layer: 0.5 to 1.0 percent
Reaction in the surface layer: pH 6.1 to 6.5
Slowest permeability class: Moderately slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Somewhat poorly drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: See "Water Features" table
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 9.0 inches

Interpretive groups

Land capability classification (nonirrigated): 2e
Land capability classification (irrigated): Not typically irrigated
Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile and Farnum soils. In some small areas the surface layer is fine sandy loam. The soil is in depressions on the flood plains.

Additional Minor Components

Hayes and similar soils: 10 percent

- This component was formerly mapped as Naron or Pratt soils. The Hayes soils are very deep and are well drained. Permeability is rapid in the upper part and slow in the lower part. These soils formed in loamy eolian sediments over clayey alluvium. The paleosol varies laterally in thickness and in texture. The texture ranges from sandy clay loam to silty clay. The texture of the paleosol generally becomes coarser with

increasing depth. In some areas the soil contains more sand. In places the slopes are more than 2 percent.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. Many areas are in the Conservation Reserve Program. This map unit is somewhat poorly suited to most of the commonly grown crops. Wheat, grain sorghum, and irrigated corn are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Conservation tillage, crop residue management, and tall grass barriers can help to control wind erosion. The depth to the water table limits many engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3550—Spelvin loamy sand, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the western half of the county in level or nearly level interdune areas on paleoterraces.

Elevation: 1,670 to 1,755 feet

General information: This map unit is along a transitional area between the dune fields and the paleoterraces in the western part of Reno County.

Component Description

Spelvin and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Interdune areas on paleoterraces in river valleys

Parent material: Eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile, Farnum, or Shellabarger soils. In some small areas the slopes are more than 1 percent.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. Many areas are in the Conservation Reserve Program. This map unit is somewhat poorly suited to most of the commonly grown crops. Wheat, grain sorghum, and irrigated corn are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Conservation tillage, crop residue management, and tall grass barriers can help to control wind erosion. This map unit is moderately well suited to most engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3639—Taver loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the northern half of the county on level or nearly level paleoterraces.

Elevation: 1,473 to 1,795 feet

Component Description

Taver and similar soils

Setting

Percentage of the map unit: 90 percent

Geomorphic description: Paleoterraces in river valleys

Parent material: Clayey alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 6.1 to 7.3

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.4 inches

Interpretive groups

Land capability classification (nonirrigated): 2s

Land capability classification (irrigated): Not typically irrigated

Range site: Clay Upland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tabler soils.

Additional Minor Components**Saltcreek and similar soils: 10 percent**

• This component was formerly mapped as Naron soils. The Saltcreek soils are very deep and are well drained. Permeability is moderately rapid in the upper part and slow in the lower part. These soils formed in loamy eolian sediments over clayey alluvium. The paleosol varies laterally in thickness and in texture. The texture ranges from sandy clay loam to silty clay. The texture of the paleosol generally becomes coarser with increasing depth. In some areas the soils contain more sand.

Management

Major uses:

• Most areas are used as cropland, but some areas are used for pasture or range. This map unit is well suited to most of the commonly grown crops, such as wheat, grain sorghum, soybeans, and irrigated corn. The hazard of wind erosion or water erosion is slight. This map unit is moderately well suited to most engineering practices. A high shrink-swell potential limits some practices.

General and detailed information about soil properties and interpretations needed for managing

this map unit is included in subsequent sections of this publication.

3640—Tivin fine sand, 10 to 30 percent slopes**Map Unit Setting**

General location: This map unit is primarily in the northwestern part of the county on moderately steep to very steep dunes on paleoterraces.

Elevation: 1,522 to 1,768 feet

Mean annual precipitation: 24 to 35 inches

Component Description**Tivin and similar soils****Setting**

Percentage of the map unit: 95 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Sandy eolian deposits

Component properties and qualities

Slope: 10 to 30 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat excessively drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 3.2 inches

Interpretive groups

Land capability classification (nonirrigated): 6e

Land capability classification (irrigated): Not typically irrigated

Range site: Choppy Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tivoli soils.

Additional Minor Components**Langdon and similar soils: 5 percent**

• This component was formerly mapped as Tivoli and

Pratt soils. The Langdon soils are very deep, well drained, and rapidly permeable. They formed in eolian deposits.

Management

Major uses:

- Most areas are used for pasture or range. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion is severe, and the hazard of water erosion is moderate. The sandy textures limit most engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3641—Tivin-Dillhut fine sands, 0 to 15 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northeastern part of the county on level to moderately steep dunes on paleoterraces (fig. 14).

Elevation: 1,480 to 1,781 feet

Mean annual precipitation: 24 to 35 inches

General information: The Tivin soil is on high dunes, and the Dillhut soil is on low dunes.

Component Description

Tivin and similar soils

Setting

Percentage of the map unit: 45 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Sandy eolian deposits

Component properties and qualities

Slope: 1 to 15 percent

Rate of surface runoff: Medium

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat excessively drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 3.2 inches

Interpretive groups

Land capability classification (nonirrigated): 6e

Land capability classification (irrigated): Not typically irrigated

Range site: Choppy Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tivoli soils.

Dillhut and similar soils

Setting

Percentage of the map unit: 40 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 7 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 6.0 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Elsmere soils. In some places the surface layer is fine sand.

Additional Minor Components

Solvay and similar soils: 15 percent

- This component was formerly mapped as Carwile and Farnum soils. The Solvay soils are very deep, somewhat poorly drained, and moderately permeable. They formed in loamy eolian deposits over alluvium. In some places the surface layer is loamy fine sand.

Management

Major uses:

- Most areas are used for pasture or range. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. The map unit is poorly suited to most engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3642—Tivin-Willowbrook, occasionally flooded, complex, 0 to 12 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northern half of the county on level to moderately steep dunes on flood plains.

Elevation: 1,463 to 1,611 feet

Mean annual precipitation: 24 to 35 inches

General information: The Tivin soil is on dunes on the flood plains. The Willowbrook soil is on the flood plains.

Component Description

Tivin and similar soils

Setting

Percentage of the map unit: 70 percent

Geomorphic description: Dunes on flood plains in river valleys

Parent material: Sandy eolian deposits

Component properties and qualities

Slope: 1 to 12 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat excessively drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 4.1 inches

Interpretive groups

Land capability classification (nonirrigated): 6e

Land capability classification (irrigated): Not typically irrigated

Range site: Choppy Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tivoli soils.

Willowbrook and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium over sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.6 to 8.4

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: Occasional

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 5.7 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 2e

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Wann soils.

Management

Major uses:

- Most areas are used for pasture or range. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. The sandy textures and the water table limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3643—Tobin silt loam, 0 to 1 percent slopes, occasionally flooded

Map Unit Setting

General location: This map unit is in the northeastern part of the county on level or nearly level flood plains.

Elevation: 1,201 to 2,799 feet

Component Description

Tobin and similar soils

Setting

Percentage of the map unit: 100 percent

Geomorphic description: Flood plains in river valleys

Parent material: Silty alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 4.0 percent

Reaction in the surface layer: pH 5.6 to 7.8

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: Occasional

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 11.9 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): Not typically irrigated

Range site: Loamy Lowland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Vanoss soils.

Management

Major uses:

- Most areas are used as cropland. This map unit is well suited to all of the commonly grown crops. Wheat, grain sorghum, and soybeans are the major crops. A few areas are planted to irrigated corn. The hazard of water erosion is slight, and the hazard of wind erosion is moderate. Erosion can be overcome by using a system of conservation tillage and properly managing

crop residue. This map unit is poorly suited to most engineering uses because of the flooding.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3644—Turon-Carway complex, 0 to 5 percent slopes

Map Unit Setting

General location: This map unit is primarily in the northwestern part of the county on gently sloping and moderately sloping dunes on paleoterraces.

Elevation: 1,516 to 1,804 feet

General information: The Turon soil is on the middle and upper parts of the dunes. The Carway soil is in interdune areas and in depressions on the paleoterrace.

Component Description

Turon and similar soils

Setting

Percentage of the map unit: 65 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Sandy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 5 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.1 to 7.3

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 7.1 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 3e

Range site: Sands (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Pratt soils. A buried soil is below a depth of 40 inches. The buried soil varies in thickness. The texture ranges from sandy clay loam to silty clay. The content of sand in the buried soil generally increases with increasing depth.

Carway and similar soils

Setting

Percentage of the map unit: 20 percent

Geomorphic description: Interdune areas and depressions on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Very slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: Frequent

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 8.6 inches

Interpretive groups

Land capability classification (nonirrigated): 2w

Land capability classification (irrigated): Not typically irrigated

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile soils. In some small areas the surface layer is fine sandy loam.

Additional Minor Components

Solvay and similar soils: 15 percent

- This component was formerly mapped as Carwile and Farnum soils. The Solvay soils are very deep, somewhat poorly drained, and moderately permeable. They formed in loamy eolian deposits over alluvium. They are in interdune areas on the paleoterraces. In some places the surface layer is loamy fine sand.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. This map unit is somewhat poorly suited to most of the commonly grown crops. Wheat and grain sorghum are the major crops. The hazard of wind erosion is severe, and the hazard of water erosion is slight. Crop residue management, conservation tillage, and tall grass barriers can help to control wind erosion. The high water table, a high shrink-swell potential, and the sandy textures limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3760—Urban land-Blazefork-Kaskan complex, 0 to 1 percent slopes, protected

Map Unit Setting

General location: This map unit is in the city limits of Hutchinson in the northeastern part of the county. The map unit is protected from flooding by the levee system that surrounds the city of Hutchinson.

Elevation: 1,099 to 1,601 feet

Component Description

Urban land

Setting

Percentage of the map unit: 20 to 80 percent

Definition: Urban land consists of disturbed soil materials associated with housing, business, or industrial development within the city of Hutchinson. Streets, parking lots, buildings, and other structures obscure or alter the soils so that identification is not feasible.

Blazefork and similar soils

Setting

Percentage of the map unit: 10 to 40 percent

Geomorphic description: Stream terraces in river valleys

Parent material: Silty alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 2.0 to 4.0 percent
Reaction in the surface layer: pH 4.5 to 6.5
Slowest permeability class: Slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Moderately well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: See "Water Features" table
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 9.3 inches

Interpretive groups

Land capability classification (nonirrigated): 2s
Land capability classification (irrigated): 2s
Range site: Clay Lowland (pe25-34)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Tabler soils. In some small areas the surface layer is silt loam.

Kaskan and similar soils

Setting

Percentage of the map unit: 10 to 40 percent
Geomorphic description: Flood plains in river valleys
Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent
Rate of surface runoff: Very low
Content of organic matter in the surface layer: 2.0 to 4.0 percent
Reaction in the surface layer: pH 6.1 to 7.3
Slowest permeability class: Moderate
Depth to restrictive feature: No restrictive feature noted
Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: See "Water Features" table
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 8.7 inches

Interpretive groups

Land capability classification (nonirrigated): 2w
Land capability classification (irrigated): Not typically irrigated
Range site: Loamy Lowland (pe21-28)

A typical soil series description with range in

characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Dale soils. The Kaskan soil is very deep and is well drained. Permeability is moderate in the upper part and rapid in the lower part. The soil formed in alluvium. In some places the surface layer is silty clay loam.

Management

Major uses:

- Most areas of this map unit have been used for development within the city of Hutchinson. Some areas at the edge of the city limits are used as cropland.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3762—Urban land-Darlow-Elmer complex, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the city limits of Hutchinson in the northeastern part of the county (fig. 15). The map unit is protected from flooding by the levee system that surrounds the city of Hutchinson.

Elevation: 1,450 to 1,804 feet

Component Description

Urban land

Setting

Percentage of the map unit: 20 to 80 percent
Definition: Urban land consists of disturbed soil materials associated with housing, business, or industrial development within the city of Hutchinson. Streets, parking lots, buildings, and other structures obscure or alter the soils so that identification is not feasible.

Darlow and similar soils

Setting

Percentage of the map unit: 10 to 40 percent
Geomorphic description: Terraces in river valleys
Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent
Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent
Reaction in the surface layer: pH 4.5 to 7.8
Slowest permeability class: Very slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Somewhat poorly drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Saline within a depth of 30 inches
Sodium-affected condition: Sodic within a depth of 30 inches
Available water capacity: About 7.6 inches

Interpretive groups

Land capability classification (nonirrigated): 4s
Land capability classification (irrigated): 4s
Range site: Claypan (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Farnum soils and Slickspots. In some small areas the surface layer is fine sandy loam. In other small areas the surface layer is very slightly or slightly saline.

Elmer and similar soils

Setting

Percentage of the map unit: 0 to 30 percent
Geomorphic description: Terraces in river valleys
Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent
Rate of surface runoff: Very low
Content of organic matter in the surface layer: 1.0 to 2.0 percent
Reaction in the surface layer: pH 4.5 to 7.3
Slowest permeability class: Slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Moderately well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: More than 80 inches
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Sodic within a depth of 30 inches
Available water capacity: About 9.1 inches

Interpretive groups

Land capability classification (nonirrigated): 3s

Land capability classification (irrigated): 3s
Range site: Loamy Terrace (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Farnum soils and Slickspots. In some places the surface layer is loam. In some areas the surface layer is very slightly or slightly saline.

Additional Minor Components

Punkin and similar soils: 0 to 20 percent

- This component was formerly mapped as Slickspots and Tabler soils. The Punkin soils are very deep, moderately well drained, and very slowly permeable. They formed in saline-sodic, clayey alluvium. In places the surface layer is fine sandy loam. In some areas the surface layer is very slightly or slightly saline.

Management

Major uses:

- Most areas of this map unit have been used for development within the city of Hutchinson. Some areas at the edge of the city limits are used as cropland.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3763—Urban land-Imano complex, 0 to 1 percent slopes, protected

Map Unit Setting

General location: This map unit is in the city limits of Hutchinson in the northeastern part of the county. The map unit is protected from flooding by the levee system that surrounds the city of Hutchinson.

Elevation: 1,401 to 2,402 feet

Component Description

Urban land

Setting

Percentage of the map unit: 20 to 80 percent
Definition: Urban land consists of disturbed soil materials associated with housing, business, or industrial development within the city of Hutchinson. Streets, parking lots, buildings, and other structures obscure or alter the soils so that identification is not feasible.

Imano and similar soils**Setting**

Percentage of the map unit: 20 to 60 percent
Geomorphic description: Flood plains in river valleys
Parent material: Loamy alluvium over sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent
Rate of surface runoff: Very low
Content of organic matter in the surface layer: 1.0 to 3.0 percent
Reaction in the surface layer: pH 7.4 to 8.4
Slowest permeability class: Moderately slow
Depth to restrictive feature: No restrictive feature noted
Drainage class: Somewhat poorly drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: See "Water Features" table
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 6.3 inches

Interpretive groups

Land capability classification (nonirrigated): 3w
Land capability classification (irrigated): Not typically irrigated
Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: In some small areas the surface layer is silty clay loam.

Additional Minor Components**Willowbrook and similar soils: 0 to 25 percent**

- This component was formerly mapped as Wann soils. The Willowbrook soils are very deep, somewhat poorly drained, and moderately rapidly permeable. They formed in loamy alluvium over sandy alluvium.

Management**Major uses:**

- Most areas of this map unit have been used for development within the city of Hutchinson. Some areas at the edge of the city limits are used as cropland.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3764—Urban land-Mahone complex, 0 to 1 percent slopes, protected**Map Unit Setting**

General location: This map unit is in the city limits of Hutchinson in the northeastern part of the county. The map unit is protected from flooding by the levee system that surrounds the city of Hutchinson (fig. 16).

Elevation: 1,401 to 1,650 feet

Component Description**Urban land****Setting**

Percentage of the map unit: 20 to 80 percent
Definition: Urban land consists of disturbed soil materials associated with housing, business, or industrial development within the city of Hutchinson. Streets, parking lots, buildings, and other structures obscure or alter the soils so that identification is not feasible.

Mahone and similar soils**Setting**

Percentage of the map unit: 20 to 80 percent
Geomorphic description: Flood plains in river valleys
Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent
Content of organic matter in the surface layer: 1.0 to 2.0 percent
Reaction in the surface layer: pH 5.1 to 7.3
Slowest permeability class: Moderate
Depth to restrictive feature: No restrictive feature noted
Drainage class: Well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: See "Water Features" table
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 8.9 inches

Interpretive groups

Land capability classification (nonirrigated): 2w
Land capability classification (irrigated): Not typically irrigated
Range site: Loamy Lowland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Canadian soils.

Additional Minor Components

Yaggy and similar soils: 0 to 15 percent

- This component was formerly mapped as Platte soils. The Yaggy soils are very deep, somewhat poorly drained, and rapidly permeable. They formed in sandy alluvium. In places the surface layer is loamy fine sand.

Management

Major uses:

- Most areas of this map unit have been used for development within the city of Hutchinson. Some areas at the edge of the city limits are used as cropland.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3765—Urban land-Saltcreek-Naron complex, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is in the city limits of Hutchinson in the northeastern part of the county. The map unit is protected from flooding by the levee system that surrounds the city of Hutchinson.

Elevation: 1,201 to 1,768 feet

Component Description

Urban land

Setting

Percentage of the map unit: 20 to 80 percent

Definition: Urban land consists of disturbed soil materials associated with housing, business, or industrial development within the city of Hutchinson. Streets, parking lots, buildings, and other structures obscure or alter the soils so that identification is not feasible.

Saltcreek and similar soils

Setting

Percentage of the map unit: 20 to 50 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits over alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 4.5 to 6.6

Slowest permeability class: Slow

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 9.0 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 1

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Naron soils. A buried soil is at a depth of 25 to 60 inches. The buried soil varies in thickness. The texture ranges from sandy clay loam to silty clay. The content of sand generally increases with increasing depth. In some areas the buried soil has a higher content of sand.

Naron and similar soils

Setting

Percentage of the map unit: 5 to 30 percent

Geomorphic description: Dunes on paleoterraces in river valleys

Parent material: Loamy eolian deposits

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 3.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 9.1 inches

Interpretive groups

Land capability classification (nonirrigated): 2e
Land capability classification (irrigated): 2e
Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Management

Major uses:

- Most areas of this map unit have been used for development within the city of Hutchinson. Some areas at the edge of the city limits are used as cropland.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3766—Urban land-Saxman complex, 0 to 1 percent slopes, protected

Map Unit Setting

General location: This map unit is in the city limits of Hutchinson in the northeastern part of the county. The map unit is protected from flooding by the levee system that surrounds the city of Hutchinson.

Elevation: 1,483 to 1,604 feet

Component Description

Urban land

Setting

Percentage of the map unit: 20 to 80 percent
Definition: Urban land consists of disturbed soil materials associated with housing, business, or industrial development within the city of Hutchinson. Streets, parking lots, buildings, and other structures obscure or alter the soils so that identification is not feasible.

Saxman and similar soils

Setting

Percentage of the map unit: 20 to 80 percent
Geomorphic description: Flood plains in river valleys
Parent material: Sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low
Content of organic matter in the surface layer: 0.0 to 1.3 percent
Reaction in the surface layer: pH 4.5 to 6.0
Slowest permeability class: Moderately rapid
Depth to restrictive feature: No restrictive feature noted
Drainage class: Moderately well drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: See "Water Features" table
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 4.4 inches

Interpretive groups

Land capability classification (nonirrigated): 3e
Land capability classification (irrigated): 2e
Range site: Sandy Lowland

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Canadian and Wann soils. In some small areas the surface layer is loamy fine sand.

Additional Minor Components

Willowbrook and similar soils: 0 to 20 percent

- This component was formerly mapped as Wann soils. The Willowbrook soils are very deep, somewhat poorly drained, and rapidly permeable. They formed in loamy alluvium over sandy alluvium.

Management

Major uses:

- Most areas of this map unit have been used for development within the city of Hutchinson. Some areas at the edge of the city limits are used as cropland.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3767—Urban land-Willowbrook complex, 0 to 1 percent slopes, protected

Map Unit Setting

General location: This map unit is in the city limits of Hutchinson in the northeastern part of the county. The map unit is protected from flooding by the

levee system that surrounds the city of Hutchinson.

Elevation: 1,463 to 1,611 feet

Component Description

Urban land

Setting

Percentage of the map unit: 20 to 80 percent

Definition: Urban land consists of disturbed soil materials associated with housing, business, or industrial development within the city of Hutchinson. Streets, parking lots, buildings, and other structures obscure or alter the soils so that identification is not feasible.

Willowbrook and similar soils

Setting

Percentage of the map unit: 20 to 80 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium over sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.6 to 8.4

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 5.7 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 2e

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Wann soils.

Additional Minor Components

Nickerson and similar soils: 0 to 20 percent

- This component was formerly mapped as Carwile and Farnum soils. The Nickerson soils are very deep, moderately well drained, and moderately permeable.

They formed in loamy alluvium. In some places the surface layer is loamy fine sand.

Management

Major uses:

- Most areas of this map unit have been used for development within the city of Hutchinson. Some areas at the edge of the city limits are used as cropland.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3768—Urban land-Yaggy complex, 0 to 1 percent slopes, protected

Map Unit Setting

General location: This map unit is in the city limits of Hutchinson in the northeastern part of the county. The map unit is protected from flooding by the levee system that surrounds the city of Hutchinson.

Elevation: 1,480 to 1,591 feet

Component Description

Urban land

Setting

Percentage of the map unit: 20 to 80 percent

Definition: Urban land consists of disturbed soil materials associated with housing, business, or industrial development within the city of Hutchinson. Streets, parking lots, buildings, and other structures obscure or alter the soils so that identification is not feasible.

Yaggy and similar soils

Setting

Percentage of the map unit: 20 to 80 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium over sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: None
Depth to water table: See "Water Features" table
Ponding: None
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 4.5 inches

Interpretive groups

Land capability classification (nonirrigated): 3e
Land capability classification (irrigated): 2e
Range site: Sandy Lowland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Platte soils. In some small areas the surface layer is loamy fine sand.

Additional Minor Components

Imano and similar soils: 0 to 20 percent

- These soils are very deep and are somewhat poorly drained. Permeability is moderate in the upper part and rapid in the lower part. The soils formed in loamy alluvium over sandy alluvium. In some places the surface layer is silty clay loam.

Management

Major uses:

- Most areas of this map unit have been used for development within the city of Hutchinson. Some areas at the edge of the city limits are used as cropland.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3900—Warnut fine sandy loam, 0 to 1 percent slopes

Map Unit Setting

General location: This map unit is primarily in the western half of the county in depressions on paleoterraces.

Elevation: 1,516 to 1,804 feet

Component Description

Warnut and similar soils

Setting

Percentage of the map unit: 75 percent

Geomorphic description: Depressions on paleoterraces in river valleys
Parent material: Loamy alluvium

Component properties and qualities

Slope: 0 to 1 percent
Rate of surface runoff: Very low
Content of organic matter in the surface layer: 0.5 to 1.0 percent
Reaction in the surface layer: pH 5.6 to 6.5
Slowest permeability class: Moderate
Depth to restrictive feature: No restrictive feature noted
Drainage class: Poorly drained
Native plant cover type: Rangeland
Flooding: None
Depth to water table: See "Water Features" table
Ponding: Frequent
Salt-affected condition: Not affected
Sodium-affected condition: Not affected
Available water capacity: About 8.3 inches

Interpretive groups

Land capability classification (nonirrigated): 2w
Land capability classification (irrigated): Not typically irrigated
Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Carwile soils.

Additional Minor Components

Carway and similar soils: 25 percent

- This component was formerly mapped as Carwile soils. The Carway soils are very deep and are somewhat poorly drained. Permeability is moderate in the upper part and slow in the lower part. The soils formed in loamy eolian deposits over alluvium. In some areas the surface layer is loamy fine sand.

Management

Major uses:

- Most areas are used for range or pasture, but some areas are used as cropland. This map unit is poorly suited to most of the commonly grown crops. The hazard of wind erosion or water erosion is slight. The depth to the water table can severely limit most engineering practices.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

3926—Water**Description**

- Water areas more than 5 acres in size.

3966—Willowbrook fine sandy loam, 0 to 1 percent slopes, occasionally flooded**Map Unit Setting**

General location: This map unit is primarily on the flood plains along the Arkansas River.

Elevation: 1,463 to 1,611 feet

Component Description**Willowbrook and similar soils****Setting**

Percentage of the map unit: 90 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium over sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.6 to 8.4

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: Occasional

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 5.7 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 2e

Range site: Subirrigated (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Wann soils.

Additional Minor Components**Nickerson and similar soils: 10 percent**

- This component was formerly mapped as Carwile and Farnum soils. The Nickerson soils are very deep, moderately well drained, and moderately permeable.

They formed in loamy alluvium. In some places the surface layer is loamy fine sand.

Management**Major uses:**

- Most areas are used for pasture or range, but some areas are used for the production of hay. This map unit is poorly suited to most of the commonly grown crops. The hazard of water erosion is slight, and the hazard of wind erosion is severe. The depth to sand and the water table can limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

4004—Yaggy fine sandy loam, 0 to 1 percent slopes**Map Unit Setting**

General location: This map unit is primarily on the flood plains along the Arkansas River.

Elevation: 1,480 to 1,591 feet

Component Description**Yaggy and similar soils****Setting**

Percentage of the map unit: 95 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium over sandy alluvium

Component properties and qualities

Slope: 0 to 1 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: Occasional

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 4.5 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 2e

Range site: Sandy Lowland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Platte soils. In some small areas the surface layer is loamy fine sand.

Additional Minor Components

Imano and similar soils: 5 percent

- These soils are very deep and are somewhat poorly drained. Permeability is moderate in the upper part and rapid in the lower part. The soils formed in loamy alluvium over sandy alluvium. In some places the surface layer is silty clay loam.

Management

Major uses:

- Most areas are used for pasture or range, but some areas are used for the production of hay. This map unit is poorly suited to most of the commonly grown crops. The hazard of water erosion is slight, and the hazard of wind erosion is severe. The depth to sand and the water table can limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

4005—Yaggy-Saxman complex, 0 to 2 percent slopes, occasionally flooded

Map Unit Setting

General location: This map unit is primarily in the southern half of the county on level or nearly level flood plains.

Elevation: 1,480 to 1,604 feet

General information: The Yaggy soil is generally lower on the flood plains than the Saxman soil.

Component Description

Yaggy and similar soils

Setting

Percentage of the map unit: 60 percent

Geomorphic description: Flood plains in river valleys

Parent material: Loamy alluvium over sandy alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.5 to 1.0 percent

Reaction in the surface layer: pH 7.4 to 8.4

Slowest permeability class: Moderate

Depth to restrictive feature: No restrictive feature noted

Drainage class: Somewhat poorly drained

Native plant cover type: Rangeland

Flooding: Occasional

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 4.5 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 2e

Range site: Sandy Lowland (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Platte soils. In some small areas the surface layer is loamy fine sand.

Saxman and similar soils

Setting

Percentage of the map unit: 30 percent

Geomorphic description: Flood plains in river valleys

Parent material: Sandy alluvium

Component properties and qualities

Slope: 0 to 2 percent

Rate of surface runoff: Very low

Content of organic matter in the surface layer: 0.0 to 1.3 percent

Reaction in the surface layer: pH 4.5 to 6.0

Slowest permeability class: Moderately rapid

Depth to restrictive feature: No restrictive feature noted

Drainage class: Moderately well drained

Native plant cover type: Rangeland

Flooding: Rare

Depth to water table: See "Water Features" table

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 4.4 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): 2e

Range site: Sandy Lowland

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component

was formerly mapped as Canadian and Wann soils. In some small areas the surface layer is loamy fine sand.

Additional Minor Components

Solvay and similar soils: 10 percent

- This component was formerly mapped as Carwile and Farnum soils. The Solvay soils are very deep, somewhat poorly drained, and moderately permeable. They formed in loamy eolian deposits over alluvium. In some places the surface layer is fine sandy loam. These soils are in depressions on the flood plains.

Management

Major uses:

- Most areas are used for pasture or range, but some areas are used for the production of hay. This map unit is poorly suited to most of the commonly grown crops. The hazard of water erosion is slight, and the hazard of wind erosion is severe. The depth to sand and the water table can limit most engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

4110—Zellmont and Poxmash sandy loams, 0 to 3 percent slopes

Map Unit Setting

General location: This map unit is in the southern third of the county on the level to gently sloping side slopes of terraces.

Elevation: 751 to 2,001 feet

Mean annual precipitation: 24 to 35 inches

General information: The Poxmash and Zellmont soils are intermingled on the landscape.

Component Description

Zellmont and similar soils

Setting

Percentage of the map unit: 40 to 90 percent

Geomorphic description: Strath terraces in river valleys

Parent material: Loamy alluvium over residuum derived from Permian shale

Component properties and qualities

Slope: 0 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 1.0 to 2.0 percent

Reaction in the surface layer: pH 5.6 to 7.3

Slowest permeability class: Slow

Depth to restrictive feature: Bedrock (paralithic) at a depth of 32 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 4.9 inches

Interpretive groups

Land capability classification (nonirrigated): 2e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe24-32)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Shellabarger, shale substratum, soils. In some small areas the surface layer is sandy clay loam.

Poxmash and similar soils

Setting

Percentage of the map unit: 10 to 60 percent

Geomorphic description: Strath terraces in river valleys

Parent material: Alluvium over residuum derived from Permian shale

Component properties and qualities

Slope: 0 to 3 percent

Rate of surface runoff: Low

Content of organic matter in the surface layer: 0.8 to 2.0 percent

Reaction in the surface layer: pH 5.6 to 6.5

Slowest permeability class: Slow

Depth to restrictive feature: Bedrock (paralithic) at a depth of 51 inches

Drainage class: Well drained

Native plant cover type: Rangeland

Flooding: None

Depth to water table: More than 80 inches

Ponding: None

Salt-affected condition: Not affected

Sodium-affected condition: Not affected

Available water capacity: About 4.9 inches

Interpretive groups

Land capability classification (nonirrigated): 3e

Land capability classification (irrigated): Not typically irrigated

Range site: Sandy (pe21-28)

A typical soil series description with range in characteristics is included, in alphabetical order, under the heading "Soil Series and Their Morphology."

Additional component information: This component was formerly mapped as Shellabarger, shale substratum, soils. In some places the surface layer is loamy sand.

Management

Major uses:

- Most areas are used as cropland, but some areas are used for pasture or range. Some areas are in the Conservation Reserve Program. This map unit is moderately well suited to all of the commonly grown crops. Wheat, grain sorghum, soybeans, and irrigated corn are the main crops. The hazard of wind erosion is severe, and the hazard of water erosion is moderate.

The potential for ephemeral gully erosion also is moderate. Wind erosion and water erosion can be controlled by a system of conservation tillage that maintains a cover of crop residue on the surface, stripcropping, field windbreaks, contour farming, tall grass barriers, terraces, and grassed waterways. The moderate water-holding capacity of these soils can limit production. Increasing the content of organic matter, leaving crop residue on the surface, and using a system of conservation tillage can help to overcome this limitation. In some places the results of soil tests may show soil reaction (pH) in the strongly acid range. Additions of lime may be required for optimum nutrient balance. The moderately rapid permeability and the relatively shallow depth to bedrock can limit some engineering uses.

General and detailed information about soil properties and interpretations needed for managing this map unit is included in subsequent sections of this publication.

Table 4.--Acreage and Proportionate Extent of the Soils

Map symbol	Soil name	Acres	Percent
990	Abbyville loam, 0 to 1 percent slopes-----	3,122	0.4
991	Abbyville-Kisiwa complex, 0 to 2 percent slopes, flooded-----	6,896	0.8
1004	Albion sandy loam, 0 to 1 percent slopes-----	1,517	0.2
1011	Albion-Shellabarger sandy loams, 1 to 3 percent slopes-----	23,878	2.9
1057	Aquents, frequently ponded-----	91	*
1061	Arents, earthen dam-----	50	*
1062	Arents, loamy-----	145	*
1070	Avans loam, 0 to 1 percent slopes-----	15,456	1.9
1071	Avans loam, 1 to 3 percent slopes-----	22,488	2.8
1072	Avans loam, 3 to 7 percent slopes-----	1,520	0.2
1191	Blazefork silty clay loam, 0 to 1 percent slopes, rarely flooded-----	414	*
1192	Blazefork-Kaskan complex, 0 to 1 percent slopes, rarely flooded-----	1,313	0.2
1200	Buhler-Blazefork silty clay loams, 0 to 1 percent slopes, rarely flooded-----	3,029	0.4
1324	Carway and Carbika soils, 0 to 1 percent slopes-----	6,728	0.8
1357	Carway-Dillhut-Solvay complex, 0 to 2 percent slopes-----	4,810	0.6
1359	Clark-Ost loams, 3 to 7 percent slopes-----	3,174	0.4
1428	Crete silt loam, 0 to 1 percent slopes-----	4,225	0.5
1429	Crete silt loam, 1 to 3 percent slopes-----	5,237	0.6
1553	Darlow-Elmer complex, 0 to 2 percent slopes-----	19,403	2.4
1554	Dillhut fine sand, 1 to 3 percent slopes-----	1,716	0.2
1555	Dillhut-Plev complex, 0 to 2 percent slopes-----	5,556	0.7
1556	Dillhut-Solvay complex, 0 to 3 percent slopes-----	12,466	1.5
1725	Farnum and Funmar loams, 0 to 1 percent slopes-----	27,529	3.4
1727	Funmar-Taver loams, 0 to 2 percent slopes-----	20,502	2.5
1804	Geary silt loam, 1 to 3 percent slopes-----	1,317	0.2
1807	Geary silty clay loam, 3 to 7 percent slopes, moderately eroded-----	252	*
1985	Hayes fine sandy loam, 1 to 5 percent slopes-----	4,502	0.6
1986	Hayes-Solvay loamy fine sands, 0 to 5 percent slopes-----	31,866	3.9
1987	Hayes-Turon complex, 0 to 5 percent slopes-----	8,593	1.1
2204	Jamash-Piedmont clay loams, 0 to 1 percent slopes-----	3,369	0.4
2205	Jamash-Piedmont clay loams, 1 to 3 percent slopes-----	29,029	3.6
2206	Jamash-Piedmont clay loams, 3 to 12 percent slopes-----	2,341	0.3
2207	Jamash clay loam, 0 to 8 percent slopes-----	5,893	0.7
2381	Kanza-Ninnescah sandy loams, 0 to 2 percent slopes, commonly flooded-----	21,546	2.6
2390	Kaskan loam, 0 to 1 percent slopes, rarely flooded-----	2,255	0.3
2391	Kaskan silty clay loam, 0 to 1 percent slopes, frequently flooded, channeled-----	1,720	0.2
2395	Kisiwa loam, 0 to 1 percent slopes-----	5,869	0.7
2509	Ladysmith silty clay loam, 0 to 1 percent slopes-----	758	*
2556	Langdon fine sand, 0 to 15 percent slopes-----	11,458	1.4
2587	Imano clay loam, 0 to 1 percent slopes, occasionally flooded-----	5,851	0.7
2588	Longford silty clay loam, 3 to 7 percent slopes, moderately eroded-----	1,276	0.2
2812	Mahone loamy fine sand, 0 to 2 percent slopes, rarely flooded-----	6,346	0.8
2948	Nalim loam, 0 to 1 percent slopes-----	23,391	2.9
2949	Naron fine sandy loam, 3 to 7 percent slopes, moderately eroded-----	2,716	0.3
2950	Naron fine sandy loam, 7 to 15 percent slopes, moderately eroded-----	327	*
2951	Nash silt loam, 1 to 3 percent slopes-----	6,096	0.7
2952	Nash-Lucien silt loams, 3 to 7 percent slopes-----	763	*
2953	Nash-Lucien silt loams, 7 to 15 percent slopes, moderately eroded-----	2,286	0.3
2955	Nickerson fine sandy loam, 0 to 1 percent slopes-----	3,298	0.4
2956	Nickerson loamy fine sand, 0 to 2 percent slopes-----	5,076	0.6
2957	Nickerson-Punkin fine sandy loams, 0 to 2 percent slopes-----	3,565	0.4
2958	Ninnescah fine sandy loam, 0 to 1 percent slopes, occasionally flooded-----	3,439	0.4
2959	Ninnescah fine sandy loam, 0 to 1 percent slopes, occasionally flooded, saline-----	2,555	0.3
3051	Ost loam, 0 to 1 percent slopes-----	8,880	1.1
3052	Ost-Clark loams, 1 to 3 percent slopes-----	23,478	2.9
3170	Penalosa silt loam, 0 to 1 percent slopes-----	8,355	1.0
3171	Penalosa silt loam, 1 to 3 percent slopes-----	4,511	0.6
3180	Pratt fine sand, 5 to 10 percent slopes-----	4,530	0.6
3181	Pratt-Turon fine sands, 1 to 5 percent slopes-----	25,578	3.1
3190	Punkin silt loam, 0 to 1 percent slopes-----	4,609	0.6
3191	Punkin-Taver complex, 0 to 1 percent slopes-----	14,192	1.7
3403	Sand pits-----	240	*

See footnote at end of table.

Table 4.--Acreage and Proportionate Extent of the Soils--Continued

Map symbol	Soil name	Acres	Percent
3469	Smolan silty clay loam, 1 to 3 percent slopes-----	1,625	0.2
3510	Saltcreek-Funmar-Farnum complex, 1 to 3 percent slopes-----	14,104	1.7
3511	Saltcreek and Naron fine sandy loams, 0 to 1 percent slopes-----	6,599	0.8
3512	Saltcreek and Naron fine sandy loams, 1 to 3 percent slopes-----	31,591	3.9
3520	Saxman loamy sand, 0 to 1 percent slopes-----	6,299	0.8
3530	Shellabarger, eroded, and Albion soils, 7 to 15 percent slopes-----	5,097	0.6
3531	Shellabarger and Nalim soils, 3 to 7 percent slopes-----	1,605	0.2
3532	Shellabarger loamy sand, 0 to 3 percent slopes-----	2,674	0.3
3533	Shellabarger sandy loam, 0 to 1 percent slopes-----	11,405	1.4
3534	Shellabarger sandy loam, 1 to 3 percent slopes-----	61,715	7.6
3535	Shellabarger-Nalim complex, 1 to 3 percent slopes-----	34,997	4.3
3540	Solvay loamy fine sand, 0 to 2 percent slopes-----	7,648	0.9
3550	Spelvin loamy sand, 0 to 1 percent slopes-----	4,938	0.6
3639	Taver loam, 0 to 1 percent slopes-----	20,848	2.6
3640	Tivin fine sand, 10 to 30 percent slopes-----	4,778	0.6
3641	Tivin-Dillhut fine sands, 0 to 15 percent slopes-----	33,540	4.1
3642	Tivin-Willowbrook, occasionally flooded, complex, 0 to 12 percent slopes-----	1,171	0.1
3643	Tobin silt loam, 0 to 1 percent slopes, occasionally flooded-----	513	*
3644	Turon-Carway complex, 0 to 5 percent slopes-----	23,438	2.9
3760	Urban land-Blazefork-Kaskan complex, 0 to 1 percent slopes, protected-----	1,034	0.1
3762	Urban land-Darlow-Elmer complex, 0 to 1 percent slopes-----	4,452	0.5
3763	Urban land-Imano complex, 0 to 1 percent slopes, protected-----	1,422	0.2
3764	Urban land-Mahone complex, 0 to 1 percent slopes, protected-----	1,149	0.1
3765	Urban land-Saltcreek-Naron complex, 0 to 1 percent slopes-----	1,217	0.1
3766	Urban land-Saxman complex, 0 to 1 percent slopes, protected-----	1,075	0.1
3767	Urban land-Willowbrook complex, 0 to 1 percent slopes, protected-----	864	0.1
3768	Urban land-Yaggy complex, 0 to 1 percent slopes, protected-----	289	*
3900	Warnut fine sandy loam, 0 to 1 percent slopes-----	202	*
3926	Water-----	11,840	1.5
3966	Willowbrook fine sandy loam, 0 to 1 percent slopes, occasionally flooded-----	5,840	0.7
4004	Yaggy fine sandy loam, 0 to 1 percent slopes-----	7,851	1.0
4005	Yaggy-Saxman complex, 0 to 2 percent slopes, occasionally flooded-----	11,994	1.5
4110	Zellmont and Poxmash sandy loams, 0 to 3 percent slopes-----	6,981	0.9
	Total-----	814,186	100.0

* Less than 0.1 percent.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey.

Soil properties are ascertained by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help to characterize key soils.

The estimates of soil properties are shown in tables. They include engineering index properties, physical and chemical properties, and pertinent soil and water features.

Engineering Index Properties

Table 5 gives estimates of the engineering classifications and the range of index properties for the layers of each soil in the survey area.

Depth to the upper and lower boundaries of each layer is indicated.

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 15 percent or more, 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, 1998) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 1998).

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to particle-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, SC-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 particle-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. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20 or higher for the poorest.

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 oven-dry 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. The estimates are based on test data from the survey area or from nearby areas and on field examination.

The estimates of particle-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 generally omitted in the table.

Physical Properties

Table 6 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In table 6, the estimated clay content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay affect the fertility and physical condition of the soil and the ability of the soil to adsorb cations and to retain moisture. They influence 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 earthmoving operations.

Moist bulk density is the weight of soil (oven-dry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at $1/3$ - or $1/10$ -bar (33kPa or 10kPa) moisture tension. Weight is determined after the soil is dried at 105 degrees C. In the table, the estimated moist bulk density of each soil horizon is expressed in grams per cubic centimeter of soil material that is 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. The moist bulk density of a soil indicates the pore space available for water and roots. Depending on soil texture, a bulk density of more than 1.4 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability (K_{sat}) refers to the ability of a soil to transmit water or air. The term "permeability," as used in soil surveys, indicates saturated hydraulic conductivity (K_{sat}). The estimates in the table indicate

the rate of water movement, in inches per hour, 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 that the soil is capable of storing for use by plants. The capacity for water storage is given in inches of water per inch of soil for each soil layer. The capacity varies, depending on soil properties that affect retention of water. The most important properties are the content of organic matter, 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 the 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.

Linear extensibility refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. It is an expression of the volume change between the water content of the clod at $1/3$ - or $1/10$ -bar tension (33kPa or 10kPa tension) and oven dryness. The volume change is reported in the table as percent change for the whole soil. Volume change is influenced by the amount and type of clay minerals in the soil.

Linear extensibility is used to determine the shrink-swell potential of soils. The shrink-swell potential is low if the soil has a linear extensibility of less than 3 percent; moderate if 3 to 6 percent; high if 6 to 9 percent; and very high if more than 9 percent. If the linear extensibility is more than 3, shrinking and swelling can cause damage to buildings, roads, and other structures and to plant roots. Special design commonly is needed.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In table 6, the estimated content of organic matter 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 by returning crop residue to the soil. Organic matter has a positive effect on available water capacity, water infiltration, soil organism activity, and tillage. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion factors are shown in table 6 as the K factor (K_w and K_f) and the T factor. Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of several factors used in the Universal Soil Loss Equation (USLE) and the Revised Universal Soil Loss Equation (RUSLE) to predict the

average annual rate of soil loss by sheet and rill erosion in tons per acre per year. The estimates are based primarily on percentage of silt, sand, and organic matter and on soil structure and permeability. Values of *K* range from 0.02 to 0.69. Other factors being equal, the higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur without affecting crop productivity over a sustained period. The rate is in tons per acre per year.

Wind erodibility groups are made up of soils that have similar properties affecting their susceptibility to wind erosion in cultivated areas. The soils assigned to group 1 are the most susceptible to wind erosion, and those assigned to group 8 are the least susceptible. The groups are as follows:

1. Coarse sands, sands, fine sands, and very fine sands.
2. Loamy coarse sands, loamy sands, loamy fine sands, loamy very fine sands, ash material, and sapric soil material.
3. Coarse sandy loams, sandy loams, fine sandy loams, and very fine sandy loams.
- 4L. Calcareous loams, silt loams, clay loams, and silty clay loams.
4. Clays, silty clays, noncalcareous clay loams, and silty clay loams that are more than 35 percent clay.
5. Noncalcareous loams and silt loams that are less than 20 percent clay and sandy clay loams, sandy clays, and hemic soil material.
6. Noncalcareous loams and silt loams that are more than 20 percent clay and noncalcareous clay loams that are less than 35 percent clay.
7. Silts, noncalcareous silty clay loams that are less than 35 percent clay, and fibric soil material.
8. Soils that are not subject to wind erosion because of coarse fragments on the surface or because of surface wetness.

Wind erodibility index is a numerical value indicating the susceptibility of soil to wind erosion, or the tons per acre per year that can be expected to be lost to wind erosion. There is a close correlation between wind erosion and the texture of the surface layer, the size and durability of surface clods, rock fragments,

organic matter, and a calcareous reaction. Soil moisture and frozen soil layers also influence wind erosion.

Chemical Properties

Table 7 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Depth to the upper and lower boundaries of each layer is indicated.

Cation-exchange capacity is the total amount of extractable bases 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 reduces the hazard of ground-water pollution.

Soil reaction is a measure of acidity or alkalinity. The pH of each soil 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 fraction of the soil less than 2 millimeters in size. 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.

Gypsum is expressed as a percent, by weight, of hydrated calcium sulfates in the fraction of the soil less than 20 millimeters in size. Gypsum is partially soluble in water. Soils that have a high content of gypsum 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 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 soil if used as construction material, and the potential of the soil to corrode metal and concrete.

Sodium adsorption ratio (SAR) is a measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration. Soils that have SAR values 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.

Soil Features

Table 8 gives estimates of various soil features. The estimates are used in land use planning that involves engineering considerations.

A *restrictive layer* is a nearly continuous layer that has one or more physical, chemical, or thermal properties that significantly impede the movement of water and air through the soil or that otherwise provide an unfavorable root environment. Examples are bedrock, cemented layers, dense layers, and frozen layers. The table indicates the hardness and thickness of the restrictive layer, both of which significantly affect the ease of excavation.

Potential for 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, content of organic matter, and depth to the water table are the most important factors considered in evaluating the potential for frost action. It is assumed that 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.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that corrodes 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 may be needed if the combination of factors results in a severe hazard of corrosion. The steel or concrete in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than the steel or concrete 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 also is expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and amount of sulfates in the saturation extract.

Water Features

Table 9 gives estimates of various water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are based on estimates of runoff potential. Soils are assigned to one of four groups according to the rate of water infiltration when the soils are not protected by vegetation, are thoroughly wet, and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of 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 chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture 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 chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture 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 chiefly of clays that have a high shrink-swell potential, soils that have a 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.

The *months* in the table indicate the portion of the year in which the feature is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 9 indicates, by month, depth to the top (*upper limit*) and base (*lower limit*) of the saturated zone in most years. Estimates of the upper and lower limits are based mainly on observations of the water table at selected sites and on evidence of a saturated zone, namely grayish colors or mottles (redoximorphic features) in the soil. A saturated zone that lasts for less than a month is not considered a water table.

Ponding is standing water in a closed depression. Unless a drainage system is installed, the water is removed only by percolation, transpiration, or evaporation. Table 9 indicates *surface water depth* and the *duration* and *frequency* of ponding. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, rare, occasional, and frequent. *None* means that ponding is not probable; *rare* that it is unlikely but possible under unusual weather conditions (the chance of ponding is nearly 0 percent to 5 percent in any year); *occasional* that it occurs, on the average, once or less in 2 years (the chance of ponding is 5 to 50 percent in any year); and *frequent* that it occurs, on the average, more than once in 2 years (the chance of ponding is more than 50 percent in any year).

Flooding is the temporary inundation of an area caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, and water standing in swamps and marshes is considered ponding rather than flooding.

Duration and *frequency* are estimated. Duration is expressed as *extremely brief* if 0.1 hour to 4 hours, *very brief* if 4 hours to 2 days, *brief* if 2 to 7 days, *long* if 7 to 30 days, and *very long* if more than 30 days. Frequency is expressed as none, very rare, rare, occasional, frequent, and very frequent. *None* means that flooding is not probable; *very rare* that it is very unlikely but possible under extremely unusual weather conditions (the chance of flooding is less than 1 percent in any year); *rare* that it is unlikely but possible under unusual weather conditions (the chance of flooding is 1 to 5 percent in any year); *occasional* that it occurs infrequently under normal weather conditions (the chance of flooding is 5 to 50 percent in any year); *frequent* that it is likely to occur often under normal weather conditions (the chance of flooding is more than 50 percent in any year but is less than 50 percent in all months in any year); and *very frequent* that it is likely to occur very often under normal weather conditions (the chance of flooding is more than 50 percent in all months of any year). The term *common* may be used to include both occasional and frequent flooding.

The information 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 are local information about the extent and levels 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.

Table 5.--Engineering Index Properties

(Absence of an entry indicates that the data were not estimated.)

Map symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas- ticity index
			Unified	AASHTO	>10	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
990: Abbyville-----	0-8	Loam	CL	A-6	0	0	100	100	85-95	50-70	25-35	10-15
	8-15	Sandy clay loam, loam	CL, SC	A-6	0	0	100	100	90-100	45-65	30-35	10-15
	15-49	Clay loam, loam	CL	A-6, A-7	0	0	100	100	90-100	50-80	35-45	15-20
	49-61	Sandy clay loam, loam, clay loam	CL, SC	A-6, A-7	0	0	100	100	80-100	40-65	30-42	15-20
	61-69	Loam, sandy clay loam, clay loam	CL, SC	A-6, A-7	0	0	100	100	80-100	40-65	30-42	15-20
	69-80	Clay loam, loam, sandy clay loam	CL, SC	A-6, A-7	0	0	100	100	80-100	40-65	30-42	15-20
991: Abbyville-----	0-8	Fine sandy loam	CL	A-6	0	0	100	100	85-95	36-45	20-30	5-10
	8-15	Sandy clay loam, loam	CL, SC	A-6	0	0	100	100	90-100	45-65	30-35	10-15
	15-49	Clay loam, loam	CL	A-6, A-7	0	0	100	100	90-100	50-80	35-45	15-20
	49-61	Sandy clay loam, loam, clay loam	CL, SC	A-6, A-7	0	0	100	100	80-100	40-65	30-42	15-20
	61-69	Loam, sandy clay loam, clay loam	CL, SC	A-6, A-7	0	0	100	100	80-100	40-65	30-42	15-20
	69-80	Clay loam, loam, sandy clay loam	CL, SC	A-6, A-7	0	0	100	100	80-100	40-65	30-42	15-20

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
991: Kisiwa-----	0-4	Loam	CL	A-4, A-6	0	0	100	100	85-96	60-75	30-35	10-15
	4-7	Loam, clay loam	CL	A-6, A-7	0	0	100	100	85-96	60-75	30-35	10-15
	7-23	Clay loam, silty clay loam	CL	A-7-6, A-6	0	0	100	95-100	90-100	65-95	35-45	15-20
	23-40	Clay, clay loam, loam	CL, CH	A-7-6, A-6	0	0	100	95-100	90-100	70-80	35-55	15-30
	40-46	Loam, clay loam, clay	CL, CH	A-7-6, A-6	0	0	94-100	90-100	85-100	55-80	35-55	15-30
	46-58	Fine sandy loam, sandy loam, loamy fine sand	SM, SC	A-4	0	0	85-100	80-100	60-95	40-50	0-30	NP-10
	58-65	Stratified coarse sand to fine sandy loam	SM, SC, SC-SM	A-2-4	0	0	100	95-100	50-90	15-60	0-25	NP-10
	65-80	Stratified coarse sand	SM, SC, SC-SM	A-2-4	0	0	100	100	50-70	15-30	0-25	NP-10
1004: Albion-----	0-9	Sandy loam	SC, SC-SM, SM	A-2, A-4	0	0	100	75-100	60-90	25-45	0-25	NP-10
	9-27	Sandy loam, loam	SC, SC-SM, SM	A-2, A-4	0	0	85-100	75-100	50-95	25-40	20-30	NP-10
	27-48	Loamy coarse sand, coarse sandy loam, loamy sand	SC, SM, SC-SM	A-1-b, A-2	0	0	85-100	75-90	40-70	15-30	0-25	NP-10
	48-80	Sand, loamy sand, gravelly sand	GM, SP-SM, GP-GM, SM	A-1, A-3, A-2	0	0-5	40-100	35-85	30-70	5-30	0-20	NP-5
1011: Albion-----	0-9	Sandy loam	SC, SC-SM, SM	A-2, A-4	0	0	100	75-100	60-90	25-45	0-25	NP-10
	9-27	Sandy loam, loam	SC, SM, SC-SM	A-2, A-4	0	0	85-100	75-100	50-95	25-40	20-30	NP-10
	27-48	Loamy coarse sand, coarse sandy loam, loamy sand	SC, SC-SM, SM	A-1-b, A-2	0	0	85-100	75-90	40-70	15-30	0-25	NP-10
	48-80	Sand, loamy sand, gravelly sand	GM, SP-SM, GP-GM, SM	A-1, A-3, A-2	0	0-5	40-100	35-85	30-70	5-30	0-20	NP-5

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1011: Shellabarger----	0-7	Sandy loam	SM, ML	A-4, A-2	0	0	95-100	95-100	75-100	30-55	0-30	NP-5
	7-19	Sandy clay loam, sandy loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	19-33	Sandy loam, sandy clay loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	33-47	Coarse sandy loam, fine sandy loam, sand	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	47-59	Loamy sand, sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	59-73	Sand, loamy sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	73-80	Sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
1057: Aguents-----	0-3	Silty clay loam	CL	A-7, A-6	0	0	100	100	100	90-100	35-50	15-30
	3-8	Sandy clay loam, sandy loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	8-12	Stratified gravelly coarse sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
	12-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
1061, 1062: Arents.												

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1070: Avans-----	0-5	Loam	CL	A-6	0	0	100	100	95-100	80-100	25-30	10-15
	5-14	Loam, silt loam	CL	A-6	0	0	100	100	95-100	80-100	25-30	10-15
	14-30	Clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	80-95	35-45	15-20
	30-53	Loam, silt loam	CL	A-6	0	0	100	100	95-100	80-95	30-35	10-15
	53-65	Silt loam, loam	CL	A-6	0	0	100	100	95-100	80-95	30-35	10-15
	65-80	Loam, silt loam	CL	A-6	0	0	99-100	99-100	95-100	80-95	30-35	10-15
1071: Avans-----	0-5	Loam	CL	A-6	0	0	100	100	95-100	80-100	25-30	10-15
	5-10	Loam, silt loam	CL	A-6	0	0	100	100	95-100	80-100	25-30	10-15
	10-14	Silt loam, loam	CL	A-6	0	0	100	100	95-100	80-100	25-30	10-15
	14-19	Clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	80-95	35-45	15-20
	19-30	Loam, clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	80-95	35-45	15-20
	30-43	Loam, silt loam	CL	A-6	0	0	100	100	95-100	80-95	30-35	10-15
	43-65	Silt loam, loam	CL	A-6	0	0	100	100	95-100	80-95	30-35	10-15
	65-80	Loam, silt loam	CL	A-6	0	0	99-100	99-100	95-100	80-95	30-35	10-15
1072: Avans-----	0-5	Loam	CL	A-6	0	0	100	100	95-100	80-100	25-30	10-15
	5-10	Loam, silt loam	CL	A-6	0	0	100	100	95-100	80-100	25-30	10-15
	10-14	Silt loam, loam	CL	A-6	0	0	100	100	95-100	80-100	25-30	10-15
	14-19	Clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	80-95	35-45	15-20
	19-30	Loam, clay loam, silty clay loam	CL	A-6, A-7-6	0	0	100	100	95-100	80-95	35-45	15-20
	30-43	Loam, silt loam	CL	A-6	0	0	100	100	95-100	80-95	30-35	10-15
	43-65	Silt loam, loam	CL	A-6	0	0	100	100	95-100	80-95	30-35	10-15
	65-80	Loam, silt loam	CL	A-6	0	0	99-100	99-100	95-100	80-95	30-35	10-15

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
1191:												
Blazefork-----	0-7	Silty clay loam	CL, CH	A-7-6	0	0	100	100	95-100	85-95	45-55	25-35
	7-34	Silty clay, silty clay loam	CH	A-7-6	0	0	100	100	95-100	90-95	50-65	30-40
	34-40	Silty clay, silty clay loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	40-48	Silty clay loam, clay loam, silty clay	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	48-61	Clay loam, silty clay loam, loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	61-80	Loam, clay loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
1192:												
Blazefork-----	0-7	Silty clay loam	CL, CH	A-7-6	0	0	100	100	95-100	85-95	45-55	25-35
	7-34	Silty clay, silty clay loam	CH	A-7-6	0	0	100	100	95-100	90-95	50-65	30-40
	34-40	Silty clay, silty clay loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	40-48	Silty clay loam, clay loam, silty clay	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	48-61	Clay loam, silty clay loam, loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	61-80	Loam, clay loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1192: Kaskan-----	0-7	Loam	CL	A-6	0	0	100	100	95-100	85-100	30-35	10-15
	7-17	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	100	85-100	35-45	15-20
	17-24	Loam	CL	A-6	0	0	100	100	80-95	60-80	30-35	10-15
	24-35	Fine sandy loam	SC, SC-SM	A-2-4, A-4	0	0	100	100	70-85	30-45	20-30	5-10
	35-41	Loamy fine sand, fine sand, sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	41-47	Fine sand, loamy fine sand, sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	47-66	Sand, fine sand, loamy fine sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	66-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	75-95	35-55	1-10	0-0	NP
1200: Buhler-----	0-3	Silty clay loam	CH, CL	A-6, A-7-6	0	0	100	100	95-100	85-95	35-55	15-30
	3-8	Silty clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	95-100	85-95	35-55	15-30
	8-16	Silt loam, loam	CL	A-6	0	0	100	100	80-95	60-85	25-30	10-15
	16-24	Clay loam, silty clay loam, silty clay	CL	A-6, A-7-6	0	0	100	100	95-100	90-99	30-50	15-25
	24-42	Silty clay loam, clay loam, silty clay	CL	A-6, A-7-6	0	0	100	100	95-100	90-99	30-50	15-25
	42-50	Clay, silty clay loam, clay loam	CH, CL	A-6, A-7-6	0	0	100	100	80-100	75-95	35-55	15-30
	50-58	Clay loam, silty clay loam, clay	CH, CL	A-6, A-7-6	0	0	100	100	80-100	75-95	35-55	15-30
	58-76	Fine sandy loam, loam, sandy clay loam	CL, CL-ML, SC-SM, SC	A-4	0	0	100	100	55-70	40-60	20-30	5-10
	76-80	Loam, fine sandy loam, sandy clay loam	CL, CL-ML, SC-SM, SC	A-4	0	0	100	100	55-70	40-60	20-30	5-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
1200:												
Blazefork-----	0-7	Silty clay loam	CL, CH	A-7-6	0	0	100	100	95-100	85-95	45-55	25-35
	7-34	Silty clay, silty clay loam	CH	A-7-6	0	0	100	100	95-100	90-95	50-65	30-40
	34-40	Silty clay, silty clay loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	40-48	Silty clay loam, clay loam, silty clay	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	48-61	Clay loam, silty clay loam, loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	61-80	Loam, clay loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
1324:												
Carway-----	0-7	Fine sandy loam	SC-SM, SC, CL	A-2-6, A-6	0	0	100	100	80-95	30-55	20-30	10-15
	7-15	Sandy clay loam, loam, clay loam	SC, CL	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	15-35	Fine sandy loam, sandy clay loam, loam, clay loam	SC, CL	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	35-72	Clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	90-100	85-99	45-60	25-40
	72-80	Clay loam, silty clay loam, loam, sandy clay loam, sandy loam	SC, CL	A-6	0	0	100	100	75-90	45-60	25-35	10-15

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
1324: Carbika-----	0-11	Silt loam	SC-SM, SM	A-2-4, A-4	0	0	100	100	90-100	30-45	20-30	1-7
	11-15	Clay, silty clay loam, silty clay, clay loam	CH, CL	A-7-6	0	0	100	100	90-100	85-99	45-55	30-35
	15-22	Clay loam, silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	90-100	85-99	45-55	30-35
	22-80	Clay loam, loam, sandy clay loam	CL, SC	A-4, A-6	0	0	100	100	85-100	45-60	30-35	10-15
1357: Carway-----	0-7	Loamy fine sand	SM	A-2-4	0	0	100	100	85-100	15-30	10-20	NP-5
	7-15	Sandy clay loam, loam, clay loam	SC, CL	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	15-35	Fine sandy loam, sandy clay loam, loam, clay loam	SC, CL	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	35-72	Clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	90-100	85-99	45-60	25-40
	72-80	Clay loam, silty clay loam, loam, sandy clay loam, sandy loam	SC, CL	A-6	0	0	100	100	75-90	45-60	25-35	10-15
Dillhut-----	0-10	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-15	0-0	NP
	10-29	Fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-15	0-0	NP
	29-35	Sandy clay loam, fine sandy loam	CL, SC	A-6	0	0	100	100	80-100	40-55	30-40	10-20
	35-43	Fine sandy loam, sandy clay loam	CL, SC	A-6	0	0	100	100	80-100	40-55	30-40	10-20
	43-80	Clay loam, silty clay	CL	A-7-6	0	0	100	100	90-100	70-100	40-50	20-25

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1357: Solvay-----	0-5	Loamy fine sand	SC, CL-ML, SC-SM, SM	A-2-4, A-4	0	0	100	100	80-100	25-55	20-30	3-10
	5-37	Fine sandy loam, sandy clay loam, loam	CL, SC	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	37-58	Fine sandy loam, sandy loam, loamy fine sand	CL-ML, CL, SC, SC-SM	A-4	0	0	100	100	55-100	20-52	20-30	5-10
	58-76	Loamy fine sand, sandy loam, fine sandy loam	CL-ML, SC, CL, SC-SM	A-4	0	0	100	100	55-100	20-52	20-30	5-10
	76-80	Loamy fine sand, sandy loam, fine sandy loam	CL, CL-ML, SC-SM, SC	A-4	0	0	100	100	55-100	20-52	20-30	5-10
1359: Clark-----	0-11	Loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	80-95	60-75	25-35	5-15
	11-16	Loam, clay loam	CL	A-6	0	0	100	95-100	80-100	50-80	30-40	10-20
	16-28	Loam, fine sandy loam	CL, CL-ML	A-4	0	0	100	95-100	80-100	50-80	30-40	10-20
	28-45	Fine sandy loam, loam	CL, CL-ML	A-4	0	0	100	95-100	80-100	50-80	30-40	10-20
	45-65	Fine sandy loam, very fine sandy loam	CL, CL-ML	A-4	0	0	100	95-100	80-100	50-80	30-40	10-20
	65-80	Very fine sandy loam, fine sandy loam	CL, CL-ML	A-4	0	0	100	95-100	80-100	50-80	30-40	10-20
Ost-----	0-8	Loam	CL, CL-ML	A-6, A-4	0	0	95-100	95-100	85-95	60-75	20-35	5-15
	8-18	Loam, clay loam	CL	A-6, A-7	0	0	95-100	90-100	85-100	60-80	30-45	10-20
	18-23	Clay loam, loam, sandy clay loam	CL, SC	A-6, A-7	0	0	95-100	90-100	80-100	35-80	30-45	10-20
	23-38	Clay loam, loam, sandy loam	CL, SC, SC-SM, CL-ML	A-2, A-6, A-4	0	0	85-100	85-100	60-100	30-80	20-40	5-20
	38-80	Loam, clay loam, sandy loam	CL, SC, SC-SM, CL-ML	A-2, A-4, A-6	0	0	85-100	85-100	60-100	30-80	20-40	5-20

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1428: Crete-----	0-5	Silt loam	CL, ML	A-4, A-6	0	0	100	100	100	90-100	30-40	5-15
	5-9	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	90-100	35-50	15-30
	9-38	Silty clay, silty clay loam	CH	A-7	0	0	100	100	100	90-100	50-65	25-40
	38-80	Silty clay loam, silt loam	CH, CL	A-6, A-7	0	0	100	100	100	95-100	30-55	10-35
1429: Crete-----	0-5	Silt loam	CL, ML	A-4, A-6	0	0	100	100	100	90-100	30-40	5-15
	5-9	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	90-100	35-50	15-30
	9-38	Silty clay, silty clay loam	CH	A-7	0	0	100	100	100	90-100	50-65	25-40
	38-80	Silty clay loam, silt loam	CH, CL	A-6, A-7	0	0	100	100	100	95-100	30-55	10-35
1553: Darlow-----	0-8	Loam	CL, CL-ML	A-4, A-6	0	0	100	100	85-95	53-75	21-30	4-11
	8-14	Loam	CL	A-6	0	0	100	100	90-100	60-80	30-39	11-18
	14-20	Clay loam, loam	CL	A-6	0	0	100	100	90-100	60-80	30-39	11-18
	20-26	Loam	CL	A-6	0	0	100	100	90-100	60-80	30-39	11-18
	26-44	Loam, clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	55-80	30-44	11-22
	44-68	Loam, sandy loam	CL-ML, SC, CL, SC-SM	A-4, A-6	0	0	100	100	90-100	40-52	23-37	6-16
	68-80	Sandy loam	SC-SM, SM	A-2	0	0	100	99-100	80-90	16-32	10-18	NP-5
Elmer-----	0-6	Fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	90-100	50-60	20-30	3-10
	6-9	Fine sandy loam	CL-ML, CL, ML	A-4	0	0	100	100	90-100	50-60	20-30	3-10
	9-19	Fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	90-100	50-60	20-30	3-10
	19-37	Fine sandy loam, sandy clay loam	CL, SC	A-6	0	0	100	98-100	90-100	45-60	25-35	10-20
	37-43	Loam, clay loam	CL	A-6, A-7-6	0	0	99-100	98-100	90-100	65-85	30-45	15-25
	43-51	Clay loam, loam	CL	A-6, A-7-6	0	0	99-100	98-100	90-100	65-85	30-45	15-25
	51-61	Fine sandy loam, sandy loam, sandy clay loam	CL, CL-ML, SC-SM, SC	A-2-6, A-2-4, A-4, A-6	0	0	98-100	97-100	85-95	34-55	20-30	6-16
	61-80	Fine sandy loam, sandy loam, sandy clay loam	CL-ML, CL, SC, SC-SM	A-2-6, A-4, A-2-4, A-6	0	0	98-100	97-100	85-95	34-55	20-30	6-16

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
1554:												
Dillhut-----	0-10	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-15	0-0	NP
	10-29	Fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-15	0-0	NP
	29-35	Sandy clay loam, fine sandy loam	CL, SC	A-6	0	0	100	100	80-100	40-55	30-40	10-20
	35-43	Fine sandy loam, sandy clay loam	CL, SC	A-6	0	0	100	100	80-100	40-55	30-40	10-20
	43-80	Clay loam, silty clay	CL	A-7-6	0	0	100	100	90-100	70-100	40-50	20-25
1555:												
Dillhut-----	0-9	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-15	0-0	NP
	9-26	Fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-15	0-0	NP
	26-41	Sandy clay loam, fine sandy loam	CL, SC	A-6	0	0	100	100	80-100	36-55	30-40	10-20
	41-55	Fine sandy loam, sandy clay loam	CL, CL-ML, SC	A-4, A-2, A-6	0	0	100	100	80-95	30-55	26-32	7-11
	55-65	Fine sandy loam	CL, SC, CL-ML	A-4, A-2, A-6	0	0	100	100	80-95	30-55	26-32	7-11
	65-70	Fine sandy loam	CL, CL-ML, SC	A-2, A-4, A-6	0	0	100	100	80-95	30-55	26-32	7-11
	70-80	Fine sandy loam, loamy fine sand, fine sand	SC, SP-SC, SC-SM, SM	A-2-4	0	0	100	100	50-70	5-25	22-30	NP-10
Plev-----	0-4	Loamy fine sand	SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-10	0-19	NP-3
	4-46	Fine sand	SP-SM	A-3	0	0	100	100	80-100	5-10	0-0	NP
	46-75	Fine sandy loam, sandy clay loam	SC, SC-SM	A-2-6, A-2-4, A-4, A-6	0	0	100	100	80-95	30-45	20-35	5-15
	75-80	Loamy fine sand	SP-SM	A-2-4, A-3	0	0	100	100	50-70	5-10	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
1556: Dillhut-----	0-9	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-15	0-0	NP
	9-26	Fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-15	0-0	NP
	26-41	Sandy clay loam, fine sandy loam	CL, SC	A-6	0	0	100	100	80-100	36-55	30-40	10-20
	41-55	Fine sandy loam, sandy clay loam	CL, CL-ML, SC	A-2, A-6, A-4	0	0	100	100	80-95	30-55	26-32	7-11
	55-70	Fine sandy loam	CL, SC, CL-ML	A-4, A-2, A-6	0	0	100	100	80-95	30-55	26-32	7-11
	70-80	Fine sandy loam, loamy fine sand, fine sand	SC-SM, SM, SC, SP-SC	A-2-4	0	0	100	100	50-70	5-25	22-30	NP-10
Solvay-----	0-5	Fine sandy loam	CL-ML, SM, SC, SC-SM	A-2-4, A-4	0	0	100	100	80-100	25-55	20-30	3-10
	5-37	Fine sandy loam, sandy clay loam, loam	CL, SC	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	37-58	Fine sandy loam, sandy loam, loamy fine sand	CL, CL-ML, SC-SM, SC	A-4	0	0	100	100	55-100	20-52	20-30	5-10
	58-80	Loamy fine sand, sandy loam, fine sandy loam	CL, CL-ML, SC-SM, SC	A-4	0	0	100	100	55-100	20-52	20-30	5-10
1725: Farnum-----	0-15	Loam	CL-ML, CL	A-4, A-6	0	0	100	100	90-100	60-85	20-35	5-15
	15-21	Loam	CL	A-6	0	0	100	100	85-100	60-80	30-40	10-15
	21-34	Sandy clay loam, clay loam	SC, CL	A-6, A-7-6	0	0	100	100	70-100	45-80	35-50	15-30
	34-48	Loam, clay loam, sandy clay loam	SC, CL	A-6, A-7-6	0	0	100	100	70-100	45-80	35-50	15-30
	48-73	Clay loam, sandy clay loam	SC, CL	A-6, A-7-6	0	0	100	100	70-100	45-80	35-50	15-30
	73-80	Loam, clay loam, fine sandy loam	SC, CL, SC-SM, CL-ML	A-2, A-4, A-6	0	0	100	95-100	65-100	30-80	20-35	5-15

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1725: Funmar-----	0-12	Loam	CL-ML, CL	A-4, A-6	0	0	100	100	85-100	60-85	25-35	5-15
	12-32	Loam, clay loam, sandy clay loam	CL, ML	A-6, A-4, A-7-6	0	0	100	100	85-100	60-80	30-45	7-20
	32-38	Silty clay loam, silt loam, loam	CL	A-6, A-7-6	0	0	100	100	90-100	75-100	40-50	20-30
	38-66	Silty clay loam, clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	90-100	85-100	45-60	25-35
	66-80	Silty clay loam, sandy clay loam, loam	CL, SC	A-7-6	0	0	100	100	90-100	85-100	45-60	25-35
1727: Funmar-----	0-12	Loam	CL-ML, CL	A-4, A-6	0	0	100	100	85-100	60-85	25-35	5-15
	12-32	Loam, clay loam, sandy clay loam	CL, ML	A-6, A-4, A-7-6	0	0	100	100	85-100	60-80	30-45	7-20
	32-38	Silty clay loam, silt loam, loam	CL	A-6, A-7-6	0	0	100	100	90-100	75-100	40-50	20-30
	38-66	Silty clay loam, clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	90-100	85-100	45-60	25-35
	66-80	Silty clay loam, sandy clay loam, loam	CL, SC	A-7-6	0	0	100	100	90-100	85-100	45-60	25-35

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
1727: Taver-----	0-7	Loam	CL	A-4, A-6	0	0	100	100	96-100	65-85	28-34	9-14
	7-17	Silty clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	96-100	90-99	48-60	30-40
	17-33	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	96-100	90-99	48-60	30-40
	33-53	Silty clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	96-100	90-99	48-60	30-40
	53-64	Clay loam, sandy clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	30-40	15-20
	64-80	Sandy clay loam, clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	30-40	15-20
1804: Geary-----	0-6	Silt loam	CL	A-6	0	0	100	100	95-100	85-95	35-40	15-20
	6-14	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	80-100	25-45	10-20
	14-51	Silty clay loam, clay loam	CL	A-7, A-6	0	0	100	100	90-100	70-95	25-45	15-25
	51-80	Silty clay loam, clay loam, silt loam	CL	A-6, A-7	0	0	100	100	90-100	70-100	25-45	10-20
1807: Geary-----	0-43	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-95	35-45	15-20
	43-80	Silt loam	CL	A-4, A-6	0	0	100	100	90-100	80-100	25-35	10-15

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1985: Hayes-----	0-8	Fine sandy loam	SC-SM, SM, CL-ML	A-2-4, A-4	0	0	100	100	80-95	30-55	20-25	4-7
	8-47	Fine sandy loam, sandy loam	SC, SC-SM, SM, CL-ML	A-2-4, A-4	0	0	100	100	80-95	30-55	21-28	3-10
	47-56	Sandy clay loam, loam	CL	A-6	0	0	100	100	80-100	60-85	30-35	11-15
	56-69	Silty clay, silty clay loam, clay loam	CL, CH	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35
	69-80	Clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35
1986: Hayes-----	0-8	Loamy fine sand	SM, SC-SM	A-2	0	0	100	100	75-95	15-30	0-0	NP
	8-47	Fine sandy loam, sandy loam	SC, SC-SM, SM, CL-ML	A-2-4, A-4	0	0	100	100	80-95	30-55	21-28	3-10
	47-56	Sandy clay loam, loam	CL	A-6	0	0	100	100	80-100	60-85	30-35	11-15
	56-69	Silty clay, silty clay loam, clay loam	CL, CH	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35
	69-80	Clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35
Solvay-----	0-5	Loamy fine sand	SC-SM, SM	A-2-4	0	0	100	100	85-100	15-30	10-20	NP-5
	5-37	Fine sandy loam, sandy clay loam, loam	CL, SC	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	37-58	Fine sandy loam, sandy loam, loamy fine sand	CL, CL-ML, SC-SM, SC	A-4	0	0	100	100	55-100	20-52	20-30	5-10
	58-80	Loamy fine sand, sandy loam, fine sandy loam	CL, CL-ML, SC-SM, SC	A-4	0	0	100	100	55-100	20-52	20-30	5-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
1987:												
Hayes-----	0-8	Loamy fine sand	SM, SC-SM	A-2	0	0	100	100	75-95	15-30	0-0	NP
	8-47	Fine sandy loam, sandy loam	SC, SC-SM, SM, CL-ML	A-2-4, A-4	0	0	100	100	80-95	30-55	21-28	3-10
	47-56	Sandy clay loam, loam	CL	A-6	0	0	100	100	80-100	60-85	30-35	11-15
	56-69	Silty clay, silty clay loam, clay loam	CL, CH	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35
	69-80	Clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35
Turon-----	0-8	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-25	0-0	NP
	8-28	Loamy fine sand, loamy sand	SM, SP-SM	A-2-4	0	0	100	100	80-100	10-25	0-20	NP-3
	28-40	Stratified loamy fine sand to fine sandy loam	SM, SC-SM, SP-SM	A-2-4	0	0	100	100	80-100	10-30	0-23	NP-6
	40-80	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	80-100	80-99	36-52	16-25
2204:												
Jamash-----	0-4	Clay loam	CL, CH	A-7-5, A-7-6	0	0	100	100	96-100	75-98	40-50	15-25
	4-11	Silty clay, silty clay loam, clay loam	CL, CH	A-6, A-7	0	0	100	100	96-100	75-98	45-55	20-30
	11-15	Silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	40-50	15-25
	15-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
2204:												
Piedmont-----	0-7	Clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-43	10-20
	7-20	Clay, silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	20-24	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	24-32	Silty clay, clay, gravelly silty clay	CL, CH, GC, SC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	32-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
2205:												
Jamash-----	0-4	Clay loam	CL, CH	A-7-5, A-7-6	0	0	100	100	96-100	75-98	40-50	15-25
	4-11	Silty clay, silty clay loam, clay loam	CL, CH	A-6, A-7	0	0	100	100	96-100	75-98	45-55	20-30
	11-15	Silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	40-50	15-25
	15-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Piedmont-----	0-7	Clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-43	10-20
	7-20	Clay, silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	20-24	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	24-32	Silty clay, clay, gravelly silty clay	CH, SC, CL, GC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	32-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
2206:												
Jamash-----	0-4	Clay loam	CL, CH	A-7-5, A-7-6	0	0	100	100	96-100	75-98	40-50	15-25
	4-11	Silty clay, silty clay loam, clay loam	CL, CH	A-6, A-7	0	0	100	100	96-100	75-98	45-55	20-30
	11-15	Silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	40-50	15-25
	15-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Piedmont-----	0-7	Clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-43	10-20
	7-20	Clay, silty clay loam, clay loam	CL	A-6, A-7	0	0	100	100	96-100	75-98	31-50	13-26
	20-24	Silty clay loam, silty clay, clay	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	37-60	15-34
	24-32	Silty clay, clay, gravelly silty clay	CH, SC, CL, GC	A-6, A-7	0	0	50-100	50-100	45-100	45-99	37-60	15-34
	32-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
2207:												
Jamash-----	0-4	Clay loam	CL, CH	A-7-5, A-7-6	0	0	100	100	96-100	75-98	40-50	15-25
	4-11	Silty clay, silty clay loam, clay loam	CL, CH	A-6, A-7	0	0	100	100	96-100	75-98	45-55	20-30
	11-15	Silty clay loam, clay loam	CH, CL	A-6, A-7	0	0	100	100	96-100	80-99	40-50	15-25
	15-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
2381:												
Kanza-----	0-4	Sandy loam	SM, SC, SC-SM	A-2, A-4	0	0	95-100	90-100	70-100	10-40	0-25	NP-10
	4-9	Loamy fine sand	SC-SM, SC, SM	A-2, A-4	0	0	95-100	90-100	70-100	10-40	0-25	NP-10
	9-17	Loamy fine sand, loamy sand	SM, SC, SC-SM	A-2, A-4	0	0	95-100	90-100	50-85	10-30	0-25	NP-10
	17-33	Loamy fine sand, fine sand, sand	SM, SC-SM, SP-SM	A-2, A-3, A-4	0	0	90-100	85-100	65-100	5-25	0-20	NP-5
	33-80	Sand, fine sand, loamy fine sand	SM, SC-SM, SP-SM	A-2, A-4, A-3	0	0	90-100	85-100	65-100	5-25	0-20	NP-5
Ninnescah-----	0-6	Sandy loam	SC, SM, SC-SM	A-2-6, A-4, A-2-4, A-6	0	0	100	100	70-100	20-49	15-34	NP-15
	6-19	Sandy loam, fine sandy loam	SC-SM, SC, SM	A-2-6, A-4, A-2-4, A-6	0	0	100	100	70-100	20-49	15-34	NP-15
	19-37	Sandy loam, fine sandy loam	SC, SC-SM, SM	A-2-4, A-4	0	0	100	95-100	70-100	30-49	15-26	NP-10
	37-52	Sandy loam, loamy sand, fine sandy loam	SC-SM, SP-SM, SM	A-2-4, A-3	0	0	100	90-100	60-90	5-35	0-20	NP-6
	52-80	Loamy sand, sandy loam, fine sandy loam	SC-SM, SM, SP-SM	A-2-4, A-3	0	0	100	90-100	60-90	5-35	0-20	NP-6

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
2390:												
Kaskan-----	0-7	Loam	CL	A-6	0	0	100	100	95-100	85-100	30-35	10-15
	7-17	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	100	85-100	35-45	15-20
	17-24	Loam	CL	A-6	0	0	100	100	80-95	60-80	30-35	10-15
	24-35	Fine sandy loam	SC, SC-SM	A-2-4, A-4	0	0	100	100	70-85	30-45	20-30	5-10
	35-41	Loamy fine sand, fine sand, sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	41-47	Fine sand, loamy fine sand, sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	47-66	Sand, fine sand, loamy fine sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	66-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-1-b, A-3, A-2-4	0	0	95-100	75-95	35-55	1-10	0-0	NP
2391:												
Kaskan-----	0-13	Silty clay loam	CL	A-6, A-7	0	0	100	100	100	85-100	35-45	15-20
	13-27	Fine sandy loam, very fine sandy loam	CL-ML, CL, SC, SC-SM	A-4	0	0	100	100	75-95	40-65	20-30	5-10
	27-43	Stratified fine sand to loamy fine sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	43-80	Stratified fine sand to fine sandy loam	SC-SM, SM	A-2-4, A-4	0	0	100	95-100	70-85	30-45	0-20	NP-5

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
2395:												
Kisiwa-----	0-4	Loam	CL	A-4, A-6	0	0	100	100	85-96	60-75	30-35	10-15
	4-7	Loam, clay loam	CL	A-6, A-7	0	0	100	100	85-96	60-75	30-35	10-15
	7-23	Clay loam, silty clay loam	CL	A-7-6, A-6	0	0	100	95-100	90-100	65-95	35-45	15-20
	23-40	Clay, clay loam, loam	CL, CH	A-7-6, A-6	0	0	100	95-100	90-100	70-80	35-55	15-30
	40-46	Loam, clay loam, clay	CL, CH	A-7-6, A-6	0	0	94-100	90-100	85-100	55-80	35-55	15-30
	46-52	Fine sandy loam, sandy loam, loamy fine sand	SM, SC	A-4	0	0	85-100	82-100	60-95	40-50	0-30	NP-10
	52-58	Fine sandy loam, sandy loam, loamy fine sand	SM, SC	A-4	0	0	89-100	80-100	60-95	40-50	0-30	NP-10
	58-65	Stratified coarse sand to fine sandy loam	SM, SC, SC-SM	A-2-4	0	0	100	95-100	50-90	15-60	0-25	NP-10
	65-80	Stratified coarse sand	SM, SC, SC-SM	A-2-4	0	0	100	100	50-70	15-30	0-25	NP-10
2509:												
Ladysmith-----	0-8	Silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-95	30-45	15-25
	8-31	Silty clay, clay	CH	A-7-6	0	0	100	100	95-100	85-95	50-70	30-50
	31-80	Silty clay, silty clay loam, clay	CL, CH	A-7-6	0	0	100	100	95-100	85-95	40-65	25-45
2556:												
Langdon-----	0-8	Fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-25	0-0	NP
	8-47	Stratified sand to loamy sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-25	0-0	NP
	47-64	Sand, fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-20	0-0	NP
	64-80	Stratified sand to loamy sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-25	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
2587:												
Imano-----	0-11	Clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	70-80	35-45	15-22
	11-23	Clay loam, loam	CL	A-4, A-6, A-7-6	0	0	100	100	85-100	60-80	25-45	7-22
	23-80	Sand, coarse sand, fine sand	SM, SP-SM	A-1, A-2, A-3, A-4	0	0	100	95-100	30-85	5-45	0-10	NP
2588:												
Longford-----	0-6	Silty clay loam	CL	A-7	0	0	100	95-100	90-100	85-95	45-50	25-30
	6-11	Silty clay loam	CL	A-7	0	0	100	95-100	90-100	85-95	45-50	25-30
	11-43	Silty clay, silty clay loam	CH	A-7-6	0	0	100	95-100	85-100	75-95	50-60	30-40
	43-80	Silty clay loam, clay loam	CL	A-7	0	0	100	95-100	85-100	75-95	45-50	25-30

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
2812: Mahone-----	0-8	Loamy fine sand	SC-SM, SM	A-2-4, A-4	0	0	100	100	75-95	25-45	0-20	NP-5
	8-14	Fine sandy loam, loamy fine sand	SC-SM, SM	A-2-4, A-4	0	0	100	100	75-95	25-45	0-20	NP-5
	14-25	Fine sandy loam, very fine sandy loam	CL, CL-ML, SC-SM, SC	A-4	0	0	100	90-100	75-95	45-65	20-30	5-10
	25-33	Silt loam, fine sandy loam, very fine sandy loam	CL-ML, CL, SC, SC-SM	A-4	0	0	100	90-100	75-95	45-65	20-30	5-10
	33-39	Fine sandy loam, very fine sandy loam, stratified silt loam to fine sandy loam	CL, CL-ML, SC-SM, SC	A-4	0	0	100	90-100	75-95	45-65	20-30	5-10
	39-42	Clay loam, silty clay loam, silt loam, loam	CL	A-6, A-7-6	0	0	100	100	98-100	85-95	30-45	10-25
	42-48	Silty clay loam, silt loam, loam, fine sandy loam	CL	A-7-6, A-6, A-4	0	0	100	100	98-100	85-95	30-45	10-25
	48-61	Very fine sandy loam, fine sandy loam, silt loam, silty clay loam	SC, CL-ML, SC-SM	A-4, A-6	0	0	100	95-100	65-100	40-90	20-35	5-20
	61-71	Fine sandy loam, silt loam, silty clay loam	CL-ML, SC-SM, SC	A-4, A-6	0	0	100	95-100	65-100	40-90	20-35	5-20
	71-78	Loamy fine sand, coarse sand, sand, fine sand	SP-SM, SW, SW-SM	A-1-b, A-3, A-2-4	0	0	99-100	85-100	35-75	1-10	0-0	NP
	78-80	Coarse sand, sand, fine sand	SP-SM, SW-SM, SW	A-1-b, A-3	0	0	99-100	85-100	35-75	1-10	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
2948: Nalim-----	0-9	Loam	CL-ML, CL	A-4, A-6	0	0	95-100	95-100	95-100	65-85	20-35	5-15
	9-31	Clay loam, sandy clay loam, loam	SC, CL, SM, ML	A-6, A-7-6	0	0	95-100	95-100	65-100	45-80	35-55	11-25
	31-39	Sandy clay loam, clay loam, sandy loam	SC, CL, SM, ML	A-6, A-4, A-2-6	0	0	95-100	95-100	65-100	30-80	25-40	10-20
	39-44	Clay loam, gravelly sandy clay loam, sandy loam	SC, CL, SM, ML	A-4, A-6, A-2-6	0	0	95-100	95-100	65-100	30-80	25-40	10-20
	44-52	Sandy clay loam, sandy loam, clay loam	SC, CL, SM, ML	A-4, A-2, A-6	0	0	95-100	95-100	60-90	15-70	25-40	10-20
	52-62	Loamy coarse sand, sandy loam, loamy sand	SC, SM, SC-SM	A-1-b, A-2	0	0	85-100	75-90	40-70	15-30	0-25	NP-10
	62-72	Gravelly loamy coarse sand, loamy sand, sand	GM, SP-SM, GP-GM, SM	A-3, A-2, A-1	0	0	40-100	35-85	30-70	5-30	0-20	NP-5
	72-80	Sand, loamy sand, stratified sand to gravelly loamy coarse sand	GP-GM, SM, GM, SP-SM	A-3, A-1, A-2	0	0	40-100	35-85	30-70	5-30	0-20	NP-5
2949: Naron-----	0-8	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	100	100	60-85	30-55	0-25	NP-7
	8-55	Sandy clay loam, fine sandy loam, sandy loam	CL, SC	A-6	0	0	100	100	60-90	35-55	30-35	10-15
	55-66	Fine sandy loam, loamy fine sand, fine sand	SC, SM, SC-SM	A-2, A-4	0	0	100	100	60-90	20-50	0-25	NP-10
	66-80	Loamy fine sand, fine sandy loam, fine sand	SC-SM, SC, SM	A-2, A-4	0	0	100	100	60-90	20-50	0-25	NP-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
2950: Naron-----	0-8	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-2, A-4	0	0	100	100	60-85	30-55	0-25	NP-7
	8-55	Sandy clay loam, fine sandy loam, sandy loam	CL, SC	A-6	0	0	100	100	60-90	35-55	30-35	10-15
	55-66	Fine sandy loam, loamy fine sand, fine sand	SC, SC-SM, SM	A-2, A-4	0	0	100	100	60-90	20-50	0-25	NP-10
	66-80	Loamy fine sand, fine sandy loam, fine sand	SC, SM, SC-SM	A-2, A-4	0	0	100	100	60-90	20-50	0-25	NP-10
2951: Nash-----	0-8	Silt loam	ML, CL, CL-ML	A-4	0	0	100	100	96-100	65-97	22-31	2-10
	8-28	Silt loam, loam, very fine sandy loam	ML, CL, CL-ML	A-4	0	0	100	100	94-100	51-97	0-31	NP-10
	28-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
2952: Nash-----	0-8	Silt loam	ML, CL, CL-ML	A-4	0	0	100	100	96-100	65-97	22-31	2-10
	8-28	Silt loam, loam, very fine sandy loam	ML, CL, CL-ML	A-4	0	0	100	100	94-100	51-97	0-31	NP-10
	28-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Lucien-----	0-6	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	95-100	90-100	51-97	15-37	NP-14
	6-12	Loam	CL, CL-ML, ML	A-4, A-6	0	0	100	95-100	90-100	51-97	15-37	NP-14
	12-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
2953: Nash-----	0-8	Silt loam	ML, CL, CL-ML	A-4	0	0	100	100	96-100	65-97	22-31	2-10
	8-28	Silt loam, loam, very fine sandy loam	ML, CL, CL-ML	A-4	0	0	100	100	94-100	51-97	0-31	NP-10
	28-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
2953:												
Lucien-----	0-6	Silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	95-100	90-100	51-97	15-37	NP-14
	6-12	Loam	CL, CL-ML, ML	A-4, A-6	0	0	100	95-100	90-100	51-97	15-37	NP-14
	12-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
2955:												
Nickerson-----	0-6	Fine sandy loam	SM, SC-SM, SC	A-4	0	0	100	100	90-100	35-50	0-25	NP-10
	6-12	Loamy fine sand, fine sand	SM, SP-SM, SC, SC-SM	A-4, A-2-4	0	0	100	100	90-95	23-60	25-35	10-15
	12-18	Fine sandy loam, sandy clay loam, loam	SM, SC-SM, SC	A-4	0	0	100	100	90-100	33-65	20-30	5-10
	18-29	Sandy clay loam, loam, clay loam	CL, SC	A-6	0	0	100	100	65-95	40-50	0-20	NP-5
	29-34	Loam, fine sandy loam, very fine sandy loam	CL, CL-ML	A-4	0	0	100	99-100	65-95	40-58	0-20	NP-5
	34-38	Very fine sandy loam, fine sandy loam, loam	CL, CL-ML	A-4	0	0	99-100	95-100	65-91	40-58	0-20	NP-5
	38-45	Loamy fine sand, fine sandy loam, fine sand	SC-SM, SM	A-4	0	0	100	99-100	65-91	26-50	0-20	NP-5
	45-57	Fine sand, loamy fine sand	SP-SM, SC-SM, SM	A-2-4	0	0	100	100	65-80	40-50	0-20	NP-5
	57-80	Sand, loamy fine sand, fine sandy loam, fine sand	SC-SM, SM	A-4	0	0	100	100	65-80	40-50	0-20	NP-5

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
2956: Nickerson-----	0-6	Loamy fine sand	SM, SP-SM, SC-SM	A-2-4	0	0	100	100	80-95	10-30	0-20	NP-5
	6-12	Loamy fine sand, fine sand	SM, SC, SP-SM, SC-SM	A-4, A-2-4	0	0	100	100	90-95	23-60	25-35	10-15
	12-18	Fine sandy loam, sandy clay loam, loam	SM, SC-SM, SC	A-4	0	0	100	100	90-100	33-65	20-30	5-10
	18-29	Sandy clay loam, loam, clay loam	CL, SC	A-6	0	0	100	100	65-95	40-50	0-20	NP-5
	29-34	Loam, fine sandy loam, very fine sandy loam	CL, CL-ML	A-4	0	0	100	99-100	65-95	40-58	0-20	NP-5
	34-38	Very fine sandy loam, fine sandy loam, loam	CL, CL-ML	A-4	0	0	99-100	95-100	65-91	40-58	0-20	NP-5
	38-45	Loamy fine sand, fine sandy loam, fine sand	SC-SM, SM	A-4	0	0	100	99-100	65-91	26-50	0-20	NP-5
	45-57	Fine sand, loamy fine sand	SP-SM, SM, SC-SM	A-2-4	0	0	100	100	65-80	40-50	0-20	NP-5
	57-80	Sand, loamy fine sand, fine sandy loam, fine sand	SC-SM, SM	A-4	0	0	100	100	65-80	40-50	0-20	NP-5

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
2957: Nickerson-----	0-6	Fine sandy loam	SM, SC-SM, SC	A-4	0	0	100	100	90-100	35-50	0-25	NP-10
	6-12	Loamy fine sand, fine sand	SM, SC, SP-SM, SC-SM	A-4, A-2-4	0	0	100	100	90-95	23-60	25-35	10-15
	12-18	Fine sandy loam, sandy clay loam, loam	SC-SM, SM, SC	A-4	0	0	100	100	90-100	33-65	20-30	5-10
	18-29	Sandy clay loam, loam, clay loam	CL, SC	A-6	0	0	100	100	65-95	40-50	0-20	NP-5
	29-34	Loam, fine sandy loam, very fine sandy loam	CL, CL-ML	A-4	0	0	100	99-100	65-95	40-58	0-20	NP-5
	34-38	Very fine sandy loam, fine sandy loam, loam	CL, CL-ML	A-4	0	0	99-100	95-100	65-91	40-58	0-20	NP-5
	38-45	Loamy fine sand, fine sandy loam, fine sand	SC-SM, SM	A-4	0	0	100	99-100	65-91	26-50	0-20	NP-5
	45-57	Fine sand, loamy fine sand	SP-SM, SM, SC-SM	A-2-4	0	0	100	100	65-80	40-50	0-20	NP-5
	57-80	Sand, loamy fine sand, fine sandy loam, fine sand	SC-SM, SM	A-4	0	0	100	100	65-80	40-50	0-20	NP-5
Punkin-----	0-14	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-2, A-4	0	0	100	95-100	60-85	30-55	0-25	NP-7
	14-32	Clay loam, clay	CH, CL	A-7	0	0	100	100	90-100	75-95	45-65	20-40
	32-51	Sandy clay loam, loam	CL	A-4, A-6	0	0	100	100	80-100	60-85	30-35	10-15
	51-63	Sand, fine sand	SM	A-3	0	0	100	80-95	65-85	20-35	0-0	NP
	63-80	Stratified coarse sand to sand	SP-SM	A-1-b, A-3	0	0	100	75-95	35-55	5-12	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
2958: Ninnescah-----	0-6	Fine sandy loam	SC, SC-SM, SM	A-2-4, A-2-6, A-6, A-4	0	0	100	100	70-100	20-49	15-34	NP-15
	6-19	Sandy loam, fine sandy loam	SC, SM, SC-SM	A-2-4, A-6, A-2-6, A-4	0	0	100	100	70-100	20-49	15-34	NP-15
	19-37	Sandy loam, fine sandy loam	SC, SM, SC-SM	A-2-4, A-4	0	0	100	95-100	70-100	30-49	15-26	NP-10
	37-52	Sandy loam, loamy sand, fine sandy loam	SC-SM, SM, SP-SM	A-2-4, A-3	0	0	100	90-100	60-90	5-35	0-20	NP-6
	52-80	Loamy sand, sandy loam, fine sandy loam	SC-SM, SM, SP-SM	A-2-4, A-3	0	0	100	90-100	60-90	5-35	0-20	NP-6
2959: Ninnescah-----	0-6	Fine sandy loam	SC, SM, SC-SM	A-2-6, A-2-4, A-4	0	0	100	100	70-100	20-49	15-34	NP-15
	6-19	Sandy loam, fine sandy loam	SC, SC-SM, SM	A-2-4, A-2-6, A-4	0	0	100	100	70-100	20-49	15-34	NP-15
	19-37	Sandy loam, fine sandy loam	SC, SM, SC-SM	A-2-4, A-4	0	0	100	95-100	70-100	30-49	15-26	NP-10
	37-80	Loamy sand, sandy loam, fine sandy loam	SC-SM, SM, SP-SM	A-2-4, A-3	0	0	100	90-100	60-90	5-35	0-20	NP-6
3051: Ost-----	0-8	Loam	CL, CL-ML	A-6, A-4	0	0	95-100	95-100	85-95	60-75	20-35	5-15
	8-18	Loam, clay loam	CL	A-6, A-7	0	0	95-100	90-100	85-100	60-80	30-45	10-20
	18-23	Clay loam, loam, sandy clay loam	CL, SC	A-6, A-7	0	0	95-100	90-100	80-100	35-80	30-45	10-20
	23-38	Clay loam, loam, sandy loam	CL, SC, SC-SM, CL-ML	A-2, A-6, A-4	0	0	85-100	85-100	60-100	30-80	20-40	5-20
	38-80	Loam, clay loam, sandy loam	CL, SC, SC-SM, CL-ML	A-2, A-6, A-4	0	0	85-100	85-100	60-100	30-80	20-40	5-20

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3052:												
Ost-----	0-8	Loam	CL, CL-ML	A-6, A-4	0	0	95-100	95-100	85-95	60-75	20-35	5-15
	8-18	Loam, clay loam	CL	A-6, A-7	0	0	95-100	90-100	85-100	60-80	30-45	10-20
	18-23	Clay loam, loam, sandy clay loam	CL, SC	A-6, A-7	0	0	95-100	90-100	80-100	35-80	30-45	10-20
	23-38	Clay loam, loam, sandy loam	CL, SC, SC-SM, CL-ML	A-2, A-4, A-6	0	0	85-100	85-100	60-100	30-80	20-40	5-20
	38-80	Loam, clay loam, sandy loam	CL, SC, SC-SM, CL-ML	A-4, A-2, A-6	0	0	85-100	85-100	60-100	30-80	20-40	5-20
Clark-----	0-11	Loam	CL, CL-ML	A-4, A-6	0	0	100	95-100	80-95	60-75	25-35	5-15
	11-16	Loam, clay loam	CL	A-6	0	0	100	95-100	80-100	50-80	30-40	10-20
	16-28	Loam, fine sandy loam	CL, CL-ML	A-4	0	0	100	95-100	80-100	50-80	30-40	10-20
	28-45	Fine sandy loam, loam	CL, CL-ML	A-4	0	0	100	95-100	80-100	50-80	30-40	10-20
	45-65	Fine sandy loam, very fine sandy loam	CL, CL-ML	A-4	0	0	100	95-100	80-100	50-80	30-40	10-20
	65-80	Very fine sandy loam, fine sandy loam	CL, CL-ML	A-4	0	0	100	95-100	80-100	50-80	30-40	10-20

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3170: Penalosa-----	0-5	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	80-98	21-37	2-13
	5-10	Silty clay loam, silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	80-98	21-37	2-13
	10-22	Silty clay loam, silty clay	CL, CH	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-26
	22-34	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	85-99	37-60	15-34
	34-39	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
	39-48	Silt loam, silty clay loam, loam, clay loam	ML, CL-ML, CL	A-6, A-4	0	0	100	100	96-100	80-98	21-37	2-13
	48-71	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	96-100	96-100	85-99	37-60	15-34
	71-80	Clay loam, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	80-99	37-60	15-34

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3171: Penalosa-----	0-5	Silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	100	96-100	80-98	21-37	2-13
	5-10	Silty clay loam, silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	100	96-100	80-98	21-37	2-13
	10-22	Silty clay loam, silty clay	CL, CH	A-6, A-7	0	0	100	100	96-100	80-98	33-43	12-26
	22-34	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	85-99	37-60	15-34
	34-39	Silty clay loam, silty clay, clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	90-99	37-60	15-34
	39-48	Silt loam, silty clay loam, loam, clay loam	ML, CL-ML, CL	A-6, A-4	0	0	100	100	96-100	80-98	21-37	2-13
	48-71	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7	0	0	100	96-100	96-100	85-99	37-60	15-34
	71-80	Clay loam, silty clay, silty clay loam	CH, CL	A-6, A-7	0	0	100	96-100	96-100	80-99	37-60	15-34
3180: Pratt-----	0-8	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	95-100	65-100	5-35	0-14	NP
	8-24	Loamy fine sand, loamy sand, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	100	95-100	90-100	15-40	0-20	NP-6
	24-64	Stratified fine sand to loamy fine sand, loamy fine sand, loamy sand, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	100	95-100	90-100	15-40	0-20	NP-6
	64-80	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	95-100	80-100	5-35	0-14	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3181: Pratt-----	0-8	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	95-100	65-100	5-35	0-14	NP
	8-24	Loamy fine sand, loamy sand, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	100	95-100	90-100	15-40	0-20	NP-6
	24-64	Stratified fine sand to loamy fine sand, loamy fine sand, loamy sand, fine sandy loam	SM, SC-SM	A-2, A-4	0	0	100	95-100	90-100	15-40	0-20	NP-6
	64-80	Loamy fine sand, fine sand	SM, SP-SM	A-2, A-3	0	0	100	95-100	80-100	5-35	0-14	NP
Turon-----	0-8	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-25	0-0	NP
	8-28	Loamy fine sand, loamy sand	SM, SP-SM	A-2-4	0	0	100	100	80-100	10-25	0-20	NP-3
	28-40	Stratified loamy fine sand to fine sandy loam	SC-SM, SM, SP-SM	A-2-4	0	0	100	100	80-100	10-30	0-23	NP-6
	40-80	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	80-100	80-99	36-52	16-25
3190: Punkin-----	0-4	Silt loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	25-35	8-15
	4-8	Silty clay, silty clay loam, clay loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	25-35	8-15
	8-64	Silty clay loam, clay, silty clay, clay loam	CH, CL	A-7	0	0	100	100	90-100	75-95	45-65	20-40
	64-80	Sandy clay loam, clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-95	35-50	15-25

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3191: Punkin-----	0-4	Silt loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	25-35	8-15
	4-8	Silty clay, silty clay loam, clay loam	CL	A-4, A-6	0	0	100	100	85-95	60-75	25-35	8-15
	8-64	Silty clay loam, clay, silty clay, clay loam	CH, CL	A-7	0	0	100	100	90-100	75-95	45-65	20-40
	64-80	Sandy clay loam, clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	90-100	70-95	35-50	15-25
Taver-----	0-7	Loam	CL	A-4, A-6	0	0	100	100	96-100	65-85	28-34	9-14
	7-17	Silty clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	96-100	90-99	48-60	30-40
	17-33	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	96-100	90-99	48-60	30-40
	33-53	Silty clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	96-100	90-99	48-60	30-40
	53-64	Clay loam, sandy clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	30-40	15-20
	64-80	Sandy clay loam, clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	30-40	15-20
3403: Sand pits.												
3469: Smolan-----	0-5	Silty clay loam	CL	A-7	0	0	100	100	95-100	85-100	42-50	22-28
	5-8	Silty clay loam, silt loam	CL	A-6, A-7	0	0	100	100	95-100	85-100	35-50	15-28
	8-15	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	85-100	35-50	15-28
	15-49	Silty clay loam, silty clay	CH	A-7	0	0	100	100	95-100	90-100	50-65	28-40
	49-80	Silty clay loam	CL	A-7	0	0	100	100	95-100	90-100	42-50	22-28

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3510: Saltcreek-----	0-5	Fine sandy loam	ML, CL-ML, SC-SM, SM	A-2-4, A-4	0	0	100	100	80-95	30-55	20-30	1-7
	5-10	Sandy clay loam, fine sandy loam, sandy loam	ML, SC-SM, CL-ML, SM	A-2-4, A-4	0	0	100	100	80-95	30-55	20-30	1-7
	10-39	Sandy clay loam, loam, fine sandy loam	CL, SC	A-6	0	0	100	100	85-100	45-60	25-35	10-20
	39-80	Silty clay loam, clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35
Funmar-----	0-12	Loam	CL-ML, CL	A-4, A-6	0	0	100	100	85-100	60-85	25-35	5-15
	12-32	Loam, clay loam, sandy clay loam	CL, ML	A-6, A-4, A-7-6	0	0	100	100	85-100	60-80	30-45	7-20
	32-38	Silty clay loam, silt loam, loam	CL	A-6, A-7-6	0	0	100	100	90-100	75-100	40-50	20-30
	38-66	Silty clay loam, clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	90-100	85-100	45-60	25-35
	66-80	Silty clay loam, sandy clay loam, loam	CL, SC	A-7-6	0	0	100	100	90-100	85-100	45-60	25-35
Farnum-----	0-15	Loam	CL-ML, CL	A-4, A-6	0	0	100	100	90-100	60-85	20-35	5-15
	15-21	Loam	CL	A-6	0	0	100	100	85-100	60-80	30-40	10-15
	21-34	Sandy clay loam, clay loam	SC, CL	A-6, A-7-6	0	0	100	100	70-100	45-80	35-50	15-30
	34-48	Loam, clay loam, sandy clay loam	SC, CL	A-6, A-7-6	0	0	100	100	70-100	45-80	35-50	15-30
	48-73	Clay loam, sandy clay loam	SC, CL	A-6, A-7-6	0	0	100	100	70-100	45-80	35-50	15-30
	73-80	Loam, clay loam, fine sandy loam	SC, CL, SC-SM, CL-ML	A-2, A-6, A-4	0	0	100	95-100	65-100	30-80	20-35	5-15

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3511: Saltcreek-----	0-5	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-2-4, A-4	0	0	100	100	80-95	30-55	20-30	1-7
	5-10	Sandy clay loam, fine sandy loam, sandy loam	CL-ML, ML, SM, SC-SM	A-2-4, A-4	0	0	100	100	80-95	30-55	20-30	1-7
	10-39	Sandy clay loam, loam, fine sandy loam	CL, SC	A-6	0	0	100	100	85-100	45-60	25-35	10-20
	39-80	Silty clay loam, clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35
Naron-----	0-19	Fine sandy loam	SC, SC-SM, CL-ML	A-4	0	0	100	100	70-85	35-55	10-20	5-10
	19-34	Loam, sandy clay loam, fine sandy loam	CL	A-4, A-6	0	0	100	100	80-95	50-70	30-35	10-15
	34-41	Sandy clay loam, loam, clay loam	CL	A-6	0	0	100	100	80-90	50-70	30-35	10-15
	41-61	Stratified loam to loamy fine sand to fine sandy loam	SM, SC-SM, SC	A-2, A-4	0	0	100	95-100	60-90	20-50	0-25	NP-10
	61-80	Coarse sand, sand	SM	A-2-4	0	0	100	85-95	45-65	15-35	0-0	NP
3512: Saltcreek-----	0-5	Fine sandy loam	CL-ML, ML, SM, SC-SM	A-2-4, A-4	0	0	100	100	80-95	30-55	20-30	1-7
	5-10	Sandy clay loam, fine sandy loam, sandy loam	CL-ML, SM, ML, SC-SM	A-2-4, A-4	0	0	100	100	80-95	30-55	20-30	1-7
	10-39	Sandy clay loam, loam, fine sandy loam	CL, SC	A-6	0	0	100	100	85-100	45-60	25-35	10-20
	39-80	Silty clay loam, clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3512: Naron-----	0-14	Fine sandy loam	SM, SC-SM, ML, CL-ML	A-2, A-4	0	0	100	100	60-85	30-55	0-25	NP-7
	14-55	Sandy clay loam, fine sandy loam, sandy loam	CL, SC	A-6	0	0	100	100	60-90	35-55	30-35	10-15
	55-66	Fine sandy loam, loamy fine sand, fine sand	SC, SM, SC-SM	A-2, A-4	0	0	100	100	60-90	20-50	0-25	NP-10
	66-80	Loamy fine sand, fine sandy loam, fine sand	SC-SM, SC, SM	A-2, A-4	0	0	100	100	60-90	20-50	0-25	NP-10
3520: Saxman-----	0-8	Loamy sand	SM	A-2-4	0	0	100	95-100	75-100	15-30	0-0	NP
	8-13	Loamy sand	SM	A-2-4	0	0	99-100	95-100	75-100	15-30	0-0	NP
	13-22	Loamy sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	95-100	75-95	8-30	0-0	NP
	22-30	Sand, loamy sand	SM, SP-SM	A-2-4, A-3	0	0	99-100	95-100	75-95	8-30	0-0	NP
	30-37	Sand, fine sand, loamy sand	SM, SP-SM, SP	A-2-4, A-3	0	0	85-100	80-95	65-85	1-15	0-0	NP
	37-48	Sand, fine sand, loamy sand	SP, SM, SP-SM	A-2-4, A-3	0	0	85-100	80-97	65-85	1-15	0-0	NP
	48-54	Fine sand, sand, loamy sand	SM, SP, SP-SM	A-2-4, A-3	0	0	85-100	80-95	65-85	1-15	0-0	NP
	54-80	Stratified gravelly coarse sand	SP, SP-SM	A-2-4, A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3530: Shellabarger----	0-5	Sandy loam	SM, ML	A-4, A-2	0	0	95-100	95-100	75-100	30-55	0-30	NP-5
	5-19	Sandy clay loam, sandy loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	19-33	Sandy loam, sandy clay loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	33-47	Coarse sandy loam, fine sandy loam, sand	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	47-59	Loamy sand, sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	59-73	Sand, loamy sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	73-80	Sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	Albion-----	0-9	Sandy loam	SC, SC-SM, SM	A-2, A-4	0	0	100	75-100	60-90	25-45	0-25
9-27		Sandy loam, loam	SC, SC-SM, SM	A-2, A-4	0	0	85-100	75-100	50-95	25-40	20-30	NP-10
27-48		Loamy coarse sand, coarse sandy loam, loamy sand	SC, SM, SC-SM	A-1-b, A-2	0	0	85-100	75-90	40-70	15-30	0-25	NP-10
48-80		Sand, loamy sand, gravelly sand	GP-GM, SM, GM, SP-SM	A-3, A-1, A-2	0	0-5	40-100	35-85	30-70	5-30	0-20	NP-5

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3531: Shellabarger----	0-6	Sandy loam	SM, ML	A-4, A-2	0	0	95-100	95-100	75-100	30-55	0-30	NP-5
	6-19	Sandy clay loam, sandy loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	19-33	Sandy loam, sandy clay loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	33-47	Coarse sandy loam, fine sandy loam, sand	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	47-59	Loamy sand, sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	59-73	Sand, loamy sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	73-80	Sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3531: Nalim-----	0-9	Loam	CL-ML, CL	A-4, A-6	0	0	95-100	95-100	95-100	65-85	20-35	5-15
	9-31	Clay loam, sandy clay loam, loam	SC, CL, SM, ML	A-6, A-7-6	0	0	95-100	95-100	65-100	45-80	35-55	11-25
	31-39	Sandy clay loam, clay loam, sandy loam	SC, CL, SM, ML	A-6, A-4, A-2-6	0	0	95-100	95-100	65-100	30-80	25-40	10-20
	39-44	Clay loam, gravelly sandy clay loam, sandy loam	SC, CL, SM, ML	A-4, A-6, A-2-6	0	0	95-100	95-100	65-100	30-80	25-40	10-20
	44-52	Sandy clay loam, sandy loam, clay loam	SC, CL, SM, ML	A-4, A-2, A-6	0	0	95-100	95-100	60-90	15-70	25-40	10-20
	52-62	Loamy coarse sand, sandy loam, loamy sand	SC-SM, SC, SM	A-1-b, A-2	0	0	85-100	75-90	40-70	15-30	0-25	NP-10
	62-72	Gravelly loamy coarse sand, loamy sand, sand	GP-GM, GM, SM, SP-SM	A-3, A-2, A-1	0	0	40-100	35-85	30-70	5-30	0-20	NP-5
	72-80	Sand, loamy sand, stratified sand to gravelly loamy coarse sand	GP-GM, SM, GM, SP-SM	A-3, A-1, A-2	0	0	40-100	35-85	30-70	5-30	0-20	NP-5

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3532: Shellabarger----	0-6	Loamy sand	SM	A-2	0	0	95-100	95-100	70-100	15-35	0-14	NP
	6-19	Sandy clay loam, sandy loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	19-33	Sandy loam, sandy clay loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	33-47	Coarse sandy loam, fine sandy loam, sand	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	47-59	Loamy sand, sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	59-73	Sand, loamy sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	73-80	Sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3533: Shellabarger----	0-7	Sandy loam	SM, ML	A-4, A-2	0	0	95-100	95-100	75-100	30-55	0-30	NP-5
	7-19	Sandy clay loam, sandy loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	19-33	Sandy loam, sandy clay loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	33-47	Coarse sandy loam, fine sandy loam, sand	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	47-59	Loamy sand, sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	59-73	Sand, loamy sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	73-80	Sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3534: Shellabarger----	0-7	Sandy loam	SM, ML	A-4, A-2	0	0	95-100	95-100	75-100	30-55	0-30	NP-5
	7-19	Sandy clay loam, sandy loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	19-33	Sandy loam, sandy clay loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	33-47	Coarse sandy loam, fine sandy loam, sand	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	47-59	Loamy sand, sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	59-73	Sand, loamy sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	73-80	Sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3535: Shellabarger----	0-7	Sandy loam	SM, ML	A-4, A-2	0	0	95-100	95-100	75-100	30-55	0-30	NP-5
	7-19	Sandy clay loam, sandy loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	19-33	Sandy loam, sandy clay loam, fine sandy loam	SC	A-4, A-6	0	0	95-100	85-100	70-90	35-50	25-40	8-20
	33-47	Coarse sandy loam, fine sandy loam, sand	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	47-59	Loamy sand, sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	59-73	Sand, loamy sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10
	73-80	Sand, fine sandy loam, coarse sandy loam	SC, SM, SP-SM, SC-SM	A-2, A-4	0	0	80-100	70-100	50-80	10-40	0-30	NP-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3535: Nalim-----	0-9	Loam	CL-ML, CL	A-4, A-6	0	0	95-100	95-100	95-100	65-85	20-35	5-15
	9-31	Clay loam, sandy clay loam, loam	SC, CL, SM, ML	A-6, A-7-6	0	0	95-100	95-100	65-100	45-80	35-55	11-25
	31-39	Sandy clay loam, clay loam, sandy loam	SC, CL, SM, ML	A-4, A-6, A-2-6	0	0	95-100	95-100	65-100	30-80	25-40	10-20
	39-44	Clay loam, gravelly sandy clay loam, sandy loam	SC, CL, SM, ML	A-6, A-4, A-2-6	0	0	95-100	95-100	65-100	30-80	25-40	10-20
	44-52	Sandy clay loam, sandy loam, clay loam	SC, CL, SM, ML	A-4, A-2, A-6	0	0	95-100	95-100	60-90	15-70	25-40	10-20
	52-62	Loamy coarse sand, sandy loam, loamy sand	SC, SM, SC-SM	A-1-b, A-2	0	0	85-100	75-90	40-70	15-30	0-25	NP-10
	62-72	Gravelly loamy coarse sand, loamy sand, sand	GP-GM, GM, SM, SP-SM	A-3, A-2, A-1	0	0	40-100	35-85	30-70	5-30	0-20	NP-5
	72-80	Sand, loamy sand, stratified sand to gravelly loamy coarse sand	GP-GM, SM, GM, SP-SM	A-1, A-3, A-2	0	0	40-100	35-85	30-70	5-30	0-20	NP-5
3540: Solvay-----	0-5	Loamy fine sand	SC-SM, SM	A-2-4	0	0	100	100	85-100	15-30	10-20	NP-5
	5-37	Fine sandy loam, sandy clay loam, loam	CL, SC	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	37-58	Fine sandy loam, sandy loam, loamy fine sand	CL, CL-ML, SC-SM, SC	A-4	0	0	100	100	55-100	20-52	20-30	5-10
	58-80	Loamy fine sand, sandy loam, fine sandy loam	CL-ML, SC, CL, SC-SM	A-4	0	0	100	100	55-100	20-52	20-30	5-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3550: Spelvin-----	0-5	Loamy sand	SM	A-2-4	0	0	100	99-100	75-100	15-30	0-0	NP
	5-23	Sandy clay loam, clay loam, loam	CL, SC	A-6	0	0	100	85-100	75-95	40-55	30-40	10-20
	23-34	Sandy loam, sandy clay loam, clay loam, loam	CL, SC	A-6	0	0	100	85-100	75-95	40-55	30-40	10-20
	34-50	Sandy loam	SC, SC-SM	A-2-4, A-4	0	0	100	85-100	65-85	30-45	25-30	5-10
	50-58	Loamy sand, sandy loam	SP-SC, SM, SP-SM	A-2-4, A-4	0	0	95-100	85-100	55-75	10-40	10-20	NP-5
	58-80	Sand, coarse sand, loamy sand	SM, SP-SM	A-2-4, A-3	0	0	95-100	80-100	50-75	5-25	0-0	NP
3639: Taver-----	0-7	Loam	CL	A-4, A-6	0	0	100	100	96-100	65-85	28-34	9-14
	7-17	Silty clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	96-100	90-99	48-60	30-40
	17-33	Silty clay, silty clay loam	CH, CL	A-7-6	0	0	100	100	96-100	90-99	48-60	30-40
	33-53	Silty clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	96-100	90-99	48-60	30-40
	53-64	Clay loam, sandy clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	30-40	15-20
	64-80	Sandy clay loam, clay loam	CL	A-4, A-6	0	0	100	100	90-100	60-80	30-40	15-20
3640: Tivin-----	0-7	Fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	90-100	5-25	0-0	NP
	7-18	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-25	0-0	NP
	18-80	Fine sand, sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-25	0-0	NP
3641: Tivin-----	0-7	Fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	90-100	5-25	0-0	NP
	7-18	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-25	0-0	NP
	18-80	Fine sand, sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-25	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3641: Dillhut-----	0-9	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-15	0-0	NP
	9-26	Fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-15	0-0	NP
	26-41	Sandy clay loam, fine sandy loam	CL, SC	A-6	0	0	100	100	80-100	36-55	30-40	10-20
	41-55	Fine sandy loam, sandy clay loam	CL, SC, CL-ML	A-2, A-6, A-4	0	0	100	100	80-95	30-55	26-32	7-11
	55-70	Fine sandy loam	CL-ML, CL, SC	A-2, A-4, A-6	0	0	100	100	80-95	30-55	26-32	7-11
	70-80	Fine sandy loam, loamy fine sand, fine sand	SC, SC-SM, SP-SC, SM	A-2-4	0	0	100	100	50-70	5-25	22-30	NP-10
3642: Tivin-----	0-11	Fine sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	90-100	5-25	0-0	NP
	11-53	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	100	80-100	5-25	0-0	NP
	53-63	Silt loam, very fine sandy loam, loam, fine sandy loam	CL, CL-ML, SC-SM, SC	A-4	0	0	100	100	80-95	45-55	20-30	5-10
	63-80	Sand, fine sand, coarse sand	SM, SP-SM	A-2, A-3	0	0	100	80-100	50-65	5-15	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3642: Willowbrook-----	0-9	Fine sandy loam	SC, SC-SM	A-4	0	0	100	99-100	90-100	36-45	20-30	5-10
	9-13	Fine sandy loam	SC-SM, SC	A-4	0	0	100	99-100	92-100	34-42	20-30	5-10
	13-17	Fine sandy loam, loam, loamy fine sand	SM, SC, SC-SM	A-2-4, A-4	0	0	100	99-100	90-100	34-42	20-30	5-10
	17-19	Loam, fine sandy loam, loamy fine sand	SC, SC-SM, SM	A-2-4, A-4	0	0	100	90-100	70-95	25-58	15-25	NP-10
	19-26	Fine sandy loam, loam, loamy fine sand	SC, SC-SM, SM	A-2-4, A-4	0	0	98-100	90-100	70-95	25-45	15-25	NP-10
	26-45	Coarse sand, sand, fine sand	SP-SM, SW-SM, SW	A-1-b, A-3	0	0	90-100	80-100	35-75	1-10	0-0	NP
	45-51	Coarse sand, sand, fine sand	SW, SW-SM, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
	51-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
3643: Tobin-----	0-6	Silt loam	CL	A-6	0	0	100	100	90-100	70-90	30-35	10-15
	6-15	Silty clay loam, silt loam	CL	A-6	0	0	100	100	90-100	70-90	30-35	10-15
	15-34	Silt loam, silty clay loam	CL	A-6, A-7	0	0	100	100	95-100	90-100	30-45	10-20
	34-47	Silt loam, silty clay loam, loam	CL	A-6, A-7	0	0	100	100	85-100	70-95	30-45	10-20
	47-80	Silty clay loam, silt loam, loam	CL	A-6, A-7	0	0	100	100	85-100	70-95	30-45	10-20

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3644:												
Turon-----	0-8	Fine sand	SM, SP-SM	A-2, A-3	0	0	100	100	80-100	5-25	0-0	NP
	8-28	Loamy fine sand, loamy sand	SM, SP-SM	A-2-4	0	0	100	100	80-100	10-25	0-20	NP-3
	28-40	Stratified loamy fine sand to fine sandy loam	SC-SM, SM, SP-SM	A-2-4	0	0	100	100	80-100	10-30	0-23	NP-6
	40-80	Silty clay loam, clay loam, silty clay	CH, CL	A-6, A-7-6	0	0	100	100	80-100	80-99	36-52	16-25
Carway-----	0-7	Loamy fine sand	SM	A-2-4	0	0	100	100	85-100	15-30	10-20	NP-5
	7-15	Sandy clay loam, loam, clay loam	SC, CL	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	15-35	Fine sandy loam, sandy clay loam, loam, clay loam	SC, CL	A-6	0	0	100	100	85-100	45-60	25-35	10-15
	35-72	Clay loam, silty clay loam, silty clay	CL, CH	A-7-6	0	0	100	100	90-100	85-99	45-60	25-40
	72-80	Clay loam, silty clay loam, loam, sandy clay loam, sandy loam	SC, CL	A-6	0	0	100	100	75-90	45-60	25-35	10-15
3760: Urban land.												

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3760: Blazefork-----	0-7	Silty clay loam	CL, CH	A-7-6	0	0	100	100	95-100	85-95	45-55	25-35
	7-34	Silty clay, silty clay loam	CH	A-7-6	0	0	100	100	95-100	90-95	50-65	30-40
	34-40	Silty clay, silty clay loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	40-48	Silty clay loam, clay loam, silty clay	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	48-61	Clay loam, silty clay loam, loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
	61-80	Loam, clay loam	CL	A-7-6	0	0	100	100	85-100	75-85	40-50	20-30
Kaskan-----	0-7	Loam	CL	A-6	0	0	100	100	95-100	85-100	30-35	10-15
	7-17	Clay loam, silty clay loam	CL	A-6, A-7	0	0	100	100	100	85-100	35-45	15-20
	17-24	Loam	CL	A-6	0	0	100	100	80-95	60-80	30-35	10-15
	24-35	Fine sandy loam	SC, SC-SM	A-2-4, A-4	0	0	100	100	70-85	30-45	20-30	5-10
	35-41	Loamy fine sand, fine sand, sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	41-47	Fine sand, loamy fine sand, sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	47-66	Sand, fine sand, loamy fine sand	SM	A-2-4	0	0	100	95-100	65-85	15-30	0-0	NP
	66-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-2-4, A-1-b, A-3	0	0	95-100	75-95	35-55	1-10	0-0	NP
3762: Urban land.												
Darlow-----	0-8	Loam	CL, CL-ML	A-4, A-6	0	0	100	100	85-95	53-75	21-30	4-11
	8-14	Loam	CL	A-6	0	0	100	100	90-100	60-80	30-39	11-18
	14-20	Clay loam, loam	CL	A-6	0	0	100	100	90-100	60-80	30-39	11-18
	20-26	Loam	CL	A-6	0	0	100	100	90-100	60-80	30-39	11-18
	26-44	Loam, clay loam	CL	A-6, A-7-6	0	0	100	100	90-100	55-80	30-44	11-22
	44-68	Loam, sandy loam	CL, SC-SM, CL-ML, SC	A-4, A-6	0	0	100	100	90-100	40-52	23-37	6-16
	68-80	Sandy loam	SC-SM, SM	A-2	0	0	100	99-100	80-90	16-32	10-18	NP-5

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3762: Elmer-----	0-9	Fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	90-100	50-60	20-30	3-10
	9-19	Fine sandy loam	CL, CL-ML, ML	A-4	0	0	100	100	90-100	50-60	20-30	3-10
	19-37	Fine sandy loam, sandy clay loam	CL, SC	A-6	0	0	100	98-100	90-100	45-60	25-35	10-20
	37-41	Loam, clay loam	CL	A-6, A-7-6	0	0	99-100	98-100	90-100	65-85	30-45	15-25
	41-51	Clay loam, loam	CL	A-6, A-7-6	0	0	99-100	98-100	90-100	65-85	30-45	15-25
	51-80	Fine sandy loam, sandy loam, sandy clay loam	CL-ML, CL, SC, SC-SM	A-2-6, A-2-4, A-4, A-6	0	0	98-100	97-100	85-95	34-55	20-30	6-16
3763: Urban land.												
Imano-----	0-11	Clay loam	CL	A-7-6, A-6	0	0	100	100	90-100	70-80	35-45	15-22
	11-23	Clay loam, loam	CL	A-4, A-6, A-7-6	0	0	100	100	85-100	60-80	25-45	7-22
	23-80	Sand, coarse sand, fine sand	SM, SP-SM	A-1, A-2, A-3, A-4	0	0	100	95-100	30-85	5-45	0-10	NP
3764: Urban land.												

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3764: Mahone-----	0-8	Loamy fine sand	SC-SM, SM	A-2-4, A-4	0	0	100	100	75-95	25-45	0-20	NP-5
	8-14	Fine sandy loam, loamy fine sand	SC-SM, SM	A-2-4, A-4	0	0	100	100	75-95	25-45	0-20	NP-5
	14-25	Fine sandy loam, very fine sandy loam	CL, CL-ML, SC-SM, SC	A-4	0	0	100	90-100	75-95	45-65	20-30	5-10
	25-33	Silt loam, fine sandy loam, very fine sandy loam	CL-ML, CL, SC, SC-SM	A-4	0	0	100	90-100	75-95	45-65	20-30	5-10
	33-39	Fine sandy loam, very fine sandy loam, stratified silt loam to fine sandy loam	CL, SC-SM, CL-ML, SC	A-4	0	0	100	90-100	75-95	45-65	20-30	5-10
	39-42	Clay loam, silty clay loam, silt loam, loam	CL	A-6, A-7-6	0	0	100	100	98-100	85-95	30-45	10-25
	42-48	Silty clay loam, silt loam, loam, fine sandy loam	CL	A-7-6, A-6, A-4	0	0	100	100	98-100	85-95	30-45	10-25
	48-61	Very fine sandy loam, fine sandy loam, silt loam, silty clay loam	CL-ML, SC-SM, SC	A-4, A-6	0	0	100	95-100	65-100	40-90	20-35	5-20
	61-71	Fine sandy loam, silt loam, silty clay loam	CL-ML, SC, SC-SM	A-4, A-6	0	0	100	95-100	65-100	40-90	20-35	5-20
	71-78	Loamy fine sand, coarse sand, sand, fine sand	SP-SM, SW, SW-SM	A-1-b, A-3, A-2-4	0	0	99-100	85-100	35-75	1-10	0-0	NP
	78-80	Coarse sand, sand, fine sand	SP-SM, SW, SW-SM	A-1-b, A-3	0	0	99-100	85-100	35-75	1-10	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3765: Urban land.												
Saltcreek-----	0-5	Fine sandy loam	ML, SC-SM, CL-ML, SM	A-2-4, A-4	0	0	100	100	80-95	30-55	20-30	1-7
	5-10	Sandy clay loam, fine sandy loam, sandy loam	ML, CL-ML, SC-SM, SM	A-2-4, A-4	0	0	100	100	80-95	30-55	20-30	1-7
	10-39	Sandy clay loam, loam, fine sandy loam	CL, SC	A-6	0	0	100	100	85-100	45-60	25-35	10-20
	39-80	Silty clay loam, clay loam, silty clay	CH, CL	A-7-6	0	0	100	100	90-100	85-99	45-55	25-35
Naron-----	0-19	Fine sandy loam	SC, SC-SM, CL-ML	A-4	0	0	100	100	70-85	35-55	10-20	5-10
	19-34	Loam, sandy clay loam, fine sandy loam	CL	A-4, A-6	0	0	100	100	80-95	50-70	30-35	10-15
	34-41	Sandy clay loam, loam, clay loam	CL	A-6	0	0	100	100	80-90	50-70	30-35	10-15
	41-61	Stratified loam to loamy fine sand to fine sandy loam	SM, SC-SM, SC	A-2, A-4	0	0	100	95-100	60-90	20-50	0-25	NP-10
	61-80	Coarse sand, sand	SM	A-2-4	0	0	100	85-95	45-65	15-35	0-0	NP
3766: Urban land.												

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3766: Saxman-----	0-8	Loamy sand	SM	A-2-4	0	0	100	95-100	75-100	15-30	0-0	NP
	8-13	Loamy sand	SM	A-2-4	0	0	99-100	95-100	75-100	15-30	0-0	NP
	13-22	Loamy sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	95-100	75-95	8-30	0-0	NP
	22-30	Sand, loamy sand	SM, SP-SM	A-2-4, A-3	0	0	99-100	95-100	75-95	8-30	0-0	NP
	30-37	Sand, fine sand, loamy sand	SM, SP, SP-SM	A-2-4, A-3	0	0	85-100	80-95	65-85	1-15	0-0	NP
	37-48	Sand, fine sand, loamy sand	SM, SP-SM, SP	A-2-4, A-3	0	0	85-100	80-97	65-85	1-15	0-0	NP
	48-54	Fine sand, sand, loamy sand	SP, SM, SP-SM	A-2-4, A-3	0	0	85-100	80-95	65-85	1-15	0-0	NP
	54-80	Stratified gravelly coarse sand	SP, SP-SM	A-2-4, A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
3767: Urban land.												
Willowbrook-----	0-9	Fine sandy loam	SC, SC-SM	A-4	0	0	100	99-100	90-100	36-45	20-30	5-10
	9-13	Fine sandy loam	SC-SM, SC	A-4	0	0	100	99-100	92-100	34-42	20-30	5-10
	13-17	Fine sandy loam, loam, loamy fine sand	SM, SC, SC-SM	A-2-4, A-4	0	0	100	99-100	90-100	34-42	20-30	5-10
	17-19	Loam, fine sandy loam, loamy fine sand	SC, SC-SM, SM	A-2-4, A-4	0	0	100	90-100	70-95	25-58	15-25	NP-10
	19-26	Fine sandy loam, loam, loamy fine sand	SC, SC-SM, SM	A-2-4, A-4	0	0	98-100	90-100	70-95	25-45	15-25	NP-10
	26-45	Coarse sand, sand, fine sand	SP-SM, SW-SM, SW	A-1-b, A-3	0	0	90-100	80-100	35-75	1-10	0-0	NP
	45-51	Coarse sand, sand, fine sand	SW, SW-SM, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
	51-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	<u>In</u>				<u>Pct</u>	<u>Pct</u>					<u>Pct</u>	
3768: Urban land.												
Yaggy-----	0-11	Fine sandy loam	SC-SM, CL-ML, SM	A-4	0	0	100	99-100	85-100	40-65	10-25	5-10
	11-14	Stratified very fine sandy loam to silt loam	CL, CL-ML, ML	A-4, A-6	0	0	100	95-100	75-95	60-80	10-35	5-15
	14-24	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	80-100	70-95	1-12	0-0	NP
	24-31	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	80-100	70-98	1-12	0-0	NP
	31-42	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	80-100	70-97	1-12	0-0	NP
	42-53	Stratified gravelly coarse sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
	53-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
3900: Warnut-----	0-2	Fine sandy loam	SC, SC-SM, SM	A-2-4, A-4	0	0	100	100	85-100	25-40	20-25	5-10
	2-5	Loam, clay loam, sandy clay loam, sandy loam	CL, SC	A-4, A-6	0	0	100	100	80-95	45-60	30-35	10-15
	5-11	Sandy clay loam, clay loam, loam, sandy loam	CL, SC	A-4, A-6	0	0	100	100	80-95	45-60	30-35	10-15
	11-22	Fine sandy loam, sandy loam	CL, SC	A-4, A-2-6, A-6	0	0	100	100	80-95	30-52	25-30	10-15
	22-37	Sandy loam, fine sandy loam	CL, SC	A-2-6, A-6, A-4	0	0	100	100	80-95	30-52	25-30	10-15
	37-80	Loamy sand, loamy fine sand, sand	SC-SM, SC, SM	A-2-4	0	0	100	100	70-90	15-30	0-25	NP-10

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
3966:												
Willowbrook-----	0-9	Fine sandy loam	SC, SC-SM	A-4	0	0	100	99-100	90-100	36-45	20-30	5-10
	9-13	Fine sandy loam	SC-SM, SC	A-4	0	0	100	99-100	92-100	34-42	20-30	5-10
	13-17	Fine sandy loam, loam, loamy fine sand	SC-SM, SM, SC	A-2-4, A-4	0	0	100	99-100	90-100	34-42	20-30	5-10
	17-19	Loam, fine sandy loam, loamy fine sand	SC, SC-SM, SM	A-2-4, A-4	0	0	100	90-100	70-95	25-58	15-25	NP-10
	19-26	Fine sandy loam, loam, loamy fine sand	SC, SC-SM, SM	A-2-4, A-4	0	0	98-100	90-100	70-95	25-45	15-25	NP-10
	26-45	Coarse sand, sand, fine sand	SW, SP-SM, SW-SM	A-1-b, A-3	0	0	90-100	80-100	35-75	1-10	0-0	NP
	45-51	Coarse sand, sand, fine sand	SW, SP-SM, SW-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
	51-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
4004:												
Yaggy-----	0-5	Fine sandy loam	SC-SM, CL-ML, SM	A-4	0	0	100	99-100	85-100	40-65	10-25	5-10
	5-11	Fine sandy loam	CL-ML, SC-SM, SM	A-4	0	0	100	99-100	85-100	40-60	10-25	5-10
	11-14	Stratified very fine sandy loam to silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	95-100	75-95	60-80	10-35	5-15
	14-24	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	80-100	70-95	1-12	0-0	NP
	24-31	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	80-100	70-98	1-12	0-0	NP
	31-42	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	80-100	70-97	1-12	0-0	NP
	42-53	Stratified gravelly coarse sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
	53-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
4005: Yaggy-----	0-5	Fine sandy loam	SC-SM, CL-ML, SM	A-4	0	0	100	99-100	85-100	40-65	10-25	5-10
	5-11	Fine sandy loam	CL-ML, SC-SM, SM	A-4	0	0	100	99-100	85-100	40-60	10-25	5-10
	11-14	Stratified very fine sandy loam to silt loam	CL, ML, CL-ML	A-4, A-6	0	0	100	95-100	75-95	60-80	10-35	5-15
	14-24	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	80-100	70-95	1-12	0-0	NP
	24-31	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	80-100	70-98	1-12	0-0	NP
	31-42	Fine sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	80-100	70-97	1-12	0-0	NP
	42-53	Stratified gravelly coarse sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
	53-80	Stratified gravelly coarse sand to sand	SP, SP-SM	A-1-b, A-3	0	0	85-100	75-95	35-55	1-10	0-0	NP
Saxman-----	0-8	Loamy sand	SM	A-2-4	0	0	100	95-100	75-100	15-30	0-0	NP
	8-13	Loamy sand	SM	A-2-4	0	0	99-100	95-100	75-100	15-30	0-0	NP
	13-22	Loamy sand, sand	SM, SP-SM	A-2-4, A-3	0	0	100	95-100	75-95	8-30	0-0	NP
	22-30	Sand, loamy sand	SM, SP-SM	A-2-4, A-3	0	0	99-100	95-100	75-95	8-30	0-0	NP
	30-37	Sand, fine sand, loamy sand	SM, SP, SP-SM	A-2-4, A-3	0	0	85-100	80-95	65-85	1-15	0-0	NP
	37-48	Sand, fine sand, loamy sand	SM, SP, SP-SM	A-2-4, A-3	0	0	85-100	80-97	65-85	1-15	0-0	NP
	48-54	Fine sand, sand, loamy sand	SM, SP, SP-SM	A-2-4, A-3	0	0	85-100	80-95	65-85	1-15	0-0	NP
	54-80	Stratified gravelly coarse sand	SP, SP-SM	A-1-b, A-3, A-2-4	0	0	85-100	75-95	35-55	1-10	0-0	NP

Table 5.--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	3-10	4	10	40	200		
					inches	inches						
	In				Pct	Pct					Pct	
4110: Zellmont-----	0-8	Sandy loam	SC	A-4, A-6, A-2-4, A-2-6	0	0	95-100	95-100	75-100	30-55	25-35	10-15
	8-18	Sandy clay loam, clay loam, loam	CL, SC	A-4, A-6, A-2-4, A-2-6	0	0	95-100	95-100	65-100	45-80	30-40	10-20
	18-26	Sandy clay loam, clay loam, loam	SC, SC-SM	A-2-4	0	0	80-100	70-100	50-80	10-40	20-30	5-10
	26-32	Loam, clay loam	CL, SC	A-2-4, A-2-6	0	0	85-100	70-100	65-100	45-80	30-40	10-20
	32-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---
Poxmash-----	0-9	Sandy loam	SC, SC-SM, SM	A-2, A-4	0	0	100	75-100	60-90	25-45	0-25	NP-10
	9-15	Sandy loam, fine sandy loam	SC, SM, SC-SM	A-2, A-4	0	0	85-100	75-100	50-95	25-40	20-30	NP-10
	15-20	Loamy sand, sandy loam, fine sandy loam	SC-SM, SC, SM	A-1-b, A-2	0	0	85-100	75-90	40-70	15-30	0-25	NP-10
	20-48	Sand, loamy sand, gravelly sand	GP-GM, SM, GM, SP-SM	A-1, A-3, A-2	0	0-5	40-100	35-85	30-70	5-30	0-20	NP-5
	48-80	Weathered bedrock	---	---	---	---	---	---	---	---	---	---

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
1070: Avans-----	0-5	15-26	1.30-1.50	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	5-10	15-26	1.30-1.50	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.32	.32			
	10-14	13-26	1.40-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.32	.32			
	14-19	27-34	1.30-1.65	0.6-2	0.15-0.20	3.0-5.9	1.0-3.0	.37	.37			
	19-30	26-34	1.30-1.65	0.6-2	0.15-0.20	3.0-5.9	0.0-1.0	.37	.37			
	30-43	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-1.0	.32	.32			
	43-53	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-0.5	.32	.32			
	53-65	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-0.2	.32	.32			
	65-80	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-0.2	.32	.32			
1071: Avans-----	0-5	15-26	1.30-1.50	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	5-10	15-26	1.30-1.50	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.32	.32			
	10-14	13-26	1.40-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.32	.32			
	14-19	27-34	1.30-1.65	0.6-2	0.15-0.20	3.0-5.9	1.0-3.0	.37	.37			
	19-30	26-34	1.30-1.65	0.6-2	0.15-0.20	3.0-5.9	0.0-1.0	.37	.37			
	30-43	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-1.0	.32	.32			
	43-53	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-0.5	.32	.32			
	53-65	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-0.2	.32	.32			
	65-80	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-0.2	.32	.32			
1072: Avans-----	0-5	15-26	1.30-1.50	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.37	.37	5	5	56
	5-10	15-26	1.30-1.50	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.32	.32			
	10-14	13-26	1.40-1.60	0.6-2	0.20-0.24	0.0-2.9	1.0-3.0	.32	.32			
	14-19	27-34	1.30-1.65	0.6-2	0.15-0.20	3.0-5.9	1.0-3.0	.37	.37			
	19-30	26-34	1.30-1.65	0.6-2	0.15-0.20	3.0-5.9	0.0-1.0	.37	.37			
	30-43	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-1.0	.32	.32			
	43-53	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-0.5	.32	.32			
	53-65	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-0.2	.32	.32			
	65-80	18-26	1.40-1.60	0.6-2	0.18-0.21	0.0-2.9	0.0-0.2	.32	.32			
1191: Blazefork-----	0-3	35-50	1.20-1.45	0.2-0.6	0.21-0.23	6.0-8.9	2.0-4.0	.37	.37	5	7	38
	3-7	35-50	1.35-1.45	0.2-0.6	0.21-0.23	6.0-8.9	2.0-4.0	.37	.37			
	7-29	35-50	1.25-1.55	0.06-0.2	0.11-0.14	6.0-8.9	1.0-2.0	.43	.43			
	29-34	35-50	1.25-1.55	0.06-0.2	0.11-0.14	6.0-8.9	0.5-2.0	.43	.43			
	34-40	35-50	1.30-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.5-1.0	.32	.32			
	40-48	35-50	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.2-1.0	.32	.32			
	48-61	26-35	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.1-1.0	.32	.32			
	61-80	18-27	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.1-1.0	.32	.32			
1192: Blazefork-----	0-3	35-50	1.20-1.45	0.2-0.6	0.21-0.23	6.0-8.9	2.0-4.0	.37	.37	5	7	38
	3-7	35-50	1.35-1.45	0.2-0.6	0.21-0.23	6.0-8.9	2.0-4.0	.37	.37			
	7-29	35-50	1.25-1.55	0.06-0.2	0.11-0.14	6.0-8.9	1.0-2.0	.43	.43			
	29-34	35-50	1.25-1.55	0.06-0.2	0.11-0.14	6.0-8.9	0.5-2.0	.43	.43			
	34-40	35-50	1.30-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.5-1.0	.32	.32			
	40-48	35-50	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.2-1.0	.32	.32			
	48-61	27-35	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.1-1.0	.32	.32			
	61-80	18-27	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.1-1.0	.32	.32			
Kaskan-----	0-7	18-26	1.35-1.45	0.6-2	0.20-0.23	0.0-2.9	2.0-4.0	.28	.28	4	6	48
	7-17	27-35	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37			
	17-24	18-26	1.45-1.55	0.6-2	0.17-0.19	0.0-2.9	1.0-2.0	.28	.28			
	24-35	10-17	1.45-1.55	2-6	0.14-0.17	0.0-2.9	0.0-1.0	.24	.24			
	35-66	0-8	1.50-1.60	6-20	0.06-0.09	0.0-2.9	0.0-0.5	.10	.10			
	66-80	0-2	1.55-1.65	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
1200: Buhler-----	0-3	28-45	1.20-1.55	0.00-0.06	0.18-0.21	6.0-8.9	2.0-6.0	.43	.43	2	7	38
	3-8	28-45	1.20-1.55	0.00-0.06	0.18-0.21	6.0-8.9	2.0-4.0	.43	.43			
	8-16	15-26	1.30-1.55	0.2-0.6	0.20-0.22	0.0-2.9	1.0-2.0	.28	.28			
	16-24	20-40	1.25-1.55	0.00-0.06	0.14-0.20	6.0-8.9	1.0-2.0	.43	.43			
	24-36	20-40	1.25-1.55	0.00-0.06	0.14-0.20	6.0-8.9	0.5-2.0	.43	.43			
	36-42	20-40	1.30-1.55	0.00-0.06	0.14-0.20	6.0-8.9	0.5-2.0	.43	.43			
	42-50	27-45	1.30-1.60	0.00-0.06	0.14-0.18	6.0-8.9	0.3-2.0	.37	.37			
	50-58	27-45	1.50-1.60	0.00-0.06	0.14-0.18	6.0-8.9	0.0-2.0	.37	.37			
	58-80	10-26	1.35-1.70	0.6-2	0.14-0.17	0.0-2.9	0.0-0.5	.24	.24			
Blazefork-----	0-3	35-50	1.20-1.45	0.2-0.6	0.21-0.23	6.0-8.9	2.0-4.0	.37	.37	5	7	38
	3-7	35-50	1.35-1.45	0.2-0.6	0.21-0.23	6.0-8.9	2.0-4.0	.37	.37			
	7-29	35-50	1.25-1.55	0.06-0.2	0.11-0.14	6.0-8.9	1.0-2.0	.43	.43			
	29-34	35-50	1.25-1.55	0.06-0.2	0.11-0.14	6.0-8.9	0.5-2.0	.43	.43			
	34-40	35-50	1.30-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.5-1.0	.32	.32			
	40-48	35-50	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.2-1.0	.32	.32			
	48-61	26-35	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.1-1.0	.32	.32			
	61-80	18-27	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.1-1.0	.32	.32			
1324: Carway-----	0-7	10-16	1.45-1.55	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20	5	3	86
	7-15	20-29	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.5-1.0	.28	.28			
	15-35	18-29	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.5-1.0	.28	.28			
	35-40	28-45	1.40-1.60	0.00-0.06	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37			
	40-72	30-45	1.40-1.60	0.00-0.06	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37			
	72-80	15-34	1.45-1.65	0.6-2	0.13-0.18	0.0-2.9	0.0-0.5	.28	.28			
Carbika-----	0-11	10-22	1.45-1.55	0.6-2	0.15-0.18	0.0-2.9	1.0-2.0	.24	.24	5	5	56
	11-22	35-42	1.40-1.60	0.00-0.06	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37			
	22-80	21-35	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.5-1.0	.28	.28			
1357: Carway-----	0-7	2-10	1.50-1.60	6-20	0.05-0.09	0.0-2.9	0.5-1.0	.17	.17	5	2	134
	7-15	20-29	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.5-1.0	.28	.28			
	15-35	18-29	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.5-1.0	.28	.28			
	35-40	28-45	1.40-1.60	0.00-0.06	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37			
	40-72	30-45	1.40-1.60	0.00-0.06	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37			
	72-80	15-34	1.45-1.65	0.6-2	0.13-0.18	0.0-2.9	0.0-0.5	.28	.28			
Dillhut-----	0-10	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15	4	1	220
	10-29	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-0.5	.15	.15			
	29-35	13-30	1.40-1.55	0.6-2	0.12-0.15	0.0-2.9	0.0-0.0	.24	.24			
	35-43	10-30	1.40-1.55	0.6-2	0.12-0.15	0.0-2.9	0.0-0.0	.24	.24			
	43-80	35-43	1.55-1.65	0.00-0.06	0.13-0.17	3.0-5.9	0.0-0.0	.32	.32			
Solvay-----	0-5	9-16	1.45-1.55	2-6	0.11-0.15	0.0-2.9	0.5-2.0	.17	.17	5	3	86
	5-14	13-34	1.50-1.80	0.2-2	0.15-0.18	0.0-2.9	0.0-0.8	.28	.28			
	14-37	13-34	1.50-1.80	0.2-2	0.15-0.18	0.0-2.9	0.0-0.5	.28	.28			
	37-80	7-22	1.50-1.80	2-6	0.11-0.16	0.0-2.9	0.0-0.5	.24	.24			
1359: Clark-----	0-11	15-27	1.35-1.45	0.6-2	0.17-0.22	3.0-5.9	1.0-2.0	.28	.28	5	4L	86
	11-16	18-35	1.35-1.70	0.6-2	0.17-0.19	3.0-5.9	0.5-2.0	.32	.32			
	16-28	18-35	1.35-1.70	0.6-2	0.14-0.19	3.0-5.9	0.5-1.0	.32	.32			
	28-45	10-25	1.35-1.70	0.6-2	0.14-0.19	3.0-5.9	0.5-1.0	.32	.32			
	45-80	7-20	1.35-1.70	0.6-2	0.14-0.19	3.0-5.9	0.0-1.0	.32	.32			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
1359: Ost-----	0-8	10-27	1.40-1.54	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	8-18	20-35	1.35-1.45	0.2-0.6	0.15-0.19	3.0-5.9	1.0-2.0	.32	.32			
	18-23	18-35	1.40-1.52	0.2-0.6	0.15-0.19	3.0-5.9	0.5-1.0	.32	.32			
	23-38	5-30	1.40-1.65	0.2-0.6	0.13-0.19	0.0-2.9	0.0-0.6	.32	.37			
	38-80	5-30	1.40-1.65	0.2-0.6	0.13-0.19	0.0-2.9	0.0-0.5	.32	.37			
1428: Crete-----	0-5	20-27	1.20-1.40	0.6-2	0.22-0.24	3.0-5.9	2.0-4.0	.37	.37	5	6	48
	5-9	27-35	1.20-1.40	0.2-0.6	0.21-0.23	6.0-8.9	1.0-3.0	.37	.37			
	9-38	35-55	1.10-1.30	0.06-0.2	0.12-0.20	6.0-8.9	0.5-2.0	.37	.37			
	38-80	25-40	1.20-1.40	0.2-2	0.18-0.22	6.0-8.9	0.5-1.0	.43	.43			
1429: Crete-----	0-5	20-27	1.20-1.40	0.6-2	0.22-0.24	3.0-5.9	2.0-4.0	.37	.37	5	6	48
	5-9	27-35	1.20-1.40	0.2-0.6	0.21-0.23	6.0-8.9	1.0-3.0	.37	.37			
	9-38	35-55	1.10-1.30	0.06-0.2	0.12-0.20	6.0-8.9	0.5-2.0	.37	.37			
	38-80	25-40	1.20-1.40	0.2-2	0.18-0.22	6.0-8.9	0.5-1.0	.43	.43			
1553: Darlow-----	0-5	8-20	1.30-1.55	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.43	.43	2	5	56
	5-8	8-20	1.30-1.70	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32			
	8-14	20-30	1.30-1.45	0.2-0.6	0.09-0.13	3.0-5.9	1.0-3.0	.28	.28			
	14-20	20-30	1.30-1.45	0.2-0.6	0.09-0.13	3.0-5.9	0.8-3.0	.28	.28			
	20-26	20-30	1.30-1.45	0.2-0.6	0.09-0.13	3.0-5.9	0.2-3.0	.28	.28			
	26-44	20-35	1.30-1.50	0.00-0.06	0.09-0.13	0.0-2.9	0.0-2.0	.28	.28			
	44-53	12-27	1.30-1.60	0.2-0.6	0.10-0.16	0.0-2.9	0.0-1.0	.24	.24			
	53-68	12-27	1.30-1.80	0.2-0.6	0.10-0.16	0.0-2.9	0.0-1.0	.24	.24			
	68-80	8-12	1.50-1.80	0.6-2	0.02-0.10	0.0-2.9	0.0-0.5	.20	.20			
Elmer-----	0-6	10-17	1.50-1.70	2-6	0.17-0.20	0.0-2.9	1.0-2.0	.32	.32	2	3	86
	6-9	10-17	1.50-1.70	2-6	0.17-0.20	0.0-2.9	1.0-2.0	.28	.28			
	9-19	10-17	1.50-1.75	2-6	0.17-0.20	0.0-2.9	1.0-2.0	.28	.28			
	19-26	17-25	1.55-1.65	0.2-0.6	0.12-0.16	0.0-2.9	0.5-1.0	.32	.32			
	26-37	17-25	1.55-1.70	0.2-0.6	0.12-0.16	0.0-2.9	0.0-1.0	.32	.32			
	37-51	20-28	1.50-1.60	0.06-0.2	0.12-0.16	6.0-8.9	0.0-0.5	.37	.37			
	51-72	14-22	1.60-1.80	0.2-6	0.10-0.16	0.0-2.9	0.0-0.5	.28	.28			
	72-80	14-20	1.60-1.80	0.2-6	0.10-0.16	0.0-2.9	0.0-0.5	.28	.28			
1554: Dillhut-----	0-10	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15	4	1	220
	10-29	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-0.5	.15	.15			
	29-35	13-30	1.40-1.55	0.6-2	0.12-0.15	0.0-2.9	0.0-0.0	.24	.24			
	35-43	10-30	1.40-1.55	0.6-2	0.12-0.15	0.0-2.9	0.0-0.0	.24	.24			
	43-80	35-43	1.55-1.65	0.00-0.06	0.13-0.17	3.0-5.9	0.0-0.0	.32	.32			
1555: Dillhut-----	0-4	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15	5	1	220
	4-9	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15			
	9-26	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-0.5	.15	.15			
	26-41	13-30	1.40-1.55	0.6-2	0.12-0.15	0.0-2.9	0.0-0.0	.24	.24			
	41-55	10-22	1.55-1.65	2-6	0.11-0.15	0.0-2.9	0.0-0.0	.17	.17			
	55-65	9-17	1.55-1.65	2-6	0.11-0.15	0.0-2.9	0.0-0.0	.17	.17			
	65-70	10-20	1.55-1.65	2-6	0.11-0.15	0.0-2.9	0.0-0.0	.17	.17			
	70-80	5-15	1.45-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.0	.15	.15			
Plev-----	0-4	3-8	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.17	.17	5	2	134
	4-12	1-5	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-0.5	.15	.15			
	12-46	0-2	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-0.0	.10	.10			
	46-75	10-27	1.55-1.65	0.6-2	0.08-0.10	0.0-2.9	0.0-0.0	.20	.20			
	75-80	4-6	1.45-1.60	6-20	0.04-0.10	0.0-2.9	0.0-0.0	.15	.15			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
1556: Dillhut-----	0-4	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15	5	1	220
	4-9	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15			
	9-26	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-0.5	.15	.15			
	26-41	13-30	1.40-1.55	0.6-2	0.12-0.15	0.0-2.9	0.0-0.0	.24	.24			
	41-55	10-22	1.55-1.65	2-6	0.11-0.15	0.0-2.9	0.0-0.0	.17	.17			
	55-65	9-17	1.55-1.65	2-6	0.11-0.15	0.0-2.9	0.0-0.0	.17	.17			
	65-70	10-20	1.55-1.65	2-6	0.11-0.15	0.0-2.9	0.0-0.0	.17	.17			
	70-80	5-15	1.45-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.0	.15	.15			
Solvay-----	0-5	9-16	1.45-1.55	2-6	0.11-0.15	0.0-2.9	0.5-2.0	.20	.20	5	3	86
	5-14	13-34	1.50-1.80	0.2-2	0.15-0.18	0.0-2.9	0.0-0.8	.28	.28			
	14-37	13-34	1.50-1.80	0.2-2	0.15-0.18	0.0-2.9	0.0-0.5	.28	.28			
	37-80	7-22	1.50-1.80	2-6	0.11-0.16	0.0-2.9	0.0-0.5	.24	.24			
1725: Farnum-----	0-5	14-27	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	56
	5-15	14-27	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28			
	15-21	20-27	1.40-1.50	0.6-2	0.17-0.19	0.0-2.9	0.5-1.5	.28	.28			
	21-34	20-35	1.40-1.50	0.6-2	0.15-0.19	3.0-5.9	0.0-0.5	.28	.28			
	34-73	25-35	1.40-1.50	0.6-2	0.15-0.19	3.0-5.9	0.0-0.5	.28	.28			
	73-80	12-29	1.40-1.55	0.6-2	0.13-0.16	0.0-2.9	0.0-0.5	.28	.28			
Funmar-----	0-6	14-26	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	56
	6-12	14-26	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28			
	12-26	22-34	1.40-1.60	0.2-0.6	0.17-0.19	0.0-2.9	1.0-2.0	.32	.32			
	26-32	22-34	1.40-1.60	0.2-0.6	0.17-0.19	0.0-2.9	0.5-2.0	.32	.32			
	32-38	26-34	1.35-1.45	0.2-0.6	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32			
	38-66	28-45	1.40-1.60	0.06-0.2	0.10-0.17	3.0-5.9	0.0-0.5	.37	.37			
	66-80	26-45	1.50-1.60	0.06-0.2	0.10-0.17	0.0-2.9	0.0-0.5	.37	.37			
1727: Funmar-----	0-6	14-26	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	6-12	14-26	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28			
	12-26	22-34	1.40-1.60	0.2-0.6	0.17-0.19	0.0-2.9	1.0-2.0	.32	.32			
	26-32	22-34	1.40-1.60	0.2-0.6	0.17-0.19	0.0-2.9	0.5-2.0	.32	.32			
	32-38	26-34	1.35-1.45	0.2-0.6	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32			
	38-66	28-45	1.40-1.60	0.06-0.2	0.10-0.17	3.0-5.9	0.0-0.5	.37	.37			
	66-80	26-45	1.50-1.60	0.06-0.2	0.10-0.17	0.0-2.9	0.0-0.5	.37	.37			
Taver-----	0-7	17-25	1.30-1.55	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	7-53	35-45	1.35-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-2.0	.37	.37			
	53-64	20-35	1.45-1.65	0.2-0.6	0.15-0.19	0.0-2.9	0.5-1.0	.28	.28			
	64-80	20-30	1.45-1.65	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.28			
1804: Geary-----	0-6	21-27	1.35-1.40	0.6-2	0.21-0.23	0.0-2.9	1.0-4.0	.32	.32	5	6	48
	6-14	15-35	1.30-1.40	0.6-2	0.18-0.22	3.0-5.9	1.0-3.0	.32	.32			
	14-51	27-35	1.35-1.40	0.6-2	0.15-0.20	3.0-5.9	1.0-2.0	.43	.43			
	51-80	15-35	1.35-1.40	0.6-2	0.14-0.20	3.0-5.9	0.5-1.0	.43	.43			
1807: Geary-----	0-5	27-35	1.30-1.40	0.2-0.6	0.21-0.23	3.0-5.9	1.0-2.0	.37	.37	5	7	38
	5-43	27-35	1.35-1.50	0.6-2	0.18-0.20	3.0-5.9	0.5-2.0	.43	.43			
	43-80	15-27	1.30-1.40	0.6-2	0.20-0.22	3.0-5.9	0.0-0.5	.43	.43			
1985: Hayes-----	0-8	9-13	1.45-1.55	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20	5	3	86
	8-47	8-17	1.45-1.55	2-6	0.11-0.15	0.0-2.9	0.0-0.5	.24	.24			
	47-56	19-28	1.40-1.60	0.2-0.6	0.15-0.18	0.0-2.9	0.0-0.5	.28	.28			
	56-80	28-45	1.40-1.60	0.06-0.2	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind	Wind	
								Kw	Kf	T	erodi- bility group	erodi- bility index	
	In	Pct	g/cc	In/hr	In/in	Pct	Pct						
1986:													
Hayes-----	0-8	1-9	1.50-1.60	6-20	0.07-0.11	0.0-2.9	0.5-1.0	.17	.17	5	2	134	
	8-47	8-17	1.45-1.55	2-6	0.11-0.15	0.0-2.9	0.0-0.5	.24	.24				
	47-56	19-28	1.40-1.60	0.2-0.6	0.15-0.18	0.0-2.9	0.0-0.5	.28	.28				
	56-80	28-45	1.40-1.60	0.06-0.2	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37				
Solvay-----	0-5	3-8	1.50-1.60	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.17	.17	5	2	134	
	5-14	13-34	1.50-1.80	0.2-2	0.15-0.18	0.0-2.9	0.0-0.8	.28	.28				
	14-37	13-34	1.50-1.80	0.2-2	0.15-0.18	0.0-2.9	0.0-0.5	.28	.28				
	37-80	7-22	1.50-1.80	2-6	0.11-0.16	0.0-2.9	0.0-0.5	.24	.24				
1987:													
Hayes-----	0-8	1-9	1.50-1.60	6-20	0.07-0.11	0.0-2.9	0.5-1.0	.17	.17	5	2	134	
	8-47	8-17	1.45-1.55	2-6	0.11-0.15	0.0-2.9	0.0-0.5	.24	.24				
	47-56	19-28	1.40-1.60	0.2-0.6	0.15-0.18	0.0-2.9	0.0-0.5	.28	.28				
	56-80	28-45	1.40-1.60	0.06-0.2	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37				
Turon-----	0-8	1-5	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15	5	1	220	
	8-28	3-10	1.40-1.55	6-20	0.09-0.12	0.0-2.9	0.5-1.0	.17	.17				
	28-40	2-18	1.40-1.55	2-20	0.10-0.15	0.0-2.9	0.0-0.0	.24	.24				
	40-58	27-41	1.45-1.60	0.00-0.6	0.12-0.18	3.0-5.9	0.0-0.5	.32	.32				
	58-80	27-45	1.45-1.60	0.00-0.6	0.12-0.18	3.0-5.9	0.0-0.5	.32	.32				
2204:													
Jamash-----	0-4	30-40	1.30-1.60	0.2-0.6	0.18-0.22	3.0-5.9	1.0-3.0	.37	.37	2	7	38	
	4-11	35-45	1.45-1.70	0.2-0.6	0.14-0.18	3.0-5.9	1.0-3.0	.37	.37				
	11-15	28-40	1.45-1.70	0.00-0.06	0.13-0.16	6.0-8.9	0.5-1.0	.32	.32				
	15-80	---	1.85-2.00	0.06-0.2	---	---	---	---	---				
Piedmont-----	0-4	27-35	1.30-1.60	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.37	.37	3	7	38	
	4-7	27-35	1.30-1.60	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43				
	7-13	32-50	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43				
	13-20	32-60	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43				
	20-24	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43				
	24-32	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37				
	32-80	---	1.85-2.00	0.06-0.2	---	---	---	---	---				
2205:													
Jamash-----	0-4	30-40	1.30-1.60	0.2-0.6	0.18-0.22	3.0-5.9	1.0-3.0	.37	.37	2	7	38	
	4-11	35-45	1.45-1.70	0.2-0.6	0.14-0.18	3.0-5.9	1.0-3.0	.37	.37				
	11-15	28-40	1.45-1.70	0.00-0.06	0.13-0.16	6.0-8.9	0.5-1.0	.32	.32				
	15-80	---	1.85-2.00	0.06-0.2	---	---	---	---	---				
Piedmont-----	0-4	27-35	1.30-1.60	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.37	.37	3	7	38	
	4-7	27-35	1.30-1.60	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43				
	7-13	32-50	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43				
	13-20	32-60	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43				
	20-24	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43				
	24-32	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37				
	32-80	---	1.85-2.00	0.06-0.2	---	---	---	---	---				
2206:													
Jamash-----	0-4	30-40	1.30-1.60	0.2-0.6	0.18-0.22	3.0-5.9	1.0-3.0	.37	.37	2	7	38	
	4-11	35-45	1.45-1.70	0.2-0.6	0.14-0.18	3.0-5.9	1.0-3.0	.37	.37				
	11-15	28-40	1.45-1.70	0.00-0.06	0.13-0.16	6.0-8.9	0.5-1.0	.32	.32				
	15-80	---	1.85-2.00	0.06-0.2	---	---	---	---	---				

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind	Wind
								Kw	Kf	T	erodi- bility group	erodi- bility index
	In	Pct	g/cc	In/hr	In/in	Pct	Pct					
2206: Piedmont-----	0-4	27-35	1.30-1.60	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.37	.37	3	7	38
	4-7	27-35	1.30-1.60	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	7-13	32-50	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	13-20	32-60	1.45-1.70	0.2-0.6	0.15-0.22	3.0-5.9	1.0-3.0	.43	.43			
	20-24	35-55	1.35-1.70	0.00-0.06	0.12-0.22	6.0-8.9	0.5-1.0	.43	.43			
	24-32	35-55	1.35-1.70	0.00-0.06	0.06-0.18	6.0-8.9	0.5-1.0	.37	.37			
	32-80	---	1.85-2.00	0.06-0.2	---	---	---	---	---			
2207: Jamash-----	0-4	30-40	1.30-1.60	0.2-0.6	0.18-0.22	3.0-5.9	1.0-3.0	.37	.37	2	7	38
	4-11	35-45	1.45-1.70	0.2-0.6	0.14-0.18	3.0-5.9	1.0-3.0	.37	.37			
	11-15	28-40	1.45-1.70	0.00-0.06	0.13-0.16	6.0-8.9	0.5-1.0	.32	.32			
	15-80	---	1.85-2.00	0.06-0.2	---	---	---	---	---			
2381: Kanza-----	0-4	3-12	1.50-1.70	0.6-2	0.08-0.13	3.0-5.9	1.0-3.0	.20	.20	5	3	86
	4-9	3-12	1.50-1.70	0.6-2	0.08-0.13	3.0-5.9	1.0-3.0	.17	.17			
	9-17	3-12	1.60-1.70	6-20	0.10-0.12	0.0-2.9	0.5-2.0	.17	.17			
	17-80	1-12	1.50-1.70	6-20	0.06-0.11	0.0-2.9	0.0-0.5	.17	.20			
Ninnescah-----	0-6	11-17	1.40-1.50	2-6	0.14-0.16	0.0-2.9	1.0-4.0	.20	.20	5	3	86
	6-14	11-17	1.40-1.50	2-6	0.14-0.16	0.0-2.9	1.0-4.0	.20	.20			
	14-19	11-17	1.40-1.60	2-6	0.14-0.16	0.0-2.9	1.0-4.0	.20	.20			
	19-30	10-17	1.40-1.65	2-6	0.12-0.16	0.0-2.9	0.5-1.0	.20	.20			
	30-37	10-17	1.40-1.70	2-6	0.12-0.16	0.0-2.9	0.5-1.0	.20	.20			
	37-52	2-12	1.50-1.70	2-20	0.05-0.12	0.0-2.9	0.0-0.5	.17	.17			
	52-80	2-10	1.50-1.70	2-20	0.05-0.12	0.0-2.9	0.0-0.5	.17	.17			
2390: Kaskan-----	0-7	18-26	1.35-1.45	0.6-2	0.20-0.23	0.0-2.9	2.0-4.0	.28	.28	4	6	48
	7-17	27-35	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37			
	17-24	18-26	1.45-1.55	0.6-2	0.17-0.19	0.0-2.9	1.0-2.0	.28	.28			
	24-35	10-17	1.45-1.55	2-6	0.14-0.17	0.0-2.9	0.0-1.0	.24	.24			
	35-66	0-8	1.50-1.60	6-20	0.06-0.09	0.0-2.9	0.0-0.5	.10	.10			
	66-80	0-2	1.55-1.65	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05			
2391: Kaskan-----	0-9	27-35	1.35-1.45	0.2-0.6	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37	5	7	38
	9-13	27-35	1.35-1.45	0.2-0.6	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37			
	13-27	10-17	1.45-1.55	2-6	0.14-0.18	0.0-2.9	0.0-1.0	.24	.24			
	27-43	0-5	1.50-1.60	6-20	0.06-0.09	0.0-2.9	0.0-0.5	.10	.10			
	43-80	1-15	1.45-1.55	2-20	0.07-0.11	0.0-2.9	0.0-1.0	.10	.10			
2395: Kisiwa-----	0-4	18-26	1.30-1.40	0.6-2	0.20-0.22	0.0-2.9	1.0-4.0	.43	.43	2	6	48
	4-7	18-28	1.30-1.50	0.6-2	0.20-0.22	0.0-2.9	1.0-4.0	.32	.32			
	7-14	27-40	1.30-1.60	0.00-0.06	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
	14-23	27-37	1.35-1.60	0.00-0.06	0.15-0.18	3.0-5.9	0.0-1.0	.37	.37			
	23-40	26-45	1.30-1.60	0.00-0.06	0.08-0.15	3.0-5.9	0.0-1.0	.37	.37			
	40-46	26-45	1.45-1.60	0.00-0.06	0.08-0.15	3.0-5.9	0.0-0.5	.37	.37			
	46-58	5-18	1.30-1.70	2-6	0.11-0.17	0.0-2.9	0.0-0.5	.20	.20			
	58-65	0-12	1.30-1.70	6-20	0.05-0.10	0.0-2.9	0.0-0.5	.10	.10			
	65-80	0-12	1.30-1.40	6-20	0.05-0.10	0.0-2.9	0.0-0.5	.10	.10			
2509: Ladysmith-----	0-8	28-35	1.35-1.45	0.2-0.6	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37	5	7	38
	8-31	40-60	1.35-1.50	0.00-0.06	0.10-0.15	6.0-8.9	1.0-2.0	.37	.37			
	31-80	35-55	1.40-1.60	0.00-0.6	0.10-0.19	3.0-5.9	1.0-2.0	.37	.37			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
2556: Langdon-----	0-8	0-6	1.35-1.50	6-20	0.07-0.09	0.0-2.9	0.0-1.0	.15	.15	5	1	220
	8-47	0-12	1.50-1.70	6-20	0.02-0.08	0.0-2.9	0.0-0.0	.15	.15			
	47-64	0-5	1.50-1.70	6-20	0.02-0.08	0.0-2.9	0.0-0.0	.17	.15			
	64-80	0-12	1.50-1.70	6-20	0.02-0.08	0.0-2.9	0.0-0.0	.15	.15			
2587: Imano-----	0-11	27-35	1.30-1.40	0.2-0.6	0.17-0.19	3.0-5.9	1.0-3.0	.28	.28	4	4L	86
	11-23	18-35	1.35-1.45	0.2-0.6	0.16-0.19	3.0-5.9	0.5-1.0	.28	.28			
	23-80	1-8	1.45-1.55	6-20	0.02-0.10	0.0-2.9	0.0-0.5	.15	.15			
2588: Longford-----	0-6	27-35	1.30-1.40	0.2-0.6	0.21-0.23	3.0-5.9	1.0-2.0	.37	.37	5	7	38
	6-11	27-35	1.30-1.40	0.2-0.6	0.21-0.23	3.0-5.9	0.5-0.9	.32	.32			
	11-43	35-45	1.35-1.50	0.00-0.6	0.11-0.20	6.0-8.9	0.5-1.0	.43	.43			
	43-80	27-35	1.30-1.40	0.2-0.6	0.14-0.20	3.0-5.9	0.0-0.5	.32	.32			
2812: Mahone-----	0-8	3-11	1.50-1.60	6-20	0.07-0.11	0.0-2.9	0.0-0.8	.17	.17	5	2	134
	8-14	3-11	1.50-1.60	6-20	0.07-0.11	0.0-2.9	0.0-0.8	.17	.17			
	14-25	5-17	1.45-1.55	2-6	0.14-0.18	0.0-2.9	0.0-1.0	.24	.24			
	25-33	7-17	1.45-1.55	2-6	0.14-0.18	0.0-2.9	0.0-1.0	.24	.24			
	33-39	8-17	1.45-1.55	2-6	0.14-0.18	0.0-2.9	0.0-1.0	.24	.24			
	39-42	18-34	1.30-1.50	0.6-2	0.18-0.22	0.0-2.9	1.0-2.0	.32	.32			
	42-48	8-34	1.30-1.50	0.6-2	0.18-0.22	0.0-2.9	1.0-2.0	.32	.32			
	48-61	12-28	1.45-1.55	2-6	0.14-0.19	0.0-2.9	0.0-0.5	.24	.24			
	61-71	10-28	1.45-1.55	2-6	0.14-0.19	0.0-2.9	0.0-0.5	.24	.24			
	71-78	0-10	1.55-1.65	6-20	0.02-0.07	0.0-2.9	0.0-0.0	.05	.05			
	78-80	0-4	1.55-1.65	6-20	0.02-0.07	0.0-2.9	0.0-0.0	.05	.05			
2948: Nalim-----	0-6	14-27	1.45-1.65	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	56
	6-9	14-27	1.35-1.65	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	9-13	25-35	1.40-1.65	0.2-0.6	0.14-0.21	3.0-5.9	0.5-1.5	.28	.28			
	13-21	25-35	1.40-1.80	0.2-0.6	0.14-0.21	3.0-5.9	0.5-1.2	.28	.28			
	21-31	25-35	1.40-1.85	0.2-0.6	0.14-0.21	3.0-5.9	0.5-1.0	.28	.28			
	31-39	10-35	1.40-1.70	0.2-0.6	0.10-0.20	3.0-5.9	0.2-0.8	.32	.28			
	39-44	10-35	1.40-1.70	0.2-0.6	0.10-0.20	3.0-5.9	0.2-0.5	.32	.28			
	44-52	5-35	1.45-1.70	0.2-0.6	0.06-0.20	3.0-5.9	0.1-0.5	.32	.32			
	52-62	4-15	1.45-1.60	2-6	0.09-0.12	0.0-2.9	0.1-0.5	.17	.20			
	62-72	2-15	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.2	.15	.32			
	72-80	2-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.2	.15	.32			
2949: Naron-----	0-8	8-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	0.0-1.0	.20	.20	5	3	86
	8-55	18-27	1.45-1.55	0.6-2	0.15-0.18	0.0-2.9	0.0-0.5	.32	.32			
	55-66	2-18	1.55-1.60	2-6	0.10-0.15	0.0-2.9	0.0-0.5	.17	.17			
	66-80	2-18	1.55-1.60	6-20	0.10-0.15	0.0-2.9	0.0-0.5	.10	.10			
2950: Naron-----	0-8	8-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	0.0-1.0	.20	.20	5	3	86
	8-55	18-27	1.45-1.55	0.6-2	0.15-0.18	0.0-2.9	0.0-0.5	.32	.32			
	55-66	2-18	1.55-1.60	2-6	0.10-0.15	0.0-2.9	0.0-0.5	.17	.17			
	66-80	2-18	1.55-1.60	6-20	0.10-0.15	0.0-2.9	0.0-0.5	.10	.10			
2951: Nash-----	0-8	10-18	1.35-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	3	5	56
	8-19	10-18	1.40-1.65	0.6-2	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	19-28	10-18	1.40-2.00	0.6-2	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	28-80	---	---	---	---	---	---	---	---			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
2952:												
Nash-----	0-8	10-18	1.35-1.55	0.6-2	0.15-0.24	0.0-2.9	1.0-3.0	.37	.37	3	5	56
	8-19	10-18	1.40-1.65	0.6-2	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	19-28	10-18	1.40-2.00	0.6-2	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	28-80	---	---	---	---	---	---	---	---			
Lucien-----	0-6	10-27	1.30-1.55	0.6-2	0.13-0.24	0.0-2.9	0.0-2.0	.37	.37	2	4L	86
	6-12	12-27	1.30-1.55	0.6-2	0.13-0.24	0.0-2.9	0.0-1.0	.37	.37			
	12-80	---	---	---	---	---	---	---	---			
2953:												
Nash-----	0-8	10-18	1.35-1.55	0.6-2	0.15-0.24	0.0-2.9	0.5-1.5	.37	.37	3	5	56
	8-19	10-18	1.40-1.65	0.6-2	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	19-28	10-18	1.40-2.00	0.6-2	0.13-0.24	0.0-2.9	0.5-1.0	.37	.37			
	28-80	---	---	---	---	---	---	---	---			
Lucien-----	0-6	10-27	1.30-1.55	0.6-2	0.13-0.24	0.0-2.9	0.0-2.0	.37	.37	2	4L	86
	6-12	12-27	1.30-1.55	0.6-2	0.13-0.24	0.0-2.9	0.0-1.0	.37	.37			
	12-80	---	---	---	---	---	---	---	---			
2955:												
Nickerson-----	0-6	9-15	1.45-1.60	6-20	0.20-0.22	0.0-2.9	0.0-0.8	.17	.17	4	3	86
	6-12	5-26	1.40-1.80	0.6-2	0.15-0.18	0.0-2.9	0.0-0.6	.24	.24			
	12-18	10-21	1.40-1.70	2-6	0.15-0.19	0.0-2.9	0.0-0.6	.17	.17			
	18-29	0-25	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.6	.10	.10			
	29-34	0-20	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.10	.10			
	34-38	0-15	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.4	.10	.10			
	38-45	0-10	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.2	.10	.10			
	45-53	0-10	1.40-1.70	6-20	0.08-0.12	0.0-2.9	0.0-0.1	.10	.10			
	53-80	0-10	1.40-1.50	6-20	0.08-0.12	0.0-2.9	0.0-0.1	.10	.10			
2956:												
Nickerson-----	0-6	2-10	1.45-1.60	6-20	0.16-0.18	0.0-2.9	0.0-0.8	.15	.15	4	2	134
	6-12	5-26	1.40-1.80	0.6-2	0.15-0.18	0.0-2.9	0.0-0.6	.24	.24			
	12-18	10-21	1.40-1.70	2-6	0.15-0.19	0.0-2.9	0.0-0.6	.17	.17			
	18-29	0-25	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.6	.10	.10			
	29-34	0-20	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.10	.10			
	34-38	0-15	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.4	.10	.10			
	38-45	0-10	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.2	.10	.10			
	45-53	0-10	1.40-1.70	6-20	0.08-0.12	0.0-2.9	0.0-0.1	.10	.10			
	53-80	0-10	1.40-1.50	6-20	0.08-0.12	0.0-2.9	0.0-0.1	.10	.10			
2957:												
Nickerson-----	0-6	9-15	1.45-1.60	6-20	0.20-0.22	0.0-2.9	0.0-0.8	.17	.17	4	3	86
	6-12	5-26	1.40-1.80	0.6-2	0.15-0.18	0.0-2.9	0.0-0.6	.24	.24			
	12-18	10-21	1.40-1.70	2-6	0.15-0.19	0.0-2.9	0.0-0.6	.17	.17			
	18-29	0-28	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.6	.10	.10			
	29-34	0-20	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.10	.10			
	34-38	0-15	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.4	.10	.10			
	38-45	0-10	1.40-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.2	.10	.10			
	45-53	0-10	1.40-1.70	6-20	0.08-0.12	0.0-2.9	0.0-0.1	.10	.10			
	53-80	0-10	1.40-1.50	6-20	0.08-0.12	0.0-2.9	0.0-0.1	.10	.10			
2957:												
Punkin-----	0-6	7-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	1.0-3.0	.32	.32	2	3	86
	6-14	7-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	1.0-3.0	.20	.20			
	14-32	34-60	1.30-1.45	0.00-0.06	0.09-0.13	6.0-8.9	1.0-3.0	.32	.28			
	32-51	20-27	1.30-1.40	0.06-0.2	0.16-0.18	3.0-5.9	1.0-2.0	.24	.24			
	51-63	0-5	1.30-1.45	6-20	0.05-0.07	0.0-2.9	0.0-0.0	.05	.05			
	63-80	0-5	1.30-1.45	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.02	.02			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
2958: Ninnescah-----	0-6	11-17	1.40-1.50	2-6	0.14-0.16	0.0-2.9	1.0-4.0	.20	.20	5	3	86
	6-14	11-17	1.40-1.50	2-6	0.14-0.16	0.0-2.9	1.0-4.0	.20	.20			
	14-19	11-17	1.40-1.60	2-6	0.14-0.16	0.0-2.9	1.0-4.0	.20	.20			
	19-30	10-17	1.40-1.65	2-6	0.12-0.16	0.0-2.9	0.5-1.0	.20	.20			
	30-37	10-17	1.40-1.70	2-6	0.12-0.16	0.0-2.9	0.5-1.0	.20	.20			
	37-52	2-12	1.50-1.70	2-20	0.05-0.12	0.0-2.9	0.0-0.5	.17	.17			
	52-80	2-10	1.50-1.70	2-20	0.05-0.12	0.0-2.9	0.0-0.5	.17	.17			
2959: Ninnescah-----	0-6	11-17	1.40-1.50	2-6	0.12-0.14	0.0-2.9	1.0-4.0	.28	.28	5	3	86
	6-14	11-17	1.40-1.50	2-6	0.12-0.14	0.0-2.9	1.0-4.0	.20	.20			
	14-19	11-17	1.40-1.50	2-6	0.12-0.14	0.0-2.9	1.0-4.0	.20	.20			
	19-30	10-17	1.40-1.50	2-6	0.10-0.14	0.0-2.9	0.5-1.0	.20	.20			
	30-37	10-17	1.40-1.50	2-6	0.10-0.14	0.0-2.9	0.5-1.0	.20	.20			
	37-52	2-10	1.50-1.60	2-20	0.05-0.10	0.0-2.9	0.0-0.5	.17	.17			
	52-80	2-10	1.50-1.60	2-20	0.05-0.10	0.0-2.9	0.0-0.5	.17	.17			
3051: Ost-----	0-8	10-27	1.40-1.54	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	8-18	20-35	1.35-1.45	0.2-0.6	0.15-0.19	3.0-5.9	1.0-2.0	.32	.32			
	18-23	18-35	1.40-1.52	0.2-0.6	0.15-0.19	3.0-5.9	0.5-1.0	.32	.32			
	23-38	5-30	1.40-1.65	0.2-0.6	0.13-0.19	0.0-2.9	0.0-0.6	.32	.37			
	38-80	5-30	1.40-1.65	0.2-0.6	0.13-0.19	0.0-2.9	0.0-0.5	.32	.37			
3052: Ost-----	0-8	10-27	1.40-1.54	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	8-18	20-35	1.35-1.45	0.2-0.6	0.15-0.19	3.0-5.9	1.0-2.0	.32	.32			
	18-23	18-35	1.40-1.52	0.2-0.6	0.15-0.19	3.0-5.9	0.5-1.0	.32	.32			
	23-38	5-30	1.40-1.65	0.2-0.6	0.13-0.19	0.0-2.9	0.0-0.6	.32	.37			
	38-80	5-30	1.40-1.65	0.2-0.6	0.13-0.19	0.0-2.9	0.0-0.5	.32	.37			
Clark-----	0-11	15-27	1.35-1.45	0.6-2	0.17-0.22	3.0-5.9	1.0-2.0	.28	.28	5	4L	86
	11-16	18-35	1.35-1.70	0.6-2	0.17-0.19	3.0-5.9	0.5-2.0	.32	.32			
	16-28	18-35	1.35-1.70	0.6-2	0.14-0.19	3.0-5.9	0.5-1.0	.32	.32			
	28-45	10-25	1.35-1.70	0.6-2	0.14-0.19	3.0-5.9	0.5-1.0	.32	.32			
	45-80	7-20	1.35-1.70	0.6-2	0.14-0.19	3.0-5.9	0.0-1.0	.32	.32			
3170: Penalosa-----	0-5	15-28	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	5-10	15-28	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.43	.43			
	10-14	27-40	1.36-1.70	0.2-0.6	0.16-0.22	3.0-5.9	1.0-3.0	.37	.37			
	14-22	27-45	1.40-1.70	0.2-0.6	0.16-0.22	3.0-5.9	1.0-3.0	.37	.37			
	22-34	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.5-2.0	.37	.37			
	34-39	30-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.5-2.0	.37	.37			
	39-48	15-27	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	0.0-1.0	.43	.43			
	48-71	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.2-2.0	.37	.37			
	71-80	30-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.0-2.0	.37	.37			
3171: Penalosa-----	0-5	15-28	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.37	.37	5	6	48
	5-10	15-26	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	1.0-3.0	.43	.43			
	10-14	27-40	1.36-1.70	0.2-0.6	0.16-0.22	3.0-5.9	1.0-3.0	.37	.37			
	14-22	27-37	1.40-1.70	0.2-0.6	0.16-0.22	3.0-5.9	1.0-3.0	.37	.37			
	22-34	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.5-2.0	.37	.37			
	34-39	30-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.5-2.0	.37	.37			
	39-48	15-27	1.30-1.50	0.6-2	0.16-0.24	0.0-2.9	0.0-1.0	.43	.43			
	48-71	35-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.2-2.0	.37	.37			
	71-80	30-50	1.40-1.70	0.06-0.2	0.12-0.22	6.0-8.9	0.0-2.0	.37	.37			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
3180: Pratt-----	0-8	1-7	1.40-1.55	6-20	0.07-0.09	0.0-2.9	0.5-1.0	.15	.15	5	1	220
	8-64	4-11	1.45-1.55	6-20	0.09-0.12	0.0-2.9	0.0-0.5	.17	.17			
	64-80	1-8	1.45-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.17	.17			
3181: Pratt-----	0-8	1-7	1.40-1.55	6-20	0.07-0.09	0.0-2.9	0.5-1.0	.15	.15	5	1	220
	8-64	4-11	1.45-1.55	6-20	0.09-0.12	0.0-2.9	0.0-0.5	.17	.17			
	64-80	1-8	1.45-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.5	.17	.17			
Turon-----	0-8	1-5	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15	5	1	220
	8-28	3-10	1.40-1.55	6-20	0.09-0.12	0.0-2.9	0.5-1.0	.17	.17			
	28-40	2-18	1.40-1.55	2-20	0.10-0.15	0.0-2.9	0.0-0.0	.24	.24			
	40-58	27-41	1.45-1.60	0.00-0.6	0.12-0.18	3.0-5.9	0.0-0.5	.32	.32			
	58-80	27-45	1.45-1.60	0.00-0.6	0.12-0.18	3.0-5.9	0.0-0.5	.32	.32			
3190: Punkin-----	0-4	15-27	1.30-1.55	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.43	.43	2	5	56
	4-8	35-50	1.30-1.55	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	8-15	35-60	1.30-1.45	0.6-2	0.09-0.13	0.0-2.9	1.0-3.0	.28	.28			
	15-21	35-60	1.30-1.45	0.00-0.06	0.09-0.13	6.0-8.9	1.0-3.0	.28	.28			
	21-64	35-60	1.30-1.45	0.00-0.06	0.09-0.13	6.0-8.9	1.0-2.0	.32	.32			
	64-80	25-40	1.30-1.60	0.00-0.06	0.10-0.16	6.0-8.9	0.5-1.0	.32	.32			
3191: Punkin-----	0-4	15-27	1.30-1.55	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.43	.43	2	5	56
	4-8	35-50	1.30-1.55	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	8-15	35-60	1.30-1.45	0.6-2	0.09-0.13	0.0-2.9	1.0-3.0	.28	.28			
	15-21	35-60	1.30-1.45	0.00-0.06	0.09-0.13	6.0-8.9	1.0-3.0	.28	.28			
	21-64	35-60	1.30-1.45	0.00-0.06	0.09-0.13	6.0-8.9	1.0-2.0	.32	.32			
	64-80	25-40	1.30-1.60	0.00-0.06	0.10-0.16	6.0-8.9	0.5-1.0	.32	.32			
Taver-----	0-7	17-25	1.30-1.55	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48
	7-53	35-45	1.35-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-2.0	.37	.37			
	53-64	20-35	1.45-1.65	0.2-0.6	0.15-0.19	0.0-2.9	0.5-1.0	.28	.28			
	64-80	20-30	1.45-1.65	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.28			
3403: Sand pits.												
3469: Smolan-----	0-5	27-35	1.30-1.40	0.2-0.6	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37	5	7	38
	5-15	18-35	1.30-1.40	0.2-0.6	0.21-0.24	3.0-5.9	1.0-2.0	.37	.37			
	15-49	35-50	1.30-1.45	0.06-0.2	0.12-0.18	6.0-8.9	0.0-1.0	.37	.37			
	49-80	27-35	1.30-1.40	0.2-0.6	0.18-0.20	3.0-5.9	0.0-1.0	.37	.37			
3510: Saltcreek-----	0-5	10-19	1.45-1.55	2-6	0.11-0.15	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	5-10	10-27	1.45-1.55	2-6	0.11-0.15	0.0-2.9	1.0-2.0	.20	.20			
	10-39	16-28	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.0-1.0	.28	.28			
	39-80	28-42	1.40-1.60	0.06-0.2	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37			
Funmar-----	0-6	14-26	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	56
	6-12	14-26	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28			
	12-26	22-34	1.40-1.60	0.2-0.6	0.17-0.19	0.0-2.9	1.0-2.0	.32	.32			
	26-32	22-34	1.40-1.60	0.2-0.6	0.17-0.19	0.0-2.9	0.5-2.0	.32	.32			
	32-38	26-34	1.35-1.45	0.2-0.6	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32			
	38-66	28-45	1.40-1.60	0.06-0.2	0.10-0.17	3.0-5.9	0.0-0.5	.37	.37			
	66-80	26-45	1.50-1.60	0.06-0.2	0.10-0.17	0.0-2.9	0.0-0.5	.37	.37			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
3510: Farnum-----	0-5	14-27	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	56
	5-15	14-27	1.35-1.45	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28			
	15-21	20-27	1.40-1.50	0.6-2	0.17-0.19	0.0-2.9	0.5-1.5	.28	.28			
	21-34	20-35	1.40-1.50	0.6-2	0.15-0.19	3.0-5.9	0.0-0.5	.28	.28			
	34-73	25-35	1.40-1.50	0.6-2	0.15-0.19	3.0-5.9	0.0-0.5	.28	.28			
	73-80	12-29	1.40-1.55	0.6-2	0.13-0.16	0.0-2.9	0.0-0.5	.28	.28			
3511: Saltcreek-----	0-5	10-19	1.45-1.55	2-6	0.11-0.15	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	5-10	10-27	1.45-1.55	2-6	0.11-0.15	0.0-2.9	1.0-2.0	.20	.20			
	10-39	16-28	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.0-1.0	.28	.28			
	39-80	28-42	1.40-1.60	0.06-0.2	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37			
Naron-----	0-7	8-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	7-19	8-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	1.0-3.0	.20	.20			
	19-34	18-28	1.45-1.55	2-6	0.15-0.18	0.0-2.9	0.0-0.5	.32	.32			
	34-41	18-28	1.45-1.55	0.6-2	0.15-0.18	0.0-2.9	0.0-0.5	.32	.32			
	41-61	2-15	1.55-1.60	2-6	0.10-0.15	0.0-2.9	0.0-0.0	.15	.15			
	61-80	0-5	1.55-1.60	6-20	0.05-0.07	0.0-2.9	0.0-0.0	.05	.05			
3512: Saltcreek-----	0-5	10-19	1.45-1.55	2-6	0.11-0.15	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	5-10	10-27	1.45-1.55	2-6	0.11-0.15	0.0-2.9	1.0-2.0	.20	.20			
	10-39	16-28	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.0-1.0	.28	.28			
	39-80	28-42	1.40-1.60	0.06-0.2	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37			
Naron-----	0-8	8-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	1.0-3.0	.20	.20	5	3	86
	8-14	8-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	1.0-3.0	.20	.20			
	14-55	18-27	1.45-1.55	0.6-2	0.15-0.18	0.0-2.9	0.0-0.5	.32	.32			
	55-66	2-18	1.55-1.60	2-6	0.10-0.15	0.0-2.9	0.0-0.5	.17	.17			
	66-80	2-18	1.55-1.60	6-20	0.10-0.15	0.0-2.9	0.0-0.5	.10	.10			
3520: Saxman-----	0-4	1-7	1.50-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.3	.20	.20	5	2	134
	4-8	1-7	1.50-1.70	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.20	.20			
	8-13	1-8	1.50-1.70	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.17	.17			
	13-22	0-7	1.50-1.60	6-20	0.06-0.11	0.0-2.9	0.0-0.6	.17	.17			
	22-30	0-7	1.50-1.75	6-20	0.06-0.11	0.0-2.9	0.0-0.5	.17	.17			
	30-54	0-3	1.55-1.65	6-20	0.02-0.07	0.0-2.9	0.0-0.1	.15	.15			
	54-80	0-1	1.55-1.65	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05			
3530: Shellabarger-----	0-5	8-12	1.35-1.50	2-6	0.13-0.21	0.0-2.9	0.5-1.0	.20	.20	5	3	86
	5-11	17-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-0.9	.28	.32			
	11-33	18-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.28	.32			
	33-80	3-18	1.50-1.65	0.6-2	0.05-0.16	0.0-2.9	0.0-0.0	.28	.32			
Albion-----	0-9	7-15	1.35-1.45	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.20	.24	4	3	86
	9-27	10-18	1.45-1.55	2-6	0.12-0.18	0.0-2.9	1.0-2.0	.20	.24			
	27-48	4-15	1.45-1.60	2-6	0.09-0.12	0.0-2.9	0.0-0.5	.17	.20			
	48-80	2-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.0	.15	.32			
3531: Shellabarger-----	0-6	8-12	1.35-1.50	2-6	0.13-0.21	0.0-2.9	0.2-1.0	.20	.20	5	3	86
	6-11	17-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-1.2	.28	.32			
	11-33	18-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.28	.32			
	33-80	3-18	1.50-1.65	0.6-2	0.05-0.16	0.0-2.9	0.0-0.0	.28	.32			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
3531: Nalim-----	0-6	14-27	1.45-1.65	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	86
	6-9	14-27	1.35-1.65	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	9-13	25-35	1.40-1.65	0.2-0.6	0.14-0.21	3.0-5.9	0.5-1.5	.28	.28			
	13-21	25-35	1.40-1.80	0.2-0.6	0.14-0.21	3.0-5.9	0.5-1.2	.28	.28			
	21-31	25-35	1.40-1.85	0.2-0.6	0.14-0.21	3.0-5.9	0.5-1.0	.28	.28			
	31-39	10-35	1.40-1.70	0.2-0.6	0.10-0.20	3.0-5.9	0.2-0.8	.32	.28			
	39-44	10-35	1.40-1.70	0.2-0.6	0.10-0.20	3.0-5.9	0.2-0.5	.32	.28			
	44-52	5-35	1.45-1.70	0.2-0.6	0.06-0.20	3.0-5.9	0.1-0.5	.32	.32			
	52-62	4-15	1.45-1.60	2-6	0.09-0.12	0.0-2.9	0.1-0.5	.17	.20			
	62-72	2-15	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.2	.15	.32			
	72-80	2-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.2	.15	.32			
3532: Shellabarger-----	0-6	4-10	1.40-1.55	2-6	0.10-0.13	0.0-2.9	0.5-2.0	.17	.17	5	2	134
	6-11	17-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-1.2	.28	.32			
	11-33	18-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.28	.32			
	33-80	3-18	1.50-1.65	0.6-2	0.05-0.16	0.0-2.9	0.0-0.0	.28	.32			
3533: Shellabarger-----	0-7	8-12	1.35-1.50	2-6	0.13-0.21	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	7-11	17-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-1.2	.28	.32			
	11-33	18-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.28	.32			
	33-80	3-18	1.50-1.65	0.6-2	0.05-0.16	0.0-2.9	0.0-0.0	.28	.32			
3534: Shellabarger-----	0-7	8-12	1.35-1.50	2-6	0.13-0.21	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	7-11	17-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-1.2	.28	.32			
	11-33	18-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.28	.32			
	33-80	3-18	1.50-1.65	0.6-2	0.05-0.16	0.0-2.9	0.0-0.0	.28	.32			
3535: Shellabarger-----	0-7	8-12	1.35-1.50	2-6	0.13-0.21	0.0-2.9	1.0-2.0	.20	.20	5	3	86
	7-11	17-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-1.2	.28	.32			
	11-33	18-27	1.45-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.28	.32			
	33-80	3-18	1.50-1.65	0.6-2	0.05-0.16	0.0-2.9	0.0-0.0	.28	.32			
Nalim-----	0-6	14-27	1.45-1.65	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28	5	5	86
	6-9	14-27	1.35-1.65	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.28	.28			
	9-13	25-35	1.40-1.65	0.2-0.6	0.14-0.21	3.0-5.9	0.5-1.5	.28	.28			
	13-21	25-35	1.40-1.80	0.2-0.6	0.14-0.21	3.0-5.9	0.5-1.2	.28	.28			
	21-31	25-35	1.40-1.85	0.2-0.6	0.14-0.21	3.0-5.9	0.5-1.0	.28	.28			
	31-39	10-35	1.40-1.70	0.2-0.6	0.10-0.20	3.0-5.9	0.2-0.8	.32	.28			
	39-44	10-35	1.40-1.70	0.2-0.6	0.10-0.20	3.0-5.9	0.2-0.5	.32	.28			
	44-52	5-35	1.45-1.70	0.2-0.6	0.06-0.20	3.0-5.9	0.1-0.5	.32	.32			
	52-62	4-15	1.45-1.60	2-6	0.09-0.12	0.0-2.9	0.1-0.5	.17	.20			
	62-72	2-15	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.2	.15	.32			
	72-80	2-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.2	.15	.32			
3540: Solvay-----	0-5	3-8	1.50-1.60	2-6	0.07-0.11	0.0-2.9	0.5-1.0	.17	.17	5	3	86
	5-14	13-34	1.50-1.80	0.2-2	0.15-0.18	0.0-2.9	0.0-0.8	.28	.28			
	14-37	13-34	1.50-1.80	0.2-2	0.15-0.18	0.0-2.9	0.0-0.5	.28	.28			
	37-80	7-22	1.50-1.80	2-6	0.11-0.16	0.0-2.9	0.0-0.5	.24	.24			
3550: Spelvin-----	0-5	3-7	1.45-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.15	.15	5	2	134
	5-23	20-30	1.50-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.28	.28			
	23-34	14-30	1.50-1.60	0.6-2	0.16-0.18	0.0-2.9	0.0-0.5	.28	.28			
	34-50	13-19	1.45-1.60	2-6	0.12-0.14	0.0-2.9	0.0-0.0	.20	.20			
	50-58	5-12	1.50-1.65	2-20	0.07-0.12	0.0-2.9	0.0-0.0	.15	.15			
	58-80	0-5	1.50-1.65	6-20	0.02-0.07	0.0-2.9	0.0-0.0	.05	.05			

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind	Wind	
								Kw	Kf	T	erodi- bility group	erodi- bility index	
	In	Pct	g/cc	In/hr	In/in	Pct	Pct						
3639: Taver-----	0-7	17-25	1.30-1.55	0.6-2	0.19-0.22	0.0-2.9	1.0-3.0	.28	.28	5	6	48	
	7-53	35-45	1.35-1.60	0.00-0.06	0.12-0.18	6.0-8.9	0.0-2.0	.37	.37				
	53-64	20-35	1.45-1.65	0.2-0.6	0.15-0.19	0.0-2.9	0.5-1.0	.28	.28				
	64-80	20-30	1.45-1.65	0.6-2	0.15-0.19	0.0-2.9	0.5-1.0	.28	.28				
3640: Tivin-----	0-7	0-2	1.35-1.50	6-20	0.07-0.09	0.0-2.9	0.0-1.0	.15	.15	5	1	220	
	7-18	0-2	1.35-1.50	6-20	0.02-0.08	0.0-2.9	0.0-0.5	.10	.10				
	18-80	0-3	1.50-1.70	6-20	0.02-0.08	0.0-2.9	0.0-0.0	.10	.10				
3641: Tivin-----	0-7	0-2	1.35-1.50	6-20	0.07-0.09	0.0-2.9	0.0-1.0	.15	.15	5	1	220	
	7-18	0-2	1.35-1.50	6-20	0.02-0.08	0.0-2.9	0.0-0.5	.10	.10				
	18-80	0-3	1.50-1.70	6-20	0.02-0.08	0.0-2.9	0.0-0.0	.10	.10				
Dillhut-----	0-4	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15	5	1	220	
	4-9	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15				
	9-26	1-3	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-0.5	.15	.15				
	26-41	13-30	1.40-1.55	0.6-2	0.12-0.15	0.0-2.9	0.0-0.0	.24	.24				
	41-55	10-21	1.55-1.65	2-6	0.11-0.15	0.0-2.9	0.0-0.0	.17	.17				
	55-65	9-17	1.55-1.65	2-6	0.11-0.15	0.0-2.9	0.0-0.0	.17	.17				
	65-70	10-20	1.55-1.65	2-6	0.11-0.15	0.0-2.9	0.0-0.0	.17	.17				
	70-80	5-15	1.45-1.60	6-20	0.08-0.12	0.0-2.9	0.0-0.0	.15	.15				
3642: Tivin-----	0-11	0-2	1.35-1.50	6-20	0.07-0.09	0.0-2.9	0.0-1.0	.15	.15	5	1	220	
	11-53	0-3	1.35-1.50	6-20	0.02-0.08	0.0-2.9	0.0-0.5	.10	.10				
	53-63	10-20	1.45-1.55	2-6	0.16-0.19	0.0-2.9	0.0-0.5	.20	.20				
	63-80	0-3	1.50-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05				
Willowbrook-----	0-4	8-18	1.45-1.80	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20	4	3	86	
	4-9	8-18	1.45-1.80	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20				
	9-17	5-15	1.50-1.80	2-6	0.16-0.19	0.0-2.9	0.5-1.0	.20	.20				
	17-26	5-15	1.50-1.80	2-6	0.13-0.17	0.0-2.9	0.2-1.0	.24	.24				
	26-45	0-5	1.60-1.80	6-20	0.02-0.07	0.0-2.9	0.0-0.5	.05	.05				
	45-51	0-1	1.60-1.80	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05				
	51-80	0-1	1.60-1.80	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05				
3643: Tobin-----	0-6	18-27	1.30-1.40	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.32	.32	5	6	48	
	6-15	18-27	1.30-1.40	0.6-2	0.20-0.24	0.0-2.9	1.0-4.0	.32	.32				
	15-34	18-35	1.35-1.50	0.6-2	0.17-0.20	3.0-5.9	1.0-4.0	.32	.32				
	34-80	18-35	1.35-1.45	0.6-2	0.18-0.22	3.0-5.9	0.0-0.5	.43	.43				
3644: Turon-----	0-8	1-5	1.40-1.55	6-20	0.02-0.10	0.0-2.9	0.0-1.0	.15	.15	5	1	220	
	8-28	3-10	1.40-1.55	6-20	0.09-0.12	0.0-2.9	0.5-1.0	.17	.17				
	28-40	2-18	1.40-1.55	2-20	0.10-0.15	0.0-2.9	0.0-0.0	.24	.24				
	40-58	27-41	1.45-1.60	0.00-0.6	0.12-0.18	3.0-5.9	0.0-0.5	.32	.32				
	58-80	27-45	1.45-1.60	0.00-0.6	0.12-0.18	3.0-5.9	0.0-0.5	.32	.32				
Carway-----	0-7	2-10	1.50-1.60	6-20	0.05-0.09	0.0-2.9	0.5-1.0	.17	.17	5	2	134	
	7-15	20-29	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.5-1.0	.28	.28				
	15-35	18-29	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.5-1.0	.28	.28				
	35-40	28-45	1.40-1.60	0.00-0.06	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37				
	40-72	30-45	1.40-1.60	0.00-0.06	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37				
	72-80	15-34	1.45-1.65	0.6-2	0.13-0.18	0.0-2.9	0.0-0.5	.28	.28				

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind	Wind	
								Kw	Kf	T	erodi- bility group	erodi- bility index	
	In	Pct	g/cc	In/hr	In/in	Pct	Pct						
3760: Urban land.													
Blazefork-----	0-3	35-50	1.20-1.45	0.2-0.6	0.21-0.23	6.0-8.9	2.0-4.0	.37	.37	5	7	38	
	3-7	35-50	1.35-1.45	0.2-0.6	0.21-0.23	6.0-8.9	2.0-4.0	.37	.37				
	7-29	35-50	1.25-1.55	0.06-0.2	0.11-0.14	6.0-8.9	1.0-2.0	.43	.43				
	29-34	35-50	1.25-1.55	0.06-0.2	0.11-0.14	6.0-8.9	0.5-2.0	.43	.43				
	34-40	35-50	1.30-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.5-1.0	.32	.32				
	40-48	35-50	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.2-1.0	.32	.32				
	48-61	26-35	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.1-1.0	.32	.32				
	61-80	18-27	1.35-1.55	0.2-0.6	0.15-0.18	3.0-5.9	0.1-1.0	.32	.32				
Kaskan-----	0-7	18-26	1.35-1.45	0.6-2	0.20-0.23	0.0-2.9	2.0-4.0	.28	.28	4	6	48	
	7-17	27-35	1.35-1.45	0.6-2	0.21-0.23	3.0-5.9	2.0-4.0	.37	.37				
	17-24	18-26	1.45-1.55	0.6-2	0.17-0.19	0.0-2.9	1.0-2.0	.28	.28				
	24-35	10-17	1.45-1.55	2-6	0.14-0.17	0.0-2.9	0.0-1.0	.24	.24				
	35-66	0-8	1.50-1.60	6-20	0.06-0.09	0.0-2.9	0.0-0.5	.10	.10				
	66-80	0-2	1.55-1.65	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05				
3762: Urban land.													
Darlow-----	0-5	8-20	1.30-1.55	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.43	.43	2	5	56	
	5-8	8-20	1.30-1.70	0.6-2	0.20-0.22	0.0-2.9	1.0-3.0	.32	.32				
	8-14	20-30	1.30-1.45	0.2-0.6	0.09-0.13	3.0-5.9	1.0-3.0	.28	.28				
	14-20	20-30	1.30-1.45	0.2-0.6	0.09-0.13	3.0-5.9	0.8-3.0	.28	.28				
	20-26	20-30	1.30-1.45	0.2-0.6	0.09-0.13	3.0-5.9	0.2-3.0	.28	.28				
	26-33	20-35	1.30-1.50	0.00-0.06	0.09-0.13	0.0-2.9	0.0-2.0	.28	.28				
	33-44	20-35	1.30-1.50	0.00-0.06	0.09-0.13	0.0-2.9	0.0-2.0	.28	.28				
	44-53	12-27	1.30-1.60	0.2-0.6	0.10-0.16	0.0-2.9	0.0-1.0	.24	.24				
	53-68	12-27	1.30-1.80	0.2-0.6	0.10-0.16	0.0-2.9	0.0-1.0	.24	.24				
	68-80	8-12	1.50-1.80	0.6-2	0.02-0.10	0.0-2.9	0.0-0.5	.20	.20				
Elmer-----	0-6	10-17	1.50-1.70	2-6	0.17-0.20	0.0-2.9	1.0-2.0	.32	.32	2	3	86	
	6-9	10-17	1.50-1.70	2-6	0.17-0.20	0.0-2.9	1.0-2.0	.28	.28				
	9-19	10-17	1.50-1.75	2-6	0.17-0.20	0.0-2.9	1.0-2.0	.28	.28				
	19-26	17-25	1.55-1.65	0.2-0.6	0.12-0.16	0.0-2.9	0.5-1.0	.32	.32				
	26-37	17-25	1.55-1.70	0.2-0.6	0.12-0.16	0.0-2.9	0.0-1.0	.32	.32				
	37-51	20-28	1.50-1.60	0.06-0.2	0.12-0.16	6.0-8.9	0.0-0.5	.37	.37				
	51-80	14-20	1.60-1.80	0.2-6	0.10-0.16	0.0-2.9	0.0-0.5	.28	.28				
3763: Urban land.													
Imano-----	0-11	27-35	1.30-1.40	0.2-0.6	0.17-0.19	3.0-5.9	1.0-3.0	.28	.28	4	4L	86	
	11-23	18-35	1.35-1.45	0.2-0.6	0.16-0.19	3.0-5.9	0.5-1.0	.28	.28				
	23-80	1-8	1.45-1.55	6-20	0.02-0.10	0.0-2.9	0.0-0.5	.15	.15				
3764: Urban land.													
Mahone-----	0-8	3-11	1.50-1.60	6-20	0.07-0.11	0.0-2.9	0.0-0.8	.17	.17	5	2	134	
	8-14	3-11	1.50-1.60	6-20	0.07-0.11	0.0-2.9	0.0-0.8	.17	.17				
	14-25	5-17	1.45-1.55	2-6	0.14-0.18	0.0-2.9	0.0-1.0	.24	.24				
	25-33	7-17	1.45-1.55	2-6	0.14-0.18	0.0-2.9	0.0-1.0	.24	.24				
	33-39	8-17	1.45-1.55	2-6	0.14-0.18	0.0-2.9	0.0-1.0	.24	.24				
	39-42	18-34	1.30-1.50	0.6-2	0.18-0.22	0.0-2.9	1.0-2.0	.32	.32				
	42-48	8-34	1.30-1.50	0.6-2	0.18-0.22	0.0-2.9	1.0-2.0	.32	.32				
	48-61	12-28	1.45-1.55	2-6	0.14-0.19	0.0-2.9	0.0-0.5	.24	.24				
	61-71	10-28	1.45-1.55	2-6	0.14-0.19	0.0-2.9	0.0-0.5	.24	.24				
	71-78	0-10	1.55-1.65	6-20	0.02-0.07	0.0-2.9	0.0-0.0	.05	.05				
	78-80	0-4	1.55-1.65	6-20	0.02-0.07	0.0-2.9	0.0-0.0	.05	.05				

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	Organic matter	Erosion factors			Wind	Wind	
								Kw	Kf	T	erodi- bility group	erodi- bility index	
	In	Pct	g/cc	In/hr	In/in	Pct	Pct						
3765: Urban land.													
Saltcreek-----	0-5	10-19	1.45-1.55	2-6	0.11-0.15	0.0-2.9	1.0-2.0	.20	.20	5	3	86	
	5-10	10-27	1.45-1.55	2-6	0.11-0.15	0.0-2.9	1.0-2.0	.20	.20				
	10-39	16-28	1.40-1.60	0.6-2	0.15-0.18	0.0-2.9	0.0-1.0	.28	.28				
	39-80	28-42	1.40-1.60	0.06-0.2	0.10-0.17	6.0-8.9	0.0-0.5	.37	.37				
Naron-----	0-7	8-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	1.0-3.0	.20	.20	5	3	86	
	7-19	8-15	1.45-1.55	2-6	0.14-0.18	0.0-2.9	1.0-3.0	.20	.20				
	19-34	18-28	1.45-1.55	2-6	0.15-0.18	0.0-2.9	0.0-0.5	.32	.32				
	34-41	18-28	1.45-1.55	0.6-2	0.15-0.18	0.0-2.9	0.0-0.5	.32	.32				
	41-61	2-15	1.55-1.60	2-6	0.10-0.15	0.0-2.9	0.0-0.0	.15	.15				
	61-80	0-5	1.55-1.60	6-20	0.05-0.07	0.0-2.9	0.0-0.0	.05	.05				
3766: Urban land.													
Saxman-----	0-4	1-7	1.50-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.3	.20	.20	5	2	134	
	4-8	1-7	1.50-1.70	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.20	.20				
	8-13	1-8	1.50-1.70	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.17	.17				
	13-22	0-7	1.50-1.60	6-20	0.06-0.11	0.0-2.9	0.0-0.6	.17	.17				
	22-30	0-7	1.50-1.75	6-20	0.06-0.11	0.0-2.9	0.0-0.5	.17	.17				
	30-54	0-3	1.55-1.65	6-20	0.02-0.07	0.0-2.9	0.0-0.1	.15	.15				
	54-80	0-1	1.55-1.65	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05				
3767: Urban land.													
Willowbrook-----	0-4	8-18	1.45-1.80	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20	4	3	86	
	4-9	8-18	1.45-1.80	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20				
	9-17	5-15	1.50-1.80	2-6	0.16-0.19	0.0-2.9	0.5-1.0	.20	.20				
	17-26	5-15	1.50-1.80	2-6	0.13-0.17	0.0-2.9	0.2-1.0	.24	.24				
	26-45	0-5	1.60-1.80	6-20	0.02-0.07	0.0-2.9	0.0-0.5	.05	.05				
	45-51	0-1	1.60-1.80	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05				
	51-80	0-1	1.60-1.80	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05				
3768: Urban land.													
Yaggy-----	0-5	5-12	1.50-1.60	2-6	0.16-0.18	0.0-2.9	0.5-1.0	.20	.20	3	3	86	
	5-11	5-12	1.50-1.60	2-6	0.16-0.18	0.0-2.9	0.5-1.0	.20	.20				
	11-14	8-26	1.45-1.55	0.6-2	0.17-0.20	0.0-2.9	0.0-1.0	.24	.24				
	14-42	0-2	1.55-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.1	.05	.05				
	42-53	0-1	1.60-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05				
	53-69	0-1	1.60-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05				
	69-80	0-1	1.60-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05				
3900: Warnut-----	0-2	8-20	1.45-1.55	2-6	0.11-0.15	0.0-2.9	0.5-1.0	.20	.20	5	3	86	
	2-11	18-29	1.50-1.60	0.6-2	0.16-0.19	0.0-2.9	0.5-1.0	.28	.28				
	11-15	12-21	1.40-1.60	2-6	0.15-0.18	0.0-2.9	0.0-0.5	.20	.20				
	15-37	12-17	1.40-1.60	2-6	0.15-0.18	0.0-2.9	0.0-0.5	.20	.20				
	37-80	2-15	1.50-1.60	2-20	0.07-0.11	0.0-2.9	0.0-0.5	.15	.15				

Table 6.--Physical Properties of the Soils--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permea- bility (Ksat)	Available water capacity	Linear extensi- bility	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					
3966: Willowbrook-----	0-4	8-18	1.45-1.80	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20	4	3	86
	4-9	8-18	1.45-1.80	2-6	0.16-0.18	0.0-2.9	1.0-2.0	.20	.20			
	9-17	5-15	1.50-1.80	2-6	0.16-0.19	0.0-2.9	0.5-1.0	.20	.20			
	17-26	5-15	1.50-1.80	2-6	0.13-0.17	0.0-2.9	0.2-1.0	.24	.24			
	26-45	0-5	1.60-1.80	6-20	0.02-0.07	0.0-2.9	0.0-0.5	.05	.05			
	45-51	0-1	1.60-1.80	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05			
	51-80	0-1	1.60-1.80	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05			
4004: Yaggy-----	0-5	5-12	1.50-1.60	2-6	0.16-0.18	0.0-2.9	0.5-1.0	.20	.20	3	3	86
	5-11	5-12	1.50-1.60	2-6	0.16-0.18	0.0-2.9	0.5-1.0	.20	.20			
	11-14	8-26	1.45-1.55	0.6-2	0.17-0.20	0.0-2.9	0.0-1.0	.24	.24			
	14-42	0-2	1.55-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.1	.05	.05			
	42-53	0-1	1.60-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05			
	53-69	0-1	1.60-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05			
	69-80	0-1	1.60-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05			
4005: Yaggy-----	0-5	5-12	1.50-1.60	2-6	0.16-0.18	0.0-2.9	0.5-1.0	.20	.20	3	3	86
	5-11	5-12	1.50-1.60	2-6	0.16-0.18	0.0-2.9	0.5-1.0	.20	.20			
	11-14	8-26	1.45-1.55	0.6-2	0.17-0.20	0.0-2.9	0.0-1.0	.24	.24			
	14-42	0-2	1.55-1.65	6-20	0.04-0.06	0.0-2.9	0.0-0.1	.05	.05			
	42-53	0-1	1.60-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05			
	53-69	0-1	1.60-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.0	.05	.05			
	69-80	0-1	1.60-1.70	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05			
Saxman-----	0-4	1-7	1.50-1.60	6-20	0.10-0.12	0.0-2.9	0.0-1.3	.20	.20	5	2	134
	4-8	1-7	1.50-1.70	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.20	.20			
	8-13	1-8	1.50-1.70	6-20	0.10-0.12	0.0-2.9	0.0-1.0	.17	.17			
	13-22	0-7	1.50-1.60	6-20	0.06-0.11	0.0-2.9	0.0-0.6	.17	.17			
	22-30	0-7	1.50-1.75	6-20	0.06-0.11	0.0-2.9	0.0-0.5	.17	.17			
	30-54	0-3	1.55-1.65	6-20	0.02-0.07	0.0-2.9	0.0-0.1	.15	.15			
	54-80	0-1	1.55-1.65	6-20	0.02-0.05	0.0-2.9	0.0-0.1	.05	.05			
4110: Zellmont-----	0-8	11-19	1.35-1.50	0.6-2	0.13-0.21	0.0-2.9	1.0-2.0	.20	.20	3	3	86
	8-18	20-34	1.40-1.55	0.2-0.6	0.14-0.21	3.0-5.9	0.0-1.0	.28	.28			
	18-26	10-28	1.50-1.65	0.6-2	0.05-0.16	0.0-2.9	0.0-0.5	.28	.32			
	26-32	20-35	1.40-1.55	0.2-0.6	0.14-0.18	3.0-5.9	0.0-0.5	.28	.28			
	32-80	---	1.85-2.00	0.06-0.2	---	---	---	---	---			
Poxmash-----	0-5	7-15	1.35-1.45	2-6	0.16-0.18	0.0-2.9	0.8-2.0	.20	.20	4	3	86
	5-9	7-15	1.35-1.45	2-6	0.16-0.18	0.0-2.9	0.5-1.5	.20	.20			
	9-15	10-18	1.45-1.55	2-6	0.12-0.18	0.0-2.9	0.2-1.0	.20	.20			
	15-20	4-15	1.45-1.60	2-6	0.09-0.12	0.0-2.9	0.0-0.5	.17	.17			
	20-48	2-10	1.50-1.65	6-20	0.03-0.10	0.0-2.9	0.0-0.0	.15	.15			
	48-80	---	1.85-2.00	0.06-0.2	---	---	---	---	---			

Table 7.--Chemical Properties of the Soils

(Absence of an entry indicates that data were not estimated.)

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
990:							
Abbyville-----	0-8	10-25	7.4-8.4	0	0	0.0-2.0	2-8
	8-15	15-20	7.9-9.0	0-1	0	2.0-8.0	13-25
	15-49	20-35	7.9-9.0	1-5	0	2.0-8.0	13-30
	49-80	15-35	7.9-9.0	0-5	0	2.0-4.0	4-15
991:							
Abbyville-----	0-8	10-20	7.4-8.4	0	0	0.0-2.0	2-8
	8-15	15-20	7.9-9.0	0-1	0	2.0-8.0	13-25
	15-49	20-35	7.9-9.0	1-5	0	2.0-8.0	13-30
	49-80	15-35	7.9-9.0	0-5	0	2.0-4.0	4-15
Kisiwa-----	0-4	10-25	7.4-9.0	0-2	0	1.0-4.0	2-11
	4-7	10-25	7.4-9.0	0-2	0	1.0-4.0	2-8
	7-23	14-26	7.9-9.0	5-10	0	1.0-8.0	15-30
	23-31	14-30	7.9-9.0	5-10	0	2.0-4.0	2-26
	31-40	14-30	7.9-9.0	5-10	0	1.0-4.0	2-18
	40-46	14-30	7.9-9.0	5-10	0	0.0-4.0	2-15
	46-58	3.0-10	7.9-9.0	5-10	0	0.0-4.0	2-4
	58-80	0.0-6.0	7.9-9.0	0-2	0	0.0-4.0	2-4
1004:							
Albion-----	0-9	5.0-15	5.6-6.5	0	0	0	0
	9-27	5.0-15	6.1-7.8	0	0	0	0
	27-48	2.0-10	6.1-8.4	0	0	0	0
	48-80	2.0-5.0	6.1-8.4	0	0	0	0
1011:							
Albion-----	0-9	5.0-15	5.6-6.5	0	0	0	0
	9-27	5.0-15	6.1-7.8	0	0	0	0
	27-48	2.0-10	6.1-8.4	0	0	0	0
	48-80	2.0-5.0	6.1-8.4	0	0	0	0
Shellabarger-----	0-7	6.0-10	5.1-6.5	0	0	0	0
	7-33	9.0-12	6.1-7.8	0	0	0	0
	33-80	2.0-9.0	6.1-8.4	0-5	0	0	0
1057:							
Aquents-----	0-3	21-29	5.6-6.0	0	0	0	0
	3-8	9.0-12	6.1-7.8	0	0	0	0
	8-80	---	7.4-8.4	0	0	0	0
1061, 1062: Arents.							
1070:							
Avans-----	0-5	9.0-15	5.1-6.0	0	0	0	0
	5-10	9.0-15	5.1-6.0	0	0	0	0
	10-14	7.0-15	5.1-6.0	0	0	0	0
	14-30	15-25	5.6-7.3	0	0	0	0
	30-53	11-15	5.6-7.3	0	0	0	0
	53-80	11-15	5.6-7.8	0-3	0	0	0
1071:							
Avans-----	0-5	9.0-15	5.1-6.0	0	0	0	0
	5-10	9.0-15	5.1-6.0	0	0	0	0
	10-14	7.0-15	5.1-6.0	0	0	0	0
	14-30	15-25	5.6-7.3	0	0	0	0
	30-53	11-15	5.6-7.3	0	0	0	0
	53-80	11-15	5.6-7.8	0-3	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
1072:							
Avans-----	0-5	9.0-15	5.1-6.0	0	0	0	0
	5-10	9.0-15	5.1-6.0	0	0	0	0
	10-14	7.0-15	5.1-6.0	0	0	0	0
	14-30	15-25	5.6-7.3	0	0	0	0
	30-53	11-15	5.6-7.3	0	0	0	0
	53-80	11-15	5.6-7.8	0-3	0	0	0
1191:							
Blazefork-----	0-3	15-32	4.5-6.5	0	0	0	0
	3-7	15-32	4.5-6.5	0	0	0	0
	7-34	19-40	6.1-8.4	0	0	0	0
	34-40	14-30	7.4-8.4	0	0	0	0
	40-80	14-26	7.4-8.4	0	0	0	0
1192:							
Blazefork-----	0-3	15-32	4.5-6.5	0	0	0	0
	3-7	15-32	4.5-6.5	0	0	0	0
	7-34	19-40	6.1-8.4	0	0	0	0
	34-40	14-30	7.4-8.4	0	0	0	0
	40-80	14-26	7.4-8.4	0	0	0	0
Kaskan-----	0-7	11-17	6.1-7.3	0	0	0	0
	7-17	20-30	6.1-7.3	0	0	0	0
	17-24	10-16	6.1-7.8	0	0	0	0
	24-35	6.0-10	6.1-7.8	0-1	0	0	0
	35-66	0.0-4.0	6.1-7.8	0	0	0	0
	66-80	0.0-0.0	6.1-7.8	0	0	0	0
1200:							
Buhler-----	0-3	20-35	5.6-7.3	0	0-3	0.0-6.0	0-7
	3-8	20-35	5.6-7.3	0	0-3	0.0-4.0	20-30
	8-16	10-15	6.1-7.8	0	1-5	0.0-4.0	20-30
	16-24	12-30	6.6-7.8	1-5	0-5	4.0-8.0	20-30
	24-36	12-30	6.6-7.8	1-5	0-5	4.0-8.0	15-25
	36-42	12-30	6.6-7.8	1-5	0-5	4.0-8.0	10-20
	42-50	15-30	7.4-9.0	1-5	0-5	0.0-8.0	10-20
	50-58	15-25	7.4-9.0	1-5	0-5	0.0-8.0	10-20
	58-80	8.0-15	7.4-8.4	0	0	0.0-4.0	0-15
Blazefork-----	0-3	15-32	4.5-6.5	0	0	0	0
	3-7	15-32	4.5-6.5	0	0	0	0
	7-34	19-40	6.1-8.4	0	0	0	0
	34-40	14-30	7.4-8.4	0	0	0	0
	40-80	14-26	7.4-8.4	0	0	0	0
1324:							
Carway-----	0-7	7.0-12	5.6-6.5	0	0	0	0
	7-35	12-18	6.1-7.3	0	0	0	0
	35-72	24-35	6.6-7.8	0-5	0	0	0
	72-80	9.0-16	6.6-7.8	0-5	0	0	0
Carbika-----	0-11	7.0-12	6.1-7.3	0	0	0	0
	11-22	28-38	6.1-8.4	0-5	0	0	0
	22-60	12-16	6.1-8.4	0-5	0	0	0
	60-80	12-16	7.4-8.4	0-5	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
1357:							
Carway-----	0-7	1.0-5.0	5.6-6.5	0	0	0	0
	7-35	12-18	6.1-7.3	0	0	0	0
	35-72	24-35	6.6-7.8	0-5	0	0	0
	72-80	9.0-16	6.6-7.8	0-5	0	0	0
Dillhut-----	0-10	1.0-3.0	5.6-6.5	0	0	0	0
	10-29	0.0-2.0	5.6-6.5	0	0	0	0
	29-43	10-18	6.6-7.3	0	0	0	0
	43-80	17-22	6.6-7.3	0	0	0	0
Solvay-----	0-5	5.0-12	6.1-6.5	0	0	0	0
	5-37	8.0-19	6.1-7.3	0	0	0	0
	37-80	5.0-12	6.1-7.3	0	0	0	0
1359:							
Clark-----	0-11	10-25	7.4-8.4	0-5	0	0.0-1.0	0
	11-16	10-25	7.4-9.0	5-25	0	0.0-1.0	0
	16-28	10-25	7.4-9.0	0-25	0	0.0-1.0	0
	28-45	10-25	7.4-9.0	15-45	0	0.0-1.0	0
	45-80	5.0-20	7.4-9.0	15-25	0	0.0-1.0	0
Ost-----	0-8	15-20	6.1-8.4	0	0	0	0
	8-18	10-25	6.6-8.4	0	0	0	0
	18-23	10-25	7.4-8.4	15-34	0	0	0
	23-54	5.0-15	7.4-8.4	15-30	0	0	0
	54-80	5.0-17	7.4-8.4	15-30	0	0	0
1428:							
Crete-----	0-5	16-23	5.6-6.0	0	0	0	0
	5-9	20-28	5.6-6.0	0	0	0	0
	9-38	25-41	6.1-7.3	0	0	0	0
	38-80	18-29	7.4-8.4	0-5	0	0	0
1429:							
Crete-----	0-5	16-23	5.6-6.0	0	0	0	0
	5-9	20-28	5.6-6.0	0	0	0	0
	9-38	25-41	6.1-7.3	0	0	0	0
	38-80	18-29	7.4-8.4	0-5	0	0	0
1553:							
Darlow-----	0-8	5.0-15	4.5-7.8	0	0	0.0-2.0	0-5
	8-26	15-25	6.6-9.0	0-2	0	2.0-8.0	10-40
	26-44	15-30	7.9-9.0	0-1	0	4.0-16.0	30-40
	44-53	10-20	7.9-8.4	0-1	0	0.0-4.0	25-35
	53-68	10-15	7.9-8.4	0-1	0	0.0-4.0	25-35
	68-80	0.0-10	7.4-8.4	0-1	0	0.0-2.0	10-30
Elmer-----	0-19	5.0-12	4.5-7.3	0	0	0.0-2.0	0-1
	19-26	10-18	7.4-9.0	0	0	0.0-2.0	7-20
	26-37	10-18	7.4-9.0	0	0	1.0-2.0	7-20
	37-51	15-20	7.9-9.0	1-2	0	1.0-4.0	20-30
	51-61	8.0-15	7.4-9.0	0-1	0	1.0-2.0	5-25
	61-72	8.0-15	7.4-9.0	0-1	0	1.0-2.0	5-20
	72-80	8.0-15	7.4-9.0	0-1	0	0.0-2.0	5-20
1554:							
Dillhut-----	0-10	1.0-3.0	5.6-6.5	0	0	0	0
	10-29	0.0-2.0	5.6-6.5	0	0	0	0
	29-43	10-18	6.6-7.3	0	0	0	0
	43-80	17-22	6.6-7.3	0	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-	Soil	Calcium	Gypsum	Salinity	Sodium
		exchange capacity	reaction	carbon- ate			adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
1555:							
Dillhut-----	0-9	1.0-3.0	5.6-6.5	0	0	0	0
	9-26	0.0-2.0	5.6-6.5	0	0	0	0
	26-41	10-18	6.6-7.3	0	0	0	0
	41-70	7.0-10	6.6-7.3	0	0	0	0
	70-80	3.0-9.0	6.1-7.3	0	0	0	0
Plev-----	0-4	3.0-6.0	5.1-6.5	0	0	0	0
	4-12	0.0-3.0	5.1-6.5	0	0	0	0
	12-46	0.0-1.0	5.6-6.5	0	0	0	0
	46-75	7.0-15	6.1-7.3	0	0	0	0
	75-80	3.0-9.0	6.1-7.3	0	0	0	0
1556:							
Dillhut-----	0-9	1.0-3.0	5.6-6.5	0	0	0	0
	9-26	0.0-2.0	5.6-6.5	0	0	0	0
	26-41	10-18	6.6-7.3	0	0	0	0
	41-70	7.0-10	6.6-7.3	0	0	0	0
	70-80	3.0-9.0	6.1-7.3	0	0	0	0
Solvay-----	0-5	5.0-12	6.1-6.5	0	0	0	0
	5-37	8.0-19	6.1-7.3	0	0	0	0
	37-80	5.0-12	6.1-7.3	0	0	0	0
1725:							
Farnum-----	0-15	9.0-15	5.6-7.3	0	0	0	0
	15-21	8.0-18	6.1-7.8	0	0	0	0
	21-73	10-23	6.1-8.4	0	0	0	0
	73-80	4.0-19	6.6-8.4	0	0	0	0
Funmar-----	0-12	7.0-19	6.1-7.3	0	0	0	0
	12-32	13-19	6.6-7.3	0	0	0	0
	32-38	7.0-19	6.6-7.8	0	0	0	0
	38-66	24-41	6.6-7.8	0-5	0	0	0
	66-80	11-18	6.6-7.8	0-5	0	0	0
1727:							
Funmar-----	0-12	7.0-19	6.1-7.3	0	0	0	0
	12-32	13-19	6.6-7.3	0	0	0	0
	32-38	7.0-19	6.6-7.8	0	0	0	0
	38-66	24-41	6.6-7.8	0-5	0	0	0
	66-80	11-18	6.6-7.8	0-5	0	0	0
Taver-----	0-7	10-15	6.1-7.3	0	0	0	0
	7-53	30-40	6.6-8.4	0-5	0	0	0
	53-80	12-17	7.4-8.4	0-5	0	0	0
1804:							
Geary-----	0-6	15-30	5.6-6.5	0	0	0	0
	6-14	10-30	5.6-6.5	0	0	0	0
	14-51	15-25	6.1-7.8	0	0	0	0
	51-80	5.0-25	6.1-8.4	0	0	0	0
1807:							
Geary-----	0-5	15-30	5.6-6.5	0	0	0	0
	5-43	15-30	6.1-7.8	0	0	0	0
	43-80	15-25	6.1-8.4	0	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
1985:							
Hayes-----	0-8	5.0-8.0	5.1-7.3	0	0	0	0
	8-47	6.0-10	6.1-7.3	0	0	0	0
	47-56	10-15	6.6-7.8	0	0	0	0
	56-80	24-35	6.6-7.8	0-5	0	0	0
1986:							
Hayes-----	0-8	1.0-5.0	5.1-7.3	0	0	0	0
	8-47	6.0-10	6.1-7.3	0	0	0	0
	47-56	10-15	6.6-7.8	0	0	0	0
	56-80	24-35	6.6-7.8	0-5	0	0	0
Solvay-----	0-5	1.0-7.0	6.1-6.5	0	0	0	0
	5-37	8.0-19	6.1-7.3	0	0	0	0
	37-80	5.0-12	6.1-7.3	0	0	0	0
1987:							
Hayes-----	0-8	1.0-5.0	5.1-7.3	0	0	0	0
	8-47	6.0-10	6.1-7.3	0	0	0	0
	47-56	10-15	6.6-7.8	0	0	0	0
	56-80	24-35	6.6-7.8	0-5	0	0	0
Turon-----	0-8	1.0-3.0	5.1-7.3	0	0	0	0
	8-28	2.0-5.0	5.1-7.3	0	0	0	0
	28-40	3.0-7.0	5.1-7.3	0	0	0	0
	40-80	24-33	6.6-7.8	0	0	0	0
2204:							
Jamash-----	0-4	16-21	6.1-7.8	0	0	0	0
	4-11	19-24	6.6-8.4	0	0	0	0
	11-15	15-27	7.4-8.4	0-2	0	0	0
	15-80	10-20	7.4-9.0	15-25	0	0	0
Piedmont-----	0-7	16-21	6.1-7.3	0	0	0	0
	7-20	19-24	6.1-7.8	0	0	0	0
	20-24	21-33	6.6-8.4	0-2	0	0	0
	24-32	21-33	7.9-8.4	0-5	0	0	0
	32-80	10-20	7.4-9.0	15-25	0	0	0
2205:							
Jamash-----	0-4	16-21	6.1-7.8	0	0	0	0
	4-11	19-24	6.6-8.4	0	0	0	0
	11-15	15-27	7.4-8.4	0-2	0	0	0
	15-80	10-20	7.4-9.0	15-25	0	0	0
Piedmont-----	0-7	16-21	6.1-7.3	0	0	0	0
	7-20	19-24	6.1-7.8	0	0	0	0
	20-24	21-33	6.6-8.4	0-2	0	0	0
	24-32	21-33	7.9-8.4	0-5	0	0	0
	32-80	10-20	7.4-9.0	15-25	0	0	0
2206:							
Jamash-----	0-4	16-21	6.1-7.8	0	0	0	0
	4-11	19-24	6.6-8.4	0	0	0	0
	11-15	15-27	7.4-8.4	0-2	0	0	0
	15-80	10-20	7.4-9.0	15-25	0	0	0
Piedmont-----	0-7	16-21	6.1-7.3	0	0	0	0
	7-20	19-24	6.1-7.8	0	0	0	0
	20-24	21-33	6.6-8.4	0-2	0	0	0
	24-32	21-33	7.9-8.4	0-5	0	0	0
	32-80	10-20	7.4-9.0	15-25	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
2207: Jamash-----	0-4	16-21	6.1-7.8	0	0	0	0
	4-11	19-24	6.6-8.4	0	0	0	0
	11-15	15-27	7.4-8.4	0-2	0	0	0
	15-80	10-20	7.4-9.0	15-25	0	0	0
2381: Kanza-----	0-9	2.0-10	5.6-6.5	0	0	0	0
	9-17	2.0-5.0	5.6-6.5	0	0	0	0
	17-80	2.0-5.0	5.6-8.4	0-5	0	0	0
Ninnescah-----	0-6	5.0-12	7.4-8.4	5-14	0	0.0-2.1	0-1
	6-19	5.0-12	7.4-8.4	5-14	0	0.0-2.0	0-1
	19-37	5.0-8.0	7.4-8.4	5-11	0	0.0-1.0	0-1
	37-80	3.0-8.0	6.6-8.4	0-10	0	0.0-1.0	0-1
2390: Kaskan-----	0-7	11-17	6.1-7.3	0	0	0	0
	7-17	20-30	6.1-7.3	0	0	0	0
	17-24	10-16	6.1-7.8	0	0	0	0
	24-35	6.0-10	6.1-7.8	0-1	0	0	0
	35-66	0.0-4.0	6.1-7.8	0	0	0	0
	66-80	0.0-0.0	6.1-7.8	0	0	0	0
2391: Kaskan-----	0-13	20-30	6.1-7.3	0	0	0	0
	13-27	6.0-10	6.1-7.8	0-1	0	0	0
	27-43	0.0-3.0	6.1-7.8	0	0	0	0
	43-80	0.0-8.0	6.1-7.8	0-1	0	0	0
2395: Kisiwa-----	0-4	10-25	7.4-9.0	0-2	0	1.0-4.0	2-11
	4-7	10-25	7.4-9.0	0-2	0	1.0-4.0	2-8
	7-23	14-26	7.9-9.0	5-10	0	1.0-8.0	15-30
	23-31	14-30	7.9-9.0	5-10	0	2.0-4.0	2-26
	31-40	14-30	7.9-9.0	5-10	0	1.0-4.0	2-18
	40-46	14-30	7.9-9.0	5-10	0	0.0-4.0	2-15
	46-58	3.0-10	7.9-9.0	5-10	0	0.0-4.0	2-4
	58-80	0.0-6.0	7.9-9.0	0-2	0	0.0-4.0	2-4
2509: Ladysmith-----	0-8	15-30	5.6-7.3	0	0	0	0
	8-31	17-40	5.6-7.8	0	0	0	0
	31-80	18-37	7.4-8.4	0-1	0	0	0
2556: Langdon-----	0-8	0.0-3.0	5.1-7.3	0	0	0	0
	8-47	0.0-4.0	5.1-7.3	0	0	0	0
	47-64	0.0-1.0	5.1-7.3	0	0	0	0
	64-80	0.0-4.0	4.5-6.5	0	0	0	0
2587: Imano-----	0-11	15-25	7.4-8.4	1-5	0	0.0-4.0	0-2
	11-23	10-25	7.4-8.4	1-5	0	0.0-4.0	0-2
	23-80	1.0-5.0	7.4-9.0	1-5	0	0.0-4.0	0-2
2588: Longford-----	0-6	15-25	5.6-7.3	0	0	0	0
	6-11	15-25	6.1-7.3	0	0	0	0
	11-43	15-30	6.1-7.3	0	0	0	0
	43-80	10-20	6.1-7.8	0	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-	Soil	Calcium	Gypsum	Salinity	Sodium
		exchange capacity	reaction	carbon- ate			adsorption ratio
	<u>In</u>	<u>meq/100g</u>	<u>pH</u>	<u>Pct</u>	<u>Pct</u>	<u>mmhos/cm</u>	
2812:							
Mahone-----	0-14	1.0-5.0	5.1-7.3	0	0	0	0
	14-33	6.0-10	6.1-7.3	0	0	0	0
	33-39	6.0-10	6.1-8.4	0	0	0	0
	39-48	12-21	7.4-8.4	0-1	0	0	0
	48-71	8.0-16	7.4-8.4	0-1	0	0	0
	71-80	0.0-3.0	6.6-8.4	0	0	0	0
2948:							
Nalim-----	0-6	9.0-15	5.6-7.3	0	0	0	0
	6-9	9.0-20	5.6-7.3	0	0	0	0
	9-13	15-25	5.6-8.4	0	0	0	0
	13-21	15-24	5.6-8.4	0	0	0	0
	21-31	15-20	5.6-8.4	0	0	0	0
	31-44	7.0-20	5.6-8.4	0	0	0	0
	44-52	3.0-20	5.6-8.4	0	0	0	0
	52-72	2.0-10	5.6-7.3	0	0	0	0
	72-80	2.0-5.0	5.6-7.3	0	0	0	0
2949:							
Naron-----	0-8	5.0-15	5.6-7.3	0	0	0	0
	8-55	10-15	5.6-7.8	0	0	0	0
	55-80	5.0-10	6.1-8.4	0	0	0	0
2950:							
Naron-----	0-8	5.0-15	5.6-7.3	0	0	0	0
	8-55	10-15	5.6-7.8	0	0	0	0
	55-80	5.0-10	6.1-8.4	0	0	0	0
2951:							
Nash-----	0-8	6.0-11	6.1-8.4	0	---	0	0
	8-19	6.0-11	6.1-8.4	0	---	0	0
	19-28	6.0-11	6.1-8.4	0-2	---	0	0
	28-80	---	---	0-2	---	0	0
2952:							
Nash-----	0-8	6.0-11	6.1-8.4	0	---	0	0
	8-19	6.0-11	6.1-8.4	0	---	0	0
	19-28	6.0-11	6.1-8.4	0-2	---	0	0
	28-80	---	---	0-2	---	0	0
Lucien-----							
	0-6	6.0-17	7.4-8.4	0-2	0	0	0
	6-12	6.0-17	7.4-8.4	0-2	0	0	0
	12-80	---	7.4-8.4	0-2	0	0	0
2953:							
Nash-----	0-8	6.0-11	6.1-8.4	0	---	0	0
	8-19	6.0-11	6.1-8.4	0	---	0	0
	19-28	6.0-11	6.1-8.4	0-2	---	0	0
	28-80	---	---	0-2	---	0	0
Lucien-----							
	0-6	6.0-17	7.4-8.4	0-2	0	0	0
	6-12	6.0-17	7.4-8.4	0-2	0	0	0
	12-80	---	7.4-8.4	0-2	0	0	0
2955:							
Nickerson-----	0-6	5.0-10	5.1-7.3	0	0	0	0
	6-12	10-15	5.6-7.3	0	0	0	0
	12-18	7.0-12	5.6-7.3	0-5	0	0	0
	18-29	0.0-7.0	6.1-7.8	1-5	0	0	0
	29-38	0.0-7.0	7.4-8.4	1-5	0	0	0
	38-80	0.0-7.0	6.6-8.4	1-5	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	<u>In</u>	<u>meq/100g</u>	<u>pH</u>	<u>Pct</u>	<u>Pct</u>	<u>mmhos/cm</u>	
2956:							
Nickerson-----	0-6	1.0-7.0	5.1-7.3	0	0	0	0
	6-12	10-15	5.6-7.3	0	0	0	0
	12-18	7.0-12	5.6-7.3	0-5	0	0	0
	18-29	0.0-7.0	6.1-7.8	1-5	0	0	0
	29-38	0.0-7.0	7.4-8.4	1-5	0	0	0
	38-80	0.0-7.0	6.6-8.4	1-5	0	0	0
2957:							
Nickerson-----	0-6	5.0-10	5.1-7.3	0	0	0	0
	6-12	10-15	5.6-7.3	0	0	0	0
	12-18	7.0-12	5.6-7.3	0-5	0	0	0
	18-29	0.0-7.0	6.1-7.8	1-5	0	0	0
	29-38	0.0-7.0	7.4-8.4	1-5	0	0	0
	38-80	0.0-7.0	6.6-8.4	1-5	0	0	0
Punkin-----	0-14	5.0-15	6.6-7.8	0	0	0.0-2.0	2-8
	14-32	25-55	7.9-8.4	0	0	2.0-4.0	13-25
	32-51	12-15	6.6-8.4	1-5	0	2.0-8.0	13-25
	51-63	0.0-2.0	7.9-8.4	0	0	0.0-2.0	0
	63-80	0.0-2.0	6.6-8.4	0	0	0	0
2958:							
Ninnescah-----	0-6	5.0-12	7.4-8.4	5-14	0	0.0-2.1	0-1
	6-19	5.0-12	7.4-8.4	5-14	0	0.0-2.0	0-1
	19-37	5.0-8.0	7.4-8.4	5-11	0	0.0-1.0	0-1
	37-80	3.0-8.0	6.6-8.4	0-10	0	0.0-1.0	0-1
2959:							
Ninnescah-----	0-6	5.0-12	7.4-8.4	5-14	0	4.0-8.0	1-5
	6-19	5.0-12	7.4-8.4	5-14	0	4.0-8.0	1-5
	19-37	5.0-8.0	7.4-8.4	5-11	0	4.0-8.0	1-5
	37-80	3.0-8.0	6.6-8.4	0-10	0	0.0-2.0	1-5
3051:							
Ost-----	0-8	15-20	6.1-8.4	0	0	0	0
	8-18	10-25	6.6-8.4	0	0	0	0
	18-23	10-25	7.4-8.4	15-34	0	0	0
	23-54	5.0-15	7.4-8.4	15-30	0	0	0
	54-80	5.0-17	7.4-8.4	15-30	0	0	0
3052:							
Ost-----	0-8	15-20	6.1-8.4	0	0	0	0
	8-18	10-25	6.6-8.4	0	0	0	0
	18-23	10-25	7.4-8.4	15-34	0	0	0
	23-54	5.0-15	7.4-8.4	15-30	0	0	0
	54-80	5.0-17	7.4-8.4	15-30	0	0	0
Clark-----	0-11	10-25	7.4-8.4	0-5	0	0.0-1.0	0
	11-16	10-25	7.4-9.0	5-25	0	0.0-1.0	0
	16-28	10-25	7.4-9.0	0-25	0	0.0-1.0	0
	28-45	10-25	7.4-9.0	15-45	0	0.0-1.0	0
	45-80	5.0-20	7.4-9.0	15-25	0	0.0-1.0	0
3170:							
Penalosa-----	0-10	10-16	5.1-7.3	0	0	0	0
	10-22	17-21	6.1-8.4	0	0	0	0
	22-39	21-30	6.6-8.4	0-2	0	0	0
	39-48	10-16	6.6-8.4	0	0	0	0
	48-80	21-30	6.6-8.4	0-10	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-	Soil	Calcium	Gypsum	Salinity	Sodium
		exchange capacity	reaction	carbon- ate			adsorption ratio
	<u>In</u>	<u>meq/100g</u>	<u>pH</u>	<u>Pct</u>	<u>Pct</u>	<u>mmhos/cm</u>	
3171:							
Penalosa-----	0-10	10-16	5.1-7.3	0	0	0	0
	10-22	17-21	6.1-8.4	0	0	0	0
	22-39	21-30	6.6-8.4	0-2	0	0	0
	39-48	10-16	6.6-8.4	0	0	0	0
	48-80	21-30	6.6-8.4	0-10	0	0	0
3180:							
Pratt-----	0-8	0.0-3.0	5.6-7.3	0	0	0	0
	8-24	2.0-5.0	5.6-7.3	0	0	0	0
	24-64	3.0-7.0	5.6-7.3	0	0	0	0
	64-80	1.0-3.0	6.1-7.3	0	0	0	0
3181:							
Pratt-----	0-8	0.0-3.0	5.6-7.3	0	0	0	0
	8-24	2.0-5.0	5.6-7.3	0	0	0	0
	24-64	3.0-7.0	5.6-7.3	0	0	0	0
	64-80	1.0-3.0	6.1-7.3	0	0	0	0
Turon-----	0-8	1.0-3.0	5.1-7.3	0	0	0	0
	8-28	2.0-5.0	5.1-7.3	0	0	0	0
	28-40	3.0-7.0	5.1-7.3	0	0	0	0
	40-80	24-33	6.6-7.8	0	0	0	0
3190:							
Punkin-----	0-8	10-30	6.6-7.8	0	0	0.0-2.0	2-8
	8-15	10-30	7.4-8.4	0	0	0.0-2.0	13-25
	15-21	10-30	7.4-8.4	0	0	2.0-4.0	13-25
	21-39	25-55	7.4-8.4	1-5	0	2.0-4.0	13-25
	39-64	25-50	7.4-8.4	1-5	1-5	2.0-8.0	13-25
	64-80	15-35	6.6-8.4	0	0	4.0-8.0	20-40
3191:							
Punkin-----	0-8	10-30	6.6-7.8	0	0	0.0-2.0	2-8
	8-15	10-30	7.4-8.4	0	0	0.0-2.0	13-25
	15-21	10-30	7.4-8.4	0	0	2.0-4.0	13-25
	21-39	25-55	7.4-8.4	1-5	0	2.0-4.0	13-25
	39-64	25-50	7.4-8.4	1-5	1-5	2.0-8.0	13-25
	64-80	15-35	6.6-8.4	0	0	4.0-8.0	20-40
Taver-----	0-7	10-15	6.1-7.3	0	0	0	0
	7-53	30-40	6.6-8.4	0-5	0	0	0
	53-80	12-17	7.4-8.4	0-5	0	0	0
3403:							
Sand pits.							
3469:							
Smolan-----	0-5	15-20	5.6-7.3	0	0	0	0
	5-15	10-20	5.6-7.3	0	0	0	0
	15-49	17-25	5.6-7.8	0	0	0	0
	49-80	14-18	6.6-7.8	0	0	0	0
3510:							
Saltcreek-----	0-10	5.0-10	4.5-6.6	0	0	0	0
	10-39	10-18	6.1-7.3	0	0	0	0
	39-80	24-35	6.1-8.4	0-5	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
3510:							
Funmar-----	0-12	7.0-19	6.1-7.3	0	0	0	0
	12-32	13-19	6.6-7.3	0	0	0	0
	32-38	7.0-19	6.6-7.8	0	0	0	0
	38-66	24-41	6.6-7.8	0-5	0	0	0
	66-80	11-18	6.6-7.8	0-5	0	0	0
Farnum-----	0-15	9.0-15	5.6-7.3	0	0	0	0
	15-21	8.0-18	6.1-7.8	0	0	0	0
	21-73	10-23	6.1-8.4	0	0	0	0
	73-80	4.0-19	6.6-8.4	0	0	0	0
3511:							
Saltcreek-----	0-10	5.0-10	4.5-6.6	0	0	0	0
	10-39	10-18	6.1-7.3	0	0	0	0
	39-80	24-35	6.1-8.4	0-5	0	0	0
Naron-----	0-19	6.0-10	5.6-7.3	0	0	0	0
	19-41	12-17	5.6-7.8	0	0	0	0
	41-61	4.0-10	6.1-8.4	0-5	0	0	0
	61-80	0.0-1.0	6.1-8.4	0-1	0	0	0
3512:							
Saltcreek-----	0-10	5.0-10	4.5-6.6	0	0	0	0
	10-39	10-18	6.1-7.3	0	0	0	0
	39-80	24-35	6.1-8.4	0-5	0	0	0
Naron-----	0-14	5.0-15	5.6-7.3	0	0	0	0
	14-55	10-15	5.6-7.8	0	0	0	0
	55-80	5.0-10	6.1-8.4	0	0	0	0
3520:							
Saxman-----	0-13	1.0-5.0	4.5-6.0	0	0	0	0
	13-30	1.0-4.0	6.6-8.4	0	0	0	0
	30-54	0.0-2.0	6.6-8.4	0	0	0	0
	54-80	0.0-0.0	6.6-8.4	0	0	0	0
3530:							
Shellabarger-----	0-7	6.0-10	5.1-6.5	0	0	0	0
	7-33	9.0-12	6.1-7.8	0	0	0	0
	33-80	2.0-9.0	6.1-8.4	0-5	0	0	0
Albion-----	0-9	5.0-15	5.6-6.5	0	0	0	0
	9-27	5.0-15	6.1-7.8	0	0	0	0
	27-48	2.0-10	6.1-8.4	0	0	0	0
	48-80	2.0-5.0	6.1-8.4	0	0	0	0
3531:							
Shellabarger-----	0-7	6.0-10	5.1-6.5	0	0	0	0
	7-33	9.0-12	6.1-7.8	0	0	0	0
	33-80	2.0-9.0	6.1-8.4	0-5	0	0	0
Nalim-----	0-6	9.0-15	5.6-7.3	0	0	0	0
	6-9	9.0-20	5.6-7.3	0	0	0	0
	9-13	15-25	5.6-8.4	0	0	0	0
	13-21	15-24	5.6-8.4	0	0	0	0
	21-31	15-20	5.6-8.4	0	0	0	0
	31-44	7.0-20	5.6-8.4	0	0	0	0
	44-52	3.0-20	5.6-8.4	0	0	0	0
	52-72	2.0-10	5.6-7.3	0	0	0	0
	72-80	2.0-5.0	5.6-7.3	0	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
3532: Shellabarger-----	0-7	4.0-7.0	5.1-6.5	0	0	0	0
	7-33	9.0-12	6.1-7.8	0	0	0	0
	33-80	2.0-9.0	6.1-8.4	0-5	0	0	0
3533: Shellabarger-----	0-7	6.0-10	5.1-6.5	0	0	0	0
	7-33	9.0-12	6.1-7.8	0	0	0	0
	33-80	2.0-9.0	6.1-8.4	0-5	0	0	0
3534: Shellabarger-----	0-7	6.0-10	5.1-6.5	0	0	0	0
	7-33	9.0-12	6.1-7.8	0	0	0	0
	33-80	2.0-9.0	6.1-8.4	0-5	0	0	0
3535: Shellabarger-----	0-7	6.0-10	5.1-6.5	0	0	0	0
	7-33	9.0-12	6.1-7.8	0	0	0	0
	33-80	2.0-9.0	6.1-8.4	0-5	0	0	0
Nalim-----	0-6	9.0-15	5.6-7.3	0	0	0	0
	6-9	9.0-20	5.6-7.3	0	0	0	0
	9-13	15-25	5.6-8.4	0	0	0	0
	13-21	15-24	5.6-8.4	0	0	0	0
	21-31	15-20	5.6-8.4	0	0	0	0
	31-44	7.0-20	5.6-8.4	0	0	0	0
	44-52	3.0-20	5.6-8.4	0	0	0	0
	52-72	2.0-10	5.6-7.3	0	0	0	0
	72-80	2.0-5.0	5.6-7.3	0	0	0	0
3540: Solvay-----	0-5	1.0-7.0	6.1-6.5	0	0	0	0
	5-37	8.0-19	6.1-7.3	0	0	0	0
	37-80	5.0-12	6.1-7.3	0	0	0	0
3550: Spelvin-----	0-5	2.0-5.0	5.1-6.5	0	0	0	0
	5-34	12-17	5.1-7.3	0	0	0	0
	34-50	8.0-12	5.1-7.3	0	0	0	0
	50-58	3.0-8.0	5.1-7.3	0	0	0	0
	58-80	0.0-3.0	5.1-7.3	0	0	0	0
3639: Taver-----	0-7	10-15	6.1-7.3	0	0	0	0
	7-53	30-40	6.6-8.4	0-5	0	0	0
	53-80	12-17	7.4-8.4	0-5	0	0	0
3640: Tivin-----	0-7	0.0-1.0	5.6-6.5	0	0	0.0-1.0	0
	7-80	0.0-1.0	6.1-7.3	0	0	0.0-1.0	0
3641: Tivin-----	0-7	0.0-1.0	5.6-6.5	0	0	0.0-1.0	0
	7-80	0.0-1.0	6.1-7.3	0	0	0.0-1.0	0
Dillhut-----	0-9	1.0-3.0	5.6-6.5	0	0	0	0
	9-26	0.0-2.0	5.6-6.5	0	0	0	0
	26-41	10-18	6.6-7.3	0	0	0	0
	41-70	7.0-10	6.6-7.3	0	0	0	0
	70-80	3.0-9.0	6.1-7.3	0	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation-	Soil	Calcium	Gypsum	Salinity	Sodium
		exchange capacity	reaction	carbon- ate			adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
3642:							
Tivin-----	0-11	0.0-1.0	5.6-6.5	0	0	0	0
	11-53	0.0-1.0	6.1-7.3	0	0	0	0
	53-63	7.0-11	6.1-7.8	0-3	0	0	0
	63-80	0.0-1.0	6.1-7.8	0-2	0	0	0
Willowbrook-----	0-17	5.0-11	5.6-8.4	0	0	0	0
	17-26	3.0-10	7.4-8.4	0-5	0	0	0
	26-45	0.0-3.0	7.4-8.4	0	0	0	0
	45-80	0.0-2.0	7.4-8.4	0	0	0	0
3643:							
Tobin-----	0-15	18-20	5.6-7.8	0	0	0	0
	15-80	13-20	7.4-8.4	0	0	0	0
3644:							
Turon-----	0-8	1.0-3.0	5.1-7.3	0	0	0	0
	8-28	2.0-5.0	5.1-7.3	0	0	0	0
	28-40	3.0-7.0	5.1-7.3	0	0	0	0
	40-80	24-33	6.6-7.8	0	0	0	0
Carway-----	0-7	1.0-5.0	5.6-6.5	0	0	0	0
	7-35	12-18	6.1-7.3	0	0	0	0
	35-72	24-35	6.6-7.8	0-5	0	0	0
	72-80	9.0-16	6.6-7.8	0-5	0	0	0
3760:							
Urban land.							
Blazefork-----	0-7	15-32	4.5-6.5	0	0	0	0
	7-34	19-40	6.1-8.4	0	0	0	0
	34-40	14-30	7.4-8.4	0	0	0	0
	40-80	14-26	7.4-8.4	0	0	0	0
Kaskan-----	0-7	11-17	6.1-7.3	0	0	0	0
	7-17	20-30	6.1-7.3	0	0	0	0
	17-24	10-16	6.1-7.8	0	0	0	0
	24-35	6.0-10	6.1-7.8	0-1	0	0	0
	35-66	0.0-4.0	6.1-7.8	0	0	0	0
	66-80	0.0-0.0	6.1-7.8	0	0	0	0
3762:							
Urban land.							
Darlow-----	0-8	5.0-15	4.5-7.8	0	0	0.0-2.0	0-5
	8-14	15-25	6.6-9.0	0-2	0	2.0-8.0	10-40
	14-26	15-25	6.6-9.0	0-2	0	2.0-8.0	15-40
	26-44	15-30	7.9-9.0	0-1	0	4.0-16.0	30-40
	44-53	10-20	7.9-8.4	0-1	0	0.0-4.0	25-35
	53-68	10-15	7.9-8.4	0-1	0	0.0-4.0	25-35
	68-80	0.0-10	7.4-8.4	0-1	0	0.0-2.0	10-30
Elmer-----	0-19	5.0-12	4.5-7.3	0	0	0.0-2.0	0-1
	19-26	10-18	7.4-9.0	0	0	0.0-2.0	7-20
	26-37	10-18	7.4-9.0	0	0	1.0-2.0	7-20
	37-51	15-20	7.9-9.0	1-2	0	1.0-4.0	20-30
	51-61	8.0-15	7.4-9.0	0-1	0	1.0-2.0	5-25
	61-72	8.0-15	7.4-9.0	0-1	0	1.0-2.0	5-20
	72-80	8.0-15	7.4-9.0	0-1	0	0.0-2.0	5-20

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	<u>In</u>	<u>meq/100g</u>	<u>pH</u>	<u>Pct</u>	<u>Pct</u>	<u>mmhos/cm</u>	
3763:							
Urban land.							
Imano-----	0-11	15-25	7.4-8.4	1-5	0	0.0-4.0	0-2
	11-23	10-25	7.4-8.4	1-5	0	0.0-4.0	0-2
	23-80	1.0-5.0	7.4-9.0	1-5	0	0.0-4.0	0-2
3764:							
Urban land.							
Mahone-----	0-14	1.0-5.0	5.1-7.3	0	0	0	0
	14-33	6.0-10	6.1-7.3	0	0	0	0
	33-39	6.0-10	6.1-8.4	0	0	0	0
	39-48	12-21	7.4-8.4	0-1	0	0	0
	48-71	8.0-16	7.4-8.4	0-1	0	0	0
	71-80	0.0-3.0	6.6-8.4	0	0	0	0
3765:							
Urban land.							
Saltcreek-----	0-10	5.0-10	4.5-6.6	0	0	0	0
	10-39	10-18	6.1-7.3	0	0	0	0
	39-80	24-35	6.1-8.4	0-5	0	0	0
Naron-----	0-19	6.0-10	5.6-7.3	0	0	0	0
	19-41	12-17	5.6-7.8	0	0	0	0
	41-61	4.0-10	6.1-8.4	0-5	0	0	0
	61-80	0.0-1.0	6.1-8.4	0-1	0	0	0
3766:							
Urban land.							
Saxman-----	0-13	1.0-5.0	4.5-6.0	0	0	0	0
	13-30	1.0-4.0	6.6-8.4	0	0	0	0
	30-54	0.0-2.0	6.6-8.4	0	0	0	0
	54-80	0.0-0.0	6.6-8.4	0	0	0	0
3767:							
Urban land.							
Willowbrook-----	0-17	5.0-11	5.6-8.4	0	0	0	0
	17-26	3.0-10	7.4-8.4	0-5	0	0	0
	26-45	0.0-3.0	7.4-8.4	0	0	0	0
	45-80	0.0-2.0	7.4-8.4	0	0	0	0
3768:							
Urban land.							
Yaggy-----	0-11	6.0-9.0	7.4-8.4	0-3	0	0	0
	11-14	5.0-16	7.4-8.4	0-5	0	0	0
	14-80	---	7.4-8.4	0	0	0	0
3900:							
Warnut-----							
	0-2	5.0-10	5.6-6.5	0	0	0	0
	2-11	11-16	6.1-7.3	0	0	0	0
	11-37	8.0-10	6.1-7.3	0	0	0	0
	37-80	2.0-9.0	6.1-7.3	0	0	0	0

Table 7.--Chemical Properties of the Soils--Continued

Map symbol and soil name	Depth	Cation- exchange capacity	Soil reaction	Calcium carbon- ate	Gypsum	Salinity	Sodium adsorption ratio
	In	meq/100g	pH	Pct	Pct	mmhos/cm	
3966: Willowbrook-----	0-17	5.0-11	5.6-8.4	0	0	0	0
	17-26	3.0-10	7.4-8.4	0-5	0	0	0
	26-45	0.0-3.0	7.4-8.4	0	0	0	0
	45-80	0.0-2.0	7.4-8.4	0	0	0	0
4004: Yaggy-----	0-11	6.0-9.0	7.4-8.4	0-3	0	0	0
	11-14	5.0-16	7.4-8.4	0-5	0	0	0
	14-80	---	7.4-8.4	0	0	0	0
4005: Yaggy-----	0-11	6.0-9.0	7.4-8.4	0-3	0	0	0
	11-14	5.0-16	7.4-8.4	0-5	0	0	0
	14-80	---	7.4-8.4	0	0	0	0
Saxman-----	0-13	1.0-5.0	4.5-6.0	0	0	0	0
	13-30	1.0-4.0	6.6-8.4	0	0	0	0
	30-54	0.0-2.0	6.6-8.4	0	0	0	0
	54-80	0.0-0.0	6.6-8.4	0	0	0	0
4110: Zellmont-----	0-8	6.0-10	5.6-7.3	0	0	0	0
	8-18	13-18	6.1-7.8	0	0	0	0
	18-26	7.0-11	6.1-7.8	0-2	0	0	0
	26-32	13-18	6.6-8.4	0-2	0	0	0
	32-80	---	---	10-20	0	0	0
Poxmash-----	0-9	5.0-15	5.6-6.5	0	0	0	0
	9-15	5.0-15	6.1-7.8	0	0	0	0
	15-20	2.0-10	6.1-8.4	0	0	0	0
	20-48	2.0-5.0	5.6-8.4	0	0	0	0
	48-80	---	---	---	---	---	---

Table 8.--Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that the feature is not a concern or that data were not estimated.)

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Hardness		Uncoated steel	Concrete
	In					
990: Abbyville-----	>80	---	---	Low-----	High-----	Low.
991: Abbyville-----	>80	---	---	Low-----	High-----	Low.
Kisiwa-----	>80	---	---	Low-----	High-----	Low.
1004: Albion-----	>80	---	---	Low-----	Low-----	Low.
1011: Albion-----	>80	---	---	Low-----	Low-----	Low.
Shellabarger----	>80	---	---	None-----	Low-----	Moderate.
1057: Aquents-----	>80	---	---	---	High-----	Low.
1061, 1062: Arents.						
1070: Avans-----	>80	---	---	Low-----	Moderate----	Moderate.
1071: Avans-----	>80	---	---	Low-----	Moderate----	Moderate.
1072: Avans-----	>80	---	---	Low-----	Moderate----	Moderate.
1191: Blazefork-----	>80	---	---	Low-----	High-----	Low.
1192: Blazefork-----	>80	---	---	Low-----	High-----	Low.
Kaskan-----	>80	---	---	Low-----	Moderate----	Low.
1200: Buhler-----	>80	---	---	Low-----	High-----	Low.
Blazefork-----	>80	---	---	Low-----	High-----	Low.
1324: Carway-----	>80	---	---	Low-----	High-----	Moderate.
Carbika-----	>80	---	---	Low-----	Moderate----	Low.
1357: Carway-----	>80	---	---	Low-----	High-----	Moderate.
Dillhut-----	>80	---	---	Low-----	Low-----	Moderate.
Solvay-----	>80	---	---	Low-----	High-----	Moderate.

Table 8.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Hardness		Uncoated steel	Concrete
	In					
1359: Clark-----	>80	---	---	None-----	Moderate---	Low.
Ost-----	>80	---	---	None-----	Moderate---	Low.
1428: Crete-----	>80	---	---	Moderate---	Moderate---	Low.
1429: Crete-----	>80	---	---	Moderate---	Moderate---	Low.
1553: Darlow-----	>80	---	---	Low-----	High-----	Low.
Elmer-----	>80	---	---	Low-----	High-----	Low.
1554: Dillhut-----	>80	---	---	Low-----	Low-----	Moderate.
1555: Dillhut-----	>80	---	---	Low-----	Low-----	Moderate.
Plev-----	>80	---	---	Low-----	High-----	Moderate.
1556: Dillhut-----	>80	---	---	Low-----	Low-----	Moderate.
Solvay-----	>80	---	---	Low-----	High-----	Moderate.
1725: Farnum-----	>80	---	---	Low-----	Moderate---	Low.
Funmar-----	>80	---	---	Low-----	Moderate---	Low.
1727: Funmar-----	>80	---	---	Low-----	Moderate---	Low.
Taver-----	>80	---	---	Low-----	High-----	Low.
1804: Geary-----	>80	---	---	High-----	Low-----	Low.
1807: Geary-----	>80	---	---	High-----	Low-----	Low.
1985: Hayes-----	>80	---	---	Low-----	Moderate---	Low.
1986: Hayes-----	>80	---	---	Low-----	Moderate---	Low.
Solvay-----	>80	---	---	Low-----	High-----	Moderate.
1987: Hayes-----	>80	---	---	Low-----	Moderate---	Low.
Turon-----	>80	---	---	Low-----	Low-----	Moderate.

Table 8.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Hardness		Uncoated steel	Concrete
	In					
2204: Jamash-----	12-15	Bedrock (nonparalithic).	Moderately cemented.	None-----	High-----	Low.
Piedmont-----	32-36	Bedrock (nonparalithic).	Moderately cemented.	None-----	High-----	Low.
2205: Jamash-----	12-15	Bedrock (nonparalithic).	Moderately cemented.	None-----	High-----	Low.
Piedmont-----	32-36	Bedrock (nonparalithic).	Moderately cemented.	None-----	High-----	Low.
2206: Jamash-----	12-15	Bedrock (nonparalithic).	Moderately cemented.	None-----	High-----	Low.
Piedmont-----	32-36	Bedrock (nonparalithic).	Moderately cemented.	None-----	High-----	Low.
2207: Jamash-----	12-15	Bedrock (nonparalithic).	Moderately cemented.	None-----	High-----	Low.
2381: Kanza-----	>80	---	---	Low-----	High-----	Moderate.
Ninnescah-----	>80	---	---	Moderate---	High-----	Low.
2390: Kaskan-----	>80	---	---	Low-----	Moderate---	Low.
2391: Kaskan-----	>80	---	---	Low-----	High-----	Moderate.
2395: Kisiwa-----	>80	---	---	Low-----	High-----	Low.
2509: Ladysmith-----	>80	---	---	Moderate---	High-----	Low.
2556: Langdon-----	>80	---	---	Low-----	Low-----	Low.
2587: Imano-----	>80	---	---	Low-----	High-----	Low.
2588: Longford-----	>80	---	---	Moderate---	High-----	Low.
2812: Mahone-----	>80	---	---	Low-----	Low-----	Low.
2948: Nalim-----	>80	---	---	Low-----	Moderate---	Low.
2949: Naron-----	>80	---	---	Low-----	Low-----	Low.

Table 8.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Hardness		Uncoated steel	Concrete
	In					
2950: Naron-----	>80	---	---	Low-----	Low-----	Low.
2951: Nash-----	25-32	Bedrock (nonparalithic).	---	None-----	Low-----	Low.
2952: Nash-----	25-32	Bedrock (nonparalithic).	---	None-----	Low-----	Low.
Lucien-----	12-16	Bedrock (nonparalithic).	---	None-----	Moderate---	Low.
2953: Nash-----	25-32	Bedrock (nonparalithic).	---	None-----	Low-----	Low.
Lucien-----	12-16	Bedrock (nonparalithic).	---	None-----	Moderate---	Low.
2955: Nickerson-----	>80	---	---	Low-----	Moderate---	Low.
2956: Nickerson-----	>80	---	---	Low-----	Moderate---	Low.
2957: Nickerson-----	>80	---	---	Low-----	Moderate---	Low.
Punkin-----	>80	---	---	Low-----	High-----	Low.
2958: Ninnescah-----	>80	---	---	Moderate---	High-----	Low.
2959: Ninnescah-----	>80	---	---	Moderate---	High-----	Low.
3051: Ost-----	>80	---	---	None-----	Moderate---	Low.
3052: Ost-----	>80	---	---	None-----	Moderate---	Low.
Clark-----	>80	---	---	None-----	Moderate---	Low.
3170: Penalosa-----	>80	---	---	Low-----	High-----	Low.
3171: Penalosa-----	>80	---	---	Low-----	High-----	Low.
3180: Pratt-----	>80	---	---	None-----	Low-----	Moderate.
3181: Pratt-----	>80	---	---	None-----	Low-----	Moderate.
Turon-----	>80	---	---	Low-----	Low-----	Moderate.

Table 8.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Hardness		Uncoated steel	Concrete
	In					
3190: Punkin-----	>80	---	---	Low-----	High-----	Low.
3191: Punkin-----	>80	---	---	Low-----	High-----	Low.
Taver-----	>80	---	---	Low-----	High-----	Low.
3403: Sand pits.						
3469: Smolan-----	>80	---	---	Moderate---	Moderate---	Low.
3510: Saltcreek-----	>80	---	---	Low-----	Moderate---	Low.
Funmar-----	>80	---	---	Low-----	Moderate---	Low.
Farnum-----	>80	---	---	Low-----	Moderate---	Low.
3511: Saltcreek-----	>80	---	---	Low-----	Moderate---	Low.
Naron-----	>80	---	---	Low-----	Low-----	Low.
3512: Saltcreek-----	>80	---	---	Low-----	Moderate---	Low.
Naron-----	>80	---	---	Low-----	Low-----	Low.
3520: Saxman-----	>80	---	---	Low-----	Low-----	High.
3530: Shellabarger----	>80	---	---	None-----	Low-----	Moderate.
Albion-----	>80	---	---	Low-----	Low-----	Low.
3531: Shellabarger----	>80	---	---	None-----	Low-----	Moderate.
Nalim-----	>80	---	---	Low-----	Moderate---	Low.
3532: Shellabarger----	>80	---	---	None-----	Low-----	Moderate.
3533: Shellabarger----	>80	---	---	None-----	Low-----	Moderate.
3534: Shellabarger----	>80	---	---	None-----	Low-----	Moderate.
3535: Shellabarger----	>80	---	---	None-----	Low-----	Moderate.
Nalim-----	>80	---	---	Low-----	Moderate---	Low.
3540: Solvay-----	>80	---	---	Low-----	High-----	Moderate.

Table 8.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Hardness		Uncoated steel	Concrete
	In					
3550: Spelvin-----	>80	---	---	Low-----	Low-----	Moderate.
3639: Taver-----	>80	---	---	Low-----	High-----	Low.
3640: Tivin-----	>80	---	---	Low-----	Low-----	Low.
3641: Tivin-----	>80	---	---	Low-----	Low-----	Low.
Dillhut-----	>80	---	---	Low-----	Low-----	Moderate.
3642: Tivin-----	>80	---	---	Low-----	Low-----	Low.
Willowbrook----	>80	---	---	Low-----	Moderate----	Moderate.
3643: Tobin-----	>80	---	---	Moderate----	Low-----	Low.
3644: Turon-----	>80	---	---	Low-----	Low-----	Moderate.
Carway-----	>80	---	---	Low-----	High-----	Moderate.
3760: Urban land.						
Blazefork-----	>80	---	---	Low-----	High-----	Low.
Kaskan-----	>80	---	---	Low-----	Moderate----	Low.
3762: Urban land.						
Darlow-----	>80	---	---	Low-----	High-----	Low.
Elmer-----	>80	---	---	Low-----	High-----	Low.
3763: Urban land.						
Imano-----	>80	---	---	Low-----	High-----	Low.
3764: Urban land.						
Mahone-----	>80	---	---	Low-----	Low-----	Low.
3765: Urban land.						
Saltcreek-----	>80	---	---	Low-----	Moderate----	Low.
Naron-----	>80	---	---	Low-----	Low-----	Low.
3766: Urban land.						
Saxman-----	>80	---	---	Low-----	Low-----	High.

Table 8.--Soil Features--Continued

Map symbol and soil name	Restrictive layer			Potential frost action	Risk of corrosion	
	Depth	Kind	Hardness		Uncoated steel	Concrete
	In					
3767: Urban land.						
Willowbrook-----	>80	---	---	Low-----	Moderate----	Moderate.
3768: Urban land.						
Yaggy-----	>80	---	---	Low-----	High-----	Low.
3900: Warnut-----	>80	---	---	Low-----	High-----	Moderate.
3966: Willowbrook-----	>80	---	---	Low-----	Moderate----	Moderate.
4004: Yaggy-----	>80	---	---	Low-----	High-----	Low.
4005: Yaggy-----	>80	---	---	Low-----	High-----	Low.
Saxman-----	>80	---	---	Low-----	Low-----	High.
4110: Zellmont-----	20-39	Bedrock (nonparalithic).	Moderately cemented.	Low-----	Low-----	Moderate.
Poxmash-----	48-53	Bedrock (nonparalithic).	---	Low-----	Low-----	Low.

Table 9.--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
1057: Aqents-----	D		Ft	Ft	Ft				
		January	0.7	6.7	1.0-2.0	Long	Occasional	---	---
		February	0.7	6.7	1.0-2.0	Long	Occasional	---	---
		March	0.7	6.7	0.7-2.0	Very long	Frequent	---	---
		April	0.7	6.7	0.7-2.0	Very long	Frequent	---	---
		May	0.7	6.7	0.7-2.0	Very long	Frequent	---	---
		June	0.7	6.7	0.7-2.0	Very long	Frequent	---	---
		July	0.7	6.7	0.7-2.0	Very long	Frequent	---	---
		August	0.7	6.7	0.7-2.0	Very long	Frequent	---	---
		September	0.7	6.7	0.7-2.0	Very long	Frequent	---	---
		October	0.7	6.7	1.0-2.0	Very long	Occasional	---	---
		November	0.7	6.7	1.0-2.0	Long	Occasional	---	---
		December	0.7	6.7	1.0-2.0	Long	Occasional	---	---
1070: Avans-----	B	Jan-Dec	---	---	---	---	---	---	---
1071: Avans-----	B	Jan-Dec	---	---	---	---	---	---	---
1072: Avans-----	B	Jan-Dec	---	---	---	---	---	---	---
1191: Blazefork-----	D	January	4.0	6.7	---	---	---	---	Rare
		February	4.0	6.7	---	---	---	---	Rare
		March	4.0	6.7	---	---	---	---	Rare
		April	4.0	6.7	---	---	---	---	Rare
		May	4.0	6.7	---	---	---	---	Rare
		June	---	---	---	---	---	---	Rare
		July	---	---	---	---	---	---	Rare
		August	---	---	---	---	---	---	Rare
		September	---	---	---	---	---	---	Rare
		October	---	---	---	---	---	---	Rare
		November	4.0	6.7	---	---	---	---	Rare
		December	4.0	6.7	---	---	---	---	Rare
1192: Blazefork-----	D	January	4.0	6.7	---	---	---	---	Rare
		February	4.0	6.7	---	---	---	---	Rare
		March	4.0	6.7	---	---	---	---	Rare
		April	4.0	6.7	---	---	---	---	Rare
		May	4.0	6.7	---	---	---	---	Rare
		June	---	---	---	---	---	---	Rare
		July	---	---	---	---	---	---	Rare
		August	---	---	---	---	---	---	Rare
		September	---	---	---	---	---	---	Rare
		October	---	---	---	---	---	---	Rare
		November	4.0	6.7	---	---	---	---	Rare
		December	4.0	6.7	---	---	---	---	Rare

Table 9.--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
1192: Kaskan-----	B		Ft	Ft	Ft				
		January	---	---	---	---	---	---	Rare
		February	5.0	6.7	---	---	---	---	Rare
		March	5.0	6.7	---	---	---	---	Rare
		April	5.0	6.7	---	---	---	---	Rare
		May	5.0	6.7	---	---	---	---	Rare
		June	5.0	6.7	---	---	---	---	Rare
		July	---	---	---	---	---	---	Rare
		August	---	---	---	---	---	---	Rare
		September	---	---	---	---	---	---	Rare
		October	---	---	---	---	---	---	Rare
		November	---	---	---	---	---	---	Rare
		December	---	---	---	---	---	---	Rare
1200: Buhler-----	D								
		January	---	---	---	---	---	---	Rare
		February	5.0	6.7	---	---	---	---	Rare
		March	5.0	6.7	---	---	---	---	Rare
		April	5.0	6.7	---	---	---	---	Rare
		May	5.0	6.7	---	---	---	---	Rare
		June	5.0	6.7	---	---	---	---	Rare
		July	---	---	---	---	---	---	Rare
		August	---	---	---	---	---	---	Rare
		September	---	---	---	---	---	---	Rare
		October	---	---	---	---	---	---	Rare
		November	---	---	---	---	---	---	Rare
		December	---	---	---	---	---	---	Rare
Blazefork-----	D								
		January	4.0	6.7	---	---	---	---	Rare
		February	4.0	6.7	---	---	---	---	Rare
		March	4.0	6.7	---	---	---	---	Rare
		April	4.0	6.7	---	---	---	---	Rare
		May	4.0	6.7	---	---	---	---	Rare
		June	---	---	---	---	---	---	Rare
		July	---	---	---	---	---	---	Rare
		August	---	---	---	---	---	---	Rare
		September	---	---	---	---	---	---	Rare
		October	---	---	---	---	---	---	Rare
		November	4.0	6.7	---	---	---	---	Rare
		December	4.0	6.7	---	---	---	---	Rare
1324: Carway-----	D								
		January	0.0	2.0	0.3-1.0	Long	Occasional	---	---
		February	0.0	2.0	0.3-1.0	Long	Occasional	---	---
		March	0.0	2.0	0.3-1.0	Long	Frequent	---	---
		April	0.0	2.0	0.3-1.0	Long	Frequent	---	---
		May	0.0	2.0	0.3-1.0	Long	Frequent	---	---
		June	0.0	2.0	0.3-1.0	Long	Frequent	---	---
		July	---	---	0.3-1.0	Long	Occasional	---	---
		August	---	---	0.3-1.0	Brief	Rare	---	---
		September	---	---	0.3-1.0	Brief	Rare	---	---
		October	---	---	0.3-1.0	Long	Occasional	---	---
		November	---	---	0.3-1.0	Long	Occasional	---	---
		December	0.0	2.0	0.3-1.0	Long	Occasional	---	---

Table 9.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
1554: Dillhut-----	B	February	1.5	4.0	---	---	---	---	---
		March	1.5	4.0	---	---	---	---	---
		April	1.5	4.0	---	---	---	---	---
		May	1.5	4.0	---	---	---	---	---
1555: Dillhut-----	B	Jan-Dec	---	---	---	---	---	---	---
Plev-----	B	February	0.5	4.0	---	---	---	---	---
		March	0.5	4.0	---	---	---	---	---
		April	0.5	4.0	---	---	---	---	---
		May	0.5	4.0	---	---	---	---	---
1556: Dillhut-----	B	Jan-Dec	---	---	---	---	---	---	---
Solvay-----	D	February	2.0-4.0	6.6	---	---	---	---	---
		March	2.0-4.0	6.6	---	---	---	---	---
		April	2.0-4.0	6.6	---	---	---	---	---
		May	2.0-4.0	6.7	---	---	---	---	---
1725: Farnum-----	B	Jan-Dec	---	---	---	---	---	---	---
Funmar-----	C	Jan-Dec	---	---	---	---	---	---	---
1727: Funmar-----	C	Jan-Dec	---	---	---	---	---	---	---
Taver-----	D	Jan-Dec	---	---	---	---	---	---	---
1804: Geary-----	B	Jan-Dec	---	---	---	---	---	---	---
1807: Geary-----	B	Jan-Dec	---	---	---	---	---	---	---
1985: Hayes-----	B	Jan-Dec	---	---	---	---	---	---	---
1986: Hayes-----	B	Jan-Dec	---	---	---	---	---	---	---
Solvay-----	D	February	2.0-4.0	6.7	---	---	---	---	---
		March	2.0-4.0	6.7	---	---	---	---	---
		April	2.0-4.0	6.7	---	---	---	---	---
		May	2.0-4.0	6.7	---	---	---	---	---

Table 9.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			<u>Ft</u>	<u>Ft</u>	<u>Ft</u>				
1987: Hayes-----	B	Jan-Dec	---	---	---	---	---	---	---
Turon-----	A	Jan-Dec	---	---	---	---	---	---	---
2204: Jamash-----	D	Jan-Dec	---	---	---	---	---	---	---
Piedmont-----	D	Jan-Dec	---	---	---	---	---	---	---
2205: Jamash-----	D	Jan-Dec	---	---	---	---	---	---	---
Piedmont-----	D	Jan-Dec	---	---	---	---	---	---	---
2206: Jamash-----	D	Jan-Dec	---	---	---	---	---	---	---
Piedmont-----	D	Jan-Dec	---	---	---	---	---	---	---
2207: Jamash-----	D	Jan-Dec	---	---	---	---	---	---	---
2381: Kanza-----	D	January	0.0-3.0	6.7	---	---	---	Very brief	Frequent
		February	0.0-3.0	6.7	---	---	---	Very brief	Frequent
		March	0.0-3.0	6.7	---	---	---	Very brief	Frequent
		April	---	---	---	---	---	Very brief	Frequent
		May	---	---	---	---	---	Very brief	Frequent
		June	---	---	---	---	---	Very brief	Frequent
		July	---	---	---	---	---	Very brief	Frequent
		August	---	---	---	---	---	Very brief	Frequent
		September	---	---	---	---	---	Very brief	Frequent
		October	---	---	---	---	---	Very brief	Frequent
		November	---	---	---	---	---	Very brief	Frequent
		December	0.0-3.0	6.7	---	---	---	Very brief	Frequent
Ninnescah-----	B	February	2.0	6.7	---	---	---	---	---
		March	2.0	6.7	---	---	---	Long	Occasional
		April	2.0	6.7	---	---	---	Long	Occasional
		May	2.0	6.7	---	---	---	Long	Occasional
		June	2.0	6.7	---	---	---	Long	Occasional
		July	---	---	---	---	---	Long	Occasional
		August	---	---	---	---	---	Long	Occasional
		September	---	---	---	---	---	Long	Occasional
		October	---	---	---	---	---	Long	Occasional

Table 9.--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
2390: Kaskan-----	B		Ft	Ft	Ft				
		January	---	---	---	---	---	---	Rare
		February	5.0	6.7	---	---	---	---	Rare
		March	5.0	6.7	---	---	---	---	Rare
		April	5.0	6.7	---	---	---	---	Rare
		May	5.0	6.7	---	---	---	---	Rare
		June	5.0	6.7	---	---	---	---	Rare
		July	---	---	---	---	---	---	Rare
		August	---	---	---	---	---	---	Rare
		September	---	---	---	---	---	---	Rare
		October	---	---	---	---	---	---	Rare
		November	---	---	---	---	---	---	Rare
		December	---	---	---	---	---	---	Rare
2391: Kaskan-----	B								
		January	---	---	---	---	---	Brief	Frequent
		February	5.0	6.7	---	---	---	Brief	Frequent
		March	5.0	6.7	---	---	---	Brief	Frequent
		April	5.0	6.7	---	---	---	Brief	Frequent
		May	5.0	6.7	---	---	---	Brief	Frequent
		June	5.0	6.7	---	---	---	Brief	Frequent
		July	---	---	---	---	---	Brief	Frequent
		August	---	---	---	---	---	Brief	Frequent
		September	---	---	---	---	---	Brief	Frequent
		October	---	---	---	---	---	Brief	Frequent
		November	---	---	---	---	---	Brief	Frequent
		December	---	---	---	---	---	Brief	Frequent
2395: Kisiwa-----	D								
		January	0.0-1.5	5.4-6.7	0.0-2.0	Long	Occasional	---	---
		February	0.0-1.5	5.4-6.7	0.0-2.0	Long	Occasional	---	---
		March	0.0-1.5	5.4-6.7	0.0-2.0	Long	Occasional	---	---
		April	0.0-1.5	5.4-6.7	0.0-2.0	Long	Occasional	---	---
		May	0.0-1.5	5.4-6.7	0.0-2.0	Long	Occasional	---	---
		June	0.0-1.5	5.4-6.7	---	---	---	---	---
		July	5.4	6.7	---	---	---	---	---
		August	5.4	6.7	---	---	---	---	---
		September	0.0-1.5	5.4-6.7	---	---	---	---	---
		October	0.0-1.5	5.4-6.7	---	---	---	---	---
		November	0.0-1.5	5.4-6.7	---	---	---	---	---
		December	0.0-1.5	5.4-6.7	---	---	---	---	---
2509: Ladysmith-----	D								
		April	2.5	3.0	---	---	---	---	---
		May	2.5	3.0	---	---	---	---	---
		June	2.5	3.0	---	---	---	---	---
2556: Langdon-----	A								
		Jan-Dec	---	---	---	---	---	---	---
2587: Imano-----	C								
		March	2.0-4.0	6.7	---	---	None	Very brief	Occasional
		April	2.0-4.0	6.7	---	---	None	Very brief	Occasional
		May	2.0-4.0	6.7	---	---	None	Very brief	Occasional
		June	2.0-4.0	6.7	---	---	None	Very brief	Occasional
		July	2.0-4.0	6.7	---	---	None	Very brief	Occasional

Table 9.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table		Surface water depth	Ponding		Flooding	
			Upper limit	Lower limit		Duration	Frequency	Duration	Frequency
			<u>Ft</u>	<u>Ft</u>	<u>Ft</u>				
2588: Longford-----	C	Jan-Dec	---	---	---	---	---	---	---
2812: Mahone-----	C	January	---	---	---	---	---	---	Rare
		February	5.0	6.7	---	---	---	---	Rare
		March	5.0	6.7	---	---	---	---	Rare
		April	5.0	6.7	---	---	---	---	Rare
		May	5.0	6.7	---	---	---	---	Rare
		June	5.0	6.7	---	---	---	---	Rare
		July	---	---	---	---	---	---	Rare
		August	---	---	---	---	---	---	Rare
		September	---	---	---	---	---	---	Rare
		October	---	---	---	---	---	---	Rare
		November	---	---	---	---	---	---	Rare
		December	---	---	---	---	---	---	Rare
2948: Nalim-----	B	Jan-Dec	---	---	---	---	---	---	---
2949: Naron-----	B	Jan-Dec	---	---	---	---	---	---	---
2950: Naron-----	B	Jan-Dec	---	---	---	---	---	---	---
2951: Nash-----	B	Jan-Dec	---	---	---	---	---	---	---
2952: Nash-----	B	Jan-Dec	---	---	---	---	---	---	---
Lucien-----	C	Jan-Dec	---	---	---	---	---	---	---
2953: Nash-----	B	Jan-Dec	---	---	---	---	---	---	---
Lucien-----	C	Jan-Dec	---	---	---	---	---	---	---
2955: Nickerson-----	B	January	2.0-4.0	6.7	---	---	---	---	---
		February	2.0-4.0	6.7	---	---	---	---	---
		March	2.0-4.0	6.7	---	---	---	---	---
		April	2.0-4.0	6.7	---	---	---	---	---
		December	2.0-4.0	6.7	---	---	---	---	---

Table 9.--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
			Ft	Ft	Ft				
3640: Tivin-----	A	Jan-Dec	---	---	---	---	---	---	---
3641: Tivin-----	A	Jan-Dec	---	---	---	---	---	---	---
Dillhut-----	B	Jan-Dec	---	---	---	---	---	---	---
3642: Tivin-----	A	January	5.0-6.7	6.7	---	---	None	---	---
		February	5.0-6.7	6.7	---	---	None	---	---
		March	5.0-6.7	6.7	---	---	None	---	---
		April	5.0-6.7	6.7	---	---	None	---	---
		May	5.0-6.7	6.7	---	---	None	---	---
		June	5.0-6.7	6.7	---	---	None	---	---
		December	5.0-6.7	6.7	---	---	None	---	---
Willowbrook-----	B	February	2.0-4.0	6.7	---	---	None	---	---
		March	2.0-4.0	6.7	---	---	None	Brief	Occasional
		April	2.0-4.0	6.7	---	---	None	Brief	Occasional
		May	2.0-4.0	6.7	---	---	None	Brief	Occasional
		June	2.0-4.0	6.7	---	---	None	Brief	Occasional
		July	---	---	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional
3643: Tobin-----	B	March	---	---	---	---	---	Very brief	Occasional
		April	---	---	---	---	---	Very brief	Occasional
		May	---	---	---	---	---	Very brief	Occasional
		June	---	---	---	---	---	Very brief	Occasional
		July	---	---	---	---	---	Very brief	Occasional
		August	---	---	---	---	---	Very brief	Occasional
		September	---	---	---	---	---	Very brief	Occasional
		October	---	---	---	---	---	Very brief	Occasional
		November	---	---	---	---	---	Very brief	Occasional
		December	---	---	---	---	---	Very brief	Occasional
3644: Turon-----	A	Jan-Dec	---	---	---	---	---	---	---
Carway-----	D	January	0.0	2.0	0.3-1.0	Long	Occasional	---	---
		February	0.0	2.0	0.3-1.0	Long	Occasional	---	---
		March	0.0	2.0	0.3-1.0	Long	Frequent	---	---
		April	0.0	2.0	0.3-1.0	Long	Frequent	---	---
		May	0.0	2.0	0.3-1.0	Long	Frequent	---	---
		June	0.0	2.0	0.3-1.0	Long	Frequent	---	---
		July	---	---	0.3-1.0	Long	Occasional	---	---
		August	---	---	0.3-1.0	Brief	Rare	---	---
		September	---	---	0.3-1.0	Brief	Rare	---	---
		October	---	---	0.3-1.0	Long	Occasional	---	---
		November	---	---	0.3-1.0	Long	Occasional	---	---
		December	0.0	2.0	0.3-1.0	Long	Occasional	---	---

Table 9.--Water Features--Continued

Map symbol and soil name	Hydro- logic group	Month	Water table			Ponding		Flooding	
			Upper limit Ft	Lower limit Ft	Surface water depth Ft	Duration	Frequency	Duration	Frequency
3766: Saxman-----	A	February	2.0-3.0	6.7	---	---	---	---	---
		March	2.0-3.0	6.7	---	---	---	---	---
		April	2.0-3.0	6.7	---	---	---	---	---
		May	2.0-3.0	6.7	---	---	---	---	---
		June	2.0-3.0	6.7	---	---	---	---	---
3767: Urban land.									
Willowbrook-----	B	February	2.0-4.0	6.7	---	---	None	---	---
		March	2.0-4.0	6.7	---	---	None	---	---
		April	2.0-4.0	6.7	---	---	None	---	---
		May	2.0-4.0	6.7	---	---	None	---	---
		June	2.0-4.0	6.7	---	---	None	---	---
3768: Urban land.									
Yaggy-----	C	January	2.0-4.0	6.7	---	---	---	---	---
		February	2.0-4.0	6.7	---	---	---	---	---
		March	2.0-4.0	6.7	---	---	---	---	---
		April	2.0-4.0	6.7	---	---	---	---	---
		May	2.0-4.0	6.7	---	---	---	---	---
		December	2.0-4.0	6.7	---	---	---	---	---
3900: Warnut-----	D	January	---	---	0.3-2.0	Long	Occasional	---	---
		February	---	---	0.3-2.0	Long	Occasional	---	---
		March	---	---	0.3-2.0	Long	Frequent	---	---
		April	0.0	6.7	0.3-2.0	Long	Frequent	---	---
		May	0.0	6.7	0.3-2.0	Long	Frequent	---	---
		June	0.0	6.7	0.3-2.0	Long	Frequent	---	---
		July	---	---	0.3-2.0	Long	Occasional	---	---
		August	---	---	0.0-2.0	Brief	Rare	---	---
		September	---	---	0.0-2.0	Brief	Rare	---	---
		October	---	---	0.3-2.0	Long	Occasional	---	---
		November	---	---	0.3-2.0	Long	Occasional	---	---
		December	---	---	0.3-2.0	Long	Occasional	---	---
3966: Willowbrook-----	B	February	2.0-4.0	6.7	---	---	None	---	---
		March	2.0-4.0	6.7	---	---	None	Brief	Occasional
		April	2.0-4.0	6.7	---	---	None	Brief	Occasional
		May	2.0-4.0	6.7	---	---	None	Brief	Occasional
		June	2.0-4.0	6.7	---	---	None	Brief	Occasional
		July	---	---	---	---	None	Brief	Occasional
		August	---	---	---	---	None	Brief	Occasional
		September	---	---	---	---	None	Brief	Occasional
		October	---	---	---	---	None	Brief	Occasional

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help to prevent soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavioral characteristics of the soils. They collect data on erosion, dryness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis in predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as rangeland and woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreational facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern in harmony with the natural soil.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Loren H. Frees, resource conservationist, Natural Resources Conservation Service, helped prepare this section.

General management needed for crops and pasture is suggested in this section. The estimated yields of

the main crops and pasture plants are listed for each soil, the system of land capability classification used by the Natural Resources Conservation Service is explained, and prime farmland is described.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under the heading "Detailed Soil Map Units." Specific information can be obtained from the local office of the Natural Resources Conservation Service or the Cooperative Extension Service.

About 545,000 acres in Reno County, or 67 percent of the total acreage, is cultivated for crop production. The nonirrigated acres are used primarily to produce wheat and grain sorghum. Approximately 20,000 acres of cropland is irrigated for the production of corn, alfalfa, soybeans, grain sorghum, and wheat.

The climate and soils in Reno County present challenges for crop production. Most of the soils are susceptible to water erosion or wind erosion unless conservation measures are implemented and proper crop management practices are used. Moisture is a limiting factor affecting crop production. Crop production systems that leave a cover of crop residue on the surface are effective in conserving moisture. Such practices can also help to control wind erosion and water erosion.

Wind erosion is a major hazard on about 22 percent of the soils in Reno County, and water erosion is a major hazard on about 4 percent. Most soils are highly susceptible to erosion when they are cultivated if they do not have adequate cover. The cultivated soils have generally been farmed for more than 100 years. As a result, they have been subjected to varying degrees of erosion and have a lower content of organic matter than they would otherwise have. Controlling erosion minimizes the pollution in the air and improves the quality of water in the streams.

Erosion-control practices provide a protective surface cover, minimize the loss of soil from the surface, and increase the rate of water infiltration. A cropping system that keeps a plant cover on the surface for extended periods helps to control erosion and preserves the productive capacity of the soils.

Conservation tillage and conservation cropping

systems help to control wind erosion and water erosion. A system of conservation tillage leaves all or part of the crop residue on the surface. Examples are stubble mulching and chemical fallow. When these systems are applied, crop stubble and crop residue are left essentially in place to provide a protective cover before and during the preparation of a seedbed and at least a partial cover for the succeeding crop. Drilled crops, such as small grain, are alternated with row crops in a conservation cropping system.

Plants on most of the arable soils in the county respond well to applications of fertilizers. Most of the soils have a slightly acid or moderately acid surface layer unless they have been limed. Applications of lime reduce the acidity of these soils, thereby making available the nitrogen and phosphate fertilizers that have been applied. On all soils the amount of fertilizer and lime to be applied should be based on the results of soil tests, on the needs of the crop, on the expected level of yields, and on the experience of farmers. The Cooperative Extension Service can help in determining the kinds and amounts of nutrients needed.

Organic matter is a storehouse of available plant nutrients. It increases the rate of water infiltration, helps to prevent surface crusting, helps to control erosion, and improves tilth. A surface crust forms during periods of intensive rainfall. When dry, the crusted surface is nearly impervious to water. As a result, the runoff rate is increased. A conservation tillage system that leaves all or part of the crop residue on the surface helps to prevent crusting, increases the rate of water infiltration, reduces the runoff rate, and helps to control erosion.

Information about the design of erosion-control practices is available in the local office of the Natural Resources Conservation Service. The latest information about growing crops can be obtained from the Cooperative Extension Service or the Natural Resources Conservation Service.

About 6 percent of the acreage in Reno County is pastured. Measures that maintain or improve the quality or quantity of forage are needed in the areas used for tame grasses. Proper stocking rates, rotation grazing, well distributed watering and salting facilities, applications of fertilizer, and control of unwanted vegetation help to keep the pasture in good condition.

Yields per Acre

The average yields per acre that can be expected of the principal crop under a high level of management are shown in table 10. In any given year, yields may be higher or lower than those indicated in the table

because of variations in rainfall and other climatic factors. The land capability classification of the map units in the survey area also is shown in the table.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations also are considered.

The management needed to obtain the indicated yields on the various crops depends on the kind of soil and the crop. Management can include erosion control and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that ensures the smallest possible loss.

For yields of irrigated crops, it is assumed that the irrigation system is adapted to the soils and to the crops grown, that good-quality irrigation water is uniformly applied as needed, and that tillage is kept to a minimum.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 10 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 of 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. The 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. The criteria in grouping the soils do not include major and generally expensive land movement that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for rangeland, woodland, or engineering suitability groupings.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit. Only class and subclass are used in this survey.

Capability classes, the broadest groups, are designated by the numbers 1 through 8. The numbers 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 that require moderate conservation practices.

Class 3 soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class 5 soils are not likely to erode but have other limitations, impractical to remove, that 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 soil groups within one class. They are designated by adding a small letter, *e*, *w*, *s*, or *c*, to the class numeral, for example, 2*e*. The letter *e* shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; *w* indicates that water in or on the soil interferes with plant growth or cultivation; *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

In class 1 there are no subclasses because the 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 to pasture, rangeland, woodland, wildlife habitat, or recreation.

The capability classification of the map units in this survey area is given in table 10.

Prime Farmland

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, or other land, but it is not urban or built-up land or water areas. The soil qualities, growing season, and moisture supply are those needed for the soil to produce sustained high yields of crops in an economic manner when proper management, including water management, and acceptable farming methods are applied. In general, 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 either is not frequently flooded during the growing season or is protected from flooding. The slope ranges mainly from 0 to 7 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

About 396,868 acres, or nearly 50 percent of the survey area, would meet the requirements for prime farmland if an adequate and dependable supply of irrigation water were available. Scattered areas of this land are throughout the county, but most are in the southern part, mainly in the Funmar-Saltcreek-Taver and Shellabarger-Albion-Nalim associations, which are described under the heading "General Soil Map Units." Most of this prime farmland is used for crops. Wheat is the main crop grown in these areas. It accounts for an estimated two-thirds of the county's total agricultural income each year.

A recent trend in land use in some parts of the survey area 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 and cannot be easily cultivated.

The map units in the survey area that are considered prime farmland are listed in table 11. This list does not constitute a recommendation for a particular land use. On some soils included in the list, measures that overcome a hazard or limitation, such as flooding, wetness, and dryness, are needed. Onsite

evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures. The location of the map units is shown on the detailed soil maps. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units."

Rangeland

R. Dwayne Rice, rangeland management specialist, Natural Resources Conservation Service, helped prepare this section.

Rangeland is land on which the natural or climax vegetation is principally native grasses, plants, forbs, or shrubs. Rangeland ecosystems are a complex set of interactions between soil, water, air, plant, and animal resources; temperature; fire; and humans. Rangeland ecosystems produce forage; provide wildlife habitat, fish and wildlife populations, and biological processes; and are recognized as important components in the quality and quantity of available water.

Rangeland makes up about 22 percent of the total acreage in Reno County. It is mainly in scattered small acreages throughout the county, but some areas are concentrated along the Arkansas River and along the North Fork Ninnescah River. Generally, this land is not suitable for cultivation. Many previously cultivated fields have been replanted to native grasses as part of the Conservation Reserve Program.

In Reno County, livestock and livestock products are the second largest agricultural enterprise. The number of breeding herds has increased steadily during the last 15 to 20 years. Most of the forage for livestock is range and pasture, but supplemental feeds from crops and crop byproducts also are used.

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. Effective management is based on the relationship between the soils and vegetation and water.

Table 12 shows, for each soil that supports rangeland vegetation suitable for grazing, the range site; the total annual production of vegetation in favorable, normal, and unfavorable years; the characteristic vegetation; and the average percentage of each species. An explanation of the column headings in the table follows.

A *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. The relationship between soils and vegetation was

ascertained during this survey; thus, range sites generally 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 plants. Soil reaction, salt content, and a seasonal high water table also are important.

The abbreviation "pe" in the range site column refers to precipitation effectivity (Thorntwaite and Mather, 1955). It is an estimate based on the mean daily air temperature and day length.

Total production is the amount of vegetation that can be expected to grow annually on well managed rangeland that is supporting the potential natural plant community. It includes all vegetation, whether or not it is palatable to grazing animals. It includes the current year's growth of leaves, twigs, and fruits of woody plants. It does not include the increase in stem diameter of trees and shrubs. It is expressed in pounds per acre of air-dry vegetation for favorable, normal, and unfavorable years. In a *favorable* year, the amount and distribution of precipitation and the temperature make growing conditions substantially better than average. In a *normal* year, growing conditions are about average. In an *unfavorable* year, growing conditions are well below average, generally because of low available soil moisture.

Dry weight is the total annual yield per acre of air-dry vegetation. Yields are adjusted to a common percent of air-dry moisture content. The relationship of green weight to air-dry weight varies according to such factors as exposure, amount of shade, recent rains, and unseasonable dry periods.

Characteristic vegetation—the grasses, forbs, and shrubs that make up most of the potential natural plant community on each soil—is listed by common name. Under *composition*, the expected percentage of the total annual production is given for each species making up the characteristic vegetation. The amount that can be used as forage depends on the kinds of grazing animals and on the grazing season.

Range management requires a knowledge of the kinds of soil and of the potential natural plant community. It also requires an evaluation of the present range condition. Range condition is determined by comparing the present plant community with the potential natural plant community on a particular range site. The more closely the existing community resembles the potential community, the better the range condition. Range condition is an ecological rating only.

The objective in range management is to control grazing so that the plants growing on a site are about the same in kind and amount as the potential natural plant community for that site. Such management

generally results in the optimum production of vegetation, control of undesirable brush species, conservation of water, and control of erosion. Sometimes, however, a range condition somewhat below the potential meets grazing needs, provides wildlife habitat, and protects soil and water resources.

Range Sites and Condition Classes

A range site is a distinctive kind of rangeland that differs from other kinds of rangeland in its ability to produce a characteristic natural plant community. A range site is the product of all the environmental factors responsible for its development. It is capable of supporting a native plant community typified by an association of species that differs from that of other range sites in the kind or proportion of species or in total production. Range sites are ecological subdivisions into which rangeland is divided for study, evaluation, and management.

Range sites are subject to many influences that modify or permanently alter the site and the subsequent climax community and production potential the site will support. The loss of soil, a decrease in soil fertility levels, a reduction in the ability of a soil to absorb and retain water, and surface crusting often follow deterioration of the plant community. The plant community can be affected by long-term tillage; practices that permanently lower or raise the water table; sheet erosion, rill erosion, and gully erosion; and wind erosion, which can result in plant pedestaling, scouring, and blowouts. When the plant community has changed and its potential is altered, a different range site is recognized.

The climax plant community for a range site is the total dominant, stable plant community that is best adapted to the unique combination of natural environmental factors. Plant communities that have been protected from the natural influences of drought, wildfires, grazing, and insects for long periods do not always typify the climax plant community.

In the descriptions of range sites, native vegetation is referred to in terms of decreasers, increasers, and invaders. Decreasers and increasers are climax plant species. Decreasers are generally the species that are most heavily grazed by cattle and are consequently the first to be injured by overgrazing. Increasers are plants that can withstand grazing or are less palatable to grazing animals. Initially they increase in overgrazed areas and replace the decreasers. Invaders are pioneer type species that become established after the climax vegetation has been reduced.

Range condition is the present state of the

vegetation in relation to the highest stage of plant growth the site can support. It is determined by comparing the production of the present plant community with that of the climax plant community, as indicated by the range condition guide for that site. Four range condition classes are used to indicate the degree to which the composition of the present plant community reflects that of the climax plant community. The range condition is considered to be *excellent* if the relative ecological rating or numerical evaluation for the range site is 76 to 100; *good* if the rating is 51 to 75; *fair* if the rating is 26 to 50; and *poor* if the rating is 0 to 25. The range condition classes show the present condition of the native vegetation on a range site in relation to the historic native vegetation that could grow there. The present range condition is a result of a sustained trend over a period of time.

Trend

Trend in range condition is the direction of change in which the plant community is moving. Trend is one of the most important parts of a rangeland resource inventory. It is a separate determination that is necessary for assessing what is currently happening to the plant community. It is important to know the trend when planning the grazing use, management, and treatment needed to maintain or improve the rangeland resource. Consideration of the trend is also important when adjustments are made in grazing systems. Some of the indicators relating to trend are plant vigor, plant form, number of seedlings and young plants, litter accumulation and distribution, and condition of the soil surface.

Grazing Management

Grazing management is one of the primary needs for rangeland in Reno County. Successful grazing management must meet the needs of the land, the landowner, and the grazing animal. Prescribed grazing is the vegetation management practice that is applied to all land where grazing is a planned use. The successful management of plant communities depends on an understanding of the ecological processes and the ecology of the communities managed. The alleviation of grazing itself does not immediately terminate or reverse changes induced by grazing pressures. More commonly, it is the use of prescribed grazing that brings about the quickest changes on a range site. Prescribed grazing is the controlled harvest of vegetation by grazing or browsing animals. It is managed with the intent to achieve a specified objective.

Descriptions of Range Sites

In this section, the range sites of Reno County are described and the climax plants and principal invaders on the sites are named. Estimates are given of the potential annual yield of air-dry herbage when the site is in excellent condition. These yields vary from year to year, depending on weather conditions, especially rainfall, and on the kind of management the range site has received in past years.

Choppy Sands.—This range site is on undulating to steeply hummocky, somewhat unstabilized sand dunes known as sandhills. Blowouts or “white caps” are common. The soils are deep and have a sandy surface layer and subsoil. They are excessively drained, and the available water capacity is low.

The natural potential vegetation on this site is a mixed-grass prairie. Sand bluestem, indiangrass, switchgrass, and little bluestem make up about 65 to 70 percent of the total vegetation. Two species that occur only on this site are James delea and big sandreed.

When the surface is left unprotected, the evaporation rate is high. Maintaining a good vegetative cover is essential on this site. Overgrazing results in decreased production of sand bluestem and indiangrass. The extent of little bluestem and switchgrass may increase initially if overgrazing is allowed, but it decreases if overgrazing continues. Continued overuse results in the elimination of most tall and mid grasses. Such species as sand lovegrass, sand dropseed, and sand paspalum and forbs and weeds tend to dominate the site. If the plant cover is allowed to deteriorate to an extreme condition, active sand dunes and blowouts develop. The low available water capacity of the soils and poor management in the past have left some areas of this range site in poor condition. A grazing system that incorporates proper stocking rates and periodic rest periods during the growing season can help to maintain a permanent cover of vegetation. Such a system can also be effective in restoring the vigor of desirable species.

Clay Lowland.—This range site is on nearly level to concave flood plains that are subject to occasional or frequent flooding. It is in broad, flat areas where sediments have collected to form deep soils along major drainageways. The soils on this site are deep and clayey, and permeability is slow or very slow. A high shrink-swell potential results in the formation of large, deep cracks in dry years. Areas of this site may be flooded, and they also receive runoff from adjacent slopes. Surface runoff is very slow. The upper part of the soil profile is frequently saturated with water prior

to and during the early spring growth periods. Puddling can be a problem under these conditions.

Under climax conditions, big bluestem is the dominant vegetation on this site. Switchgrass, prairie cordgrass, indiangrass, and eastern gamagrass also occur in smaller quantities. These tall grasses tend to attain greater heights in areas of this range site than in areas of upland sites. They make up about 75 percent of the potential vegetation. Tall dropseed, meadow dropseed, buffalograss, western wheatgrass, and Baldwin ironweed are the principal increasers on this site. Common invaders include barnyardgrass, silver bluestem, sumpweed, giant foxtail, and little barley.

If rainfall is normal, the estimated annual yield of air-dry herbage is 4,500 to 6,000 pounds per acre when this site is in excellent condition.

Claypan.—This range site is on nearly level to gently sloping uplands. The soils are very deep and have a silty to loamy surface layer 2 to 7 inches thick over a clayey subsoil. They are moderately well drained. Permeability is very slow. Because the rate of water infiltration is very slow, large amounts of rainfall are lost to runoff. Ponding can be a problem in the nearly level areas.

The natural potential vegetation on this site is a mixed-grass prairie. Big bluestem, little bluestem, switchgrass, sideoats grama, western wheatgrass, indiangrass, and tall dropseed make up about 80 percent of the total production. Grazing, fire, and drought influenced the vegetation on this site during its development. The grazing was predominantly by large transient herds of bison, elk, and deer. The site is considered preferred booming ground for the greater prairie chicken. Tall dropseed, western wheatgrass, and buffalograss are the primary increasers. Common invaders on this site include annual broomweed, Japanese brome, Kentucky bluegrass, prairie threawn, and windmillgrass.

If rainfall is normal, the estimated annual yield of air-dry herbage is 3,000 to 4,000 pounds per acre when this site is in excellent condition.

Clay Upland.—This site is on nearly level to gently sloping uplands. The soils are moderately deep or deep and have a loamy to silty surface layer 7 to 14 inches thick over a clayey subsoil. The soils are somewhat poorly drained to well drained. Permeability is slow or very slow. The soils can retain large amounts of water, but the water is tightly held and therefore is not available in adequate amounts for the vegetation during stress periods. As a result, potential forage production is typically reduced during dry years.

The natural potential vegetation on this site is a

mixed-grass prairie. Big bluestem, little bluestem, indiagrass, and switchgrass produce about 60 to 65 percent of the total vegetation. In the past, fire, grazing, and drought influenced the vegetation on this site. The grazing was predominantly by large transient herds of bison and by elk, pronghorn antelope, and deer.

This range site is in broad areas scattered throughout central Kansas. Since the site is generally a preferred grazing area by livestock, overgrazing results in the reduction of big bluestem, indiagrass, little bluestem, compassplant, and other preferred species. The extent of switchgrass decreases if overgrazing is allowed during the first half of the growing season. This species responds as an increaser, however, when overgrazing occurs only during the last half of the growing season. Sideoats grama, blue grama, and buffalograss are the major increasers under overgrazed conditions. Sunflowers, manyflower scurfpea, western ragweed, Baldwin ironweed, and heath aster commonly increase in overgrazed areas. Continued heavy use results in the domination of tall dropseed, sideoats grama, western wheatgrass, buffalograss, western ragweed, and many less palatable plants. Remnants of the preferred grass species tend to survive in a very reduced (low vigor) condition unless destructive grazing occurs. If the major grass species are overgrazed, they decline relatively slowly; but they will be eliminated if overgrazing is allowed to continue. Under these conditions, tall dropseed, prairie threeawn, and Japanese brome are the dominant species. Grazing management that includes proper stocking rates and timely rest periods can restore or maintain the vegetation on this site.

Limy Upland.—This site is on nearly level to steeply sloping uplands or on high terraces where no extra moisture from drainage or overflow is received. The soils are deep or moderately deep and have a silty or loamy surface layer. Most of the soils are weakly calcareous to strongly calcareous in the surface layer and are calcareous in the subsoil.

The natural potential vegetation on this site is a mixed-grass prairie. Big bluestem, little bluestem, and sideoats grama are the dominant species. Combined, these species make up about 65 percent of the total production. Although western ragweed is the dominant forb on this site, it is less prevalent than on associated sites. This range site is characterized by a variety of forbs, most of which are of relatively small extent.

This site generally occurs just above the breaks of hills, in gently sloping to steep areas. Concentrated grazing or other grazing systems help to maintain grazing uniformity. In extreme cases, the limited use of

fire may improve grazing in the more inaccessible areas. Fire should only be used on rangeland that is in good condition or in the more intensively managed areas. Big bluestem rapidly loses its productive capacity if continuous overgrazing is allowed. The extent of little bluestem and sideoats grama initially increases when the big bluestem is overgrazed. If continuous heavy grazing pressure is allowed, both little bluestem and sideoats grama will also decrease in extent. The extent of blue grama and buffalograss increases as the taller grasses decline. Continued excessive overuse creates a "shortgrass pasture" condition on this range site. Erosion in the form of gullying and contour trailing by livestock in the steeper areas generally occur with continued overuse. In the steeper, less accessible areas, the preferred grass species generally escape pressure from excessive grazing. Thus they provide a source for the better forage plants after long periods of drought and/or overgrazing. A grazing management system that includes needed distribution tools, proper stocking rates, and scheduled rest periods during the growing season can help to restore this site to its productive potential.

Loamy Lowland.—This range site occurs in nearly level to gently sloping alluvial areas on the narrow flood plains along drainageways that are subject to flooding. The soils are deep and have a loamy or silty surface layer and subsoil. The water table may rise into the root zone during wet periods, but it is not the dominant factor controlling vegetative growth. The available water capacity is high. Internal drainage is medium, and fertility is high.

Tall and mid grasses dominate the herbaceous plant community. Big bluestem, little bluestem, switchgrass, and indiagrass are the major forage plants on this site. They make up about 70 percent of the vegetation. Eastern gamagrass can make up more than 15 percent of the vegetation in the more favorable areas. Canada wildrye, tall dropseed, and sedges are common but occur in small stands. Important forbs are catclaw sensitivebriar, heath aster, Illinois bundleflower, Maximilian sunflower, and American licorice. Such tree species as plains cottonwood, green ash, hackberry, and redcedar have become naturalized on this site since fire-suppression measures have been introduced over the past 60 to 80 years. These trees may eventually make up a larger part of the plant community than is currently recognized.

Many areas of this range site are narrow bands adjacent to streams and have cropland on both sides. Other areas are along drainageways and have terraces and uplands on either side. Extra moisture

from overflows results in healthy, deeper rooted plants that make this site a preferred grazing area, especially during dry periods. Overgrazing by cattle results in the reduction of the extent of preferred species, such as big bluestem, eastern gamagrass, indiagrass, switchgrass, and Canada wildrye. The extent of palatable forbs, such as American licorice, catclaw sensitivebriar, Illinois bundleflower, and Maximilian sunflower, also is reduced. The less desirable species, such as western wheatgrass, blue grama, perennial threeawns, tall dropseed, Baldwin ironweed, western ragweed, and scarlet globemallow, increase as the preferred species decrease. When overgrazing has persisted for only a few years, the site can commonly be returned to near its potential if a grazing management system that includes proper use and scheduled rest periods during the growing season is used. If overgrazing has occurred over a longer period of time, recovery is slow, even with good management. Under this condition, western wheatgrass typically becomes the dominant grass along with significant stands of blue grama, tall dropseed, perennial threeawns, buffalograss, sideoats grama, and silver bluestem. The use of prescribed burning may be necessary to suppress undesirable woody species that tend to increase rapidly on this site.

Loamy Terrace.—This range site is on nearly level to gently sloping alluvial benches, terraces, or fans. Areas of this site receive some additional water in the form of run-on from nearby uplands. Flooding is rare. The soils are deep and have a loamy or silty surface layer and subsoil. Permeability is moderate or moderately slow. The soils are well drained or moderately well drained, and the available water capacity is high. The water table is below the root zone of most range plants.

The natural potential vegetation on this site is a mixed-grass prairie. Big bluestem is the dominant species. Indiagrass, switchgrass, and little bluestem are other major grasses. Various forbs are mostly in small stands. Increasers include sideoats grama, western wheatgrass, tall dropseed, prairie cordgrass, buffalograss, and western ragweed. Common invaders are little barley, prairie threeawn, silver bluestem, windmillgrass, and pricklypear cactus.

Loamy Upland.—This range site is on nearly level to moderately steep uplands. The soils are deep or moderately deep and have a silty or loamy surface layer and a silty or clayey subsoil. Permeability is moderate to slow, and the available water capacity is high. The soils are typically noncalcareous in the surface layer but may be calcareous in the subsoil and substratum. The level of fertility generally is high.

The natural potential vegetation on this site is a

mixed-grass prairie. Big bluestem, little bluestem, and sideoats grama are the dominant forage species. Combined, these species make up 50 to 60 percent of the total annual yield. Western ragweed is the dominant forb, but slimflower scurfpea and Louisiana sagewort also occur. Only a few shrubs occur on this site.

The relatively flat topography associated with this site lends itself to good grazing distribution; however, overgrazing is possible because of the site's accessibility in comparison to the steeper adjacent areas. Initial overgrazing results in a reduction in the extent of big bluestem and little bluestem, but sideoats grama and blue grama increase and eventually become the dominant vegetation. If continued overgrazing is allowed, blue grama and buffalograss and, to a lesser extent, western wheatgrass become the dominant species on the site. In areas where blue grama and buffalograss are dominant, buffalograss will prevail if continued heavy grazing is allowed in combination with long dry cycles. Under moderate grazing pressure, blue grama typically is dominant. Buffalograss and blue grama are persistent on this site, but they may give way to perennial threeawns and silver bluestem if continued overgrazing is allowed. If most of the taller species are eliminated through heavy continuous grazing and dry weather cycles, reestablishing the potential vegetation through management is extremely slow and may take several decades. Where remnant plants of the taller species persist, the site may be restored to its potential by using proper stocking rates and a system of grazing that includes scheduled rest periods during the growing season. Significant stands of big bluestem and little bluestem are difficult to maintain on this site without a grazing management plan that includes rest periods.

Saline Subirrigated.—This site is on lowlands and stream terraces of major stream valleys. The soils are deep and have a loamy surface layer and a loamy to clayey subsoil. They are somewhat poorly drained to poorly drained, saline-alkali soils that formed in alluvial sediments. Permeability is moderately slow or slow. The water table is usually above a depth of 4 feet during the growing season, and most of the soils are wet on the surface throughout the spring and early summer. The main limitations on this site are salinity, alkalinity, and flooding. The site is not normally used for hay production.

The natural potential vegetation on this site is a prairie dominated by salt-tolerant species. Alkali cordgrass, alkali sacaton, inland saltgrass, and switchgrass make up about 65 percent of the potential vegetation. Tall species, such as big bluestem and

indiangrass, are common in the less saline areas. Sedges, rushes, inland saltgrass, and alkali cordgrass are common increasers. Western ragweed, tall dropseed, alkali muhly, and sumpweed are the principal invaders. Overgrazing can easily reduce the small amounts of big bluestem, indiangrass, and switchgrass. Excessive use reduces the productivity of the site, principally by reducing the vigor of the more palatable grasses.

If rainfall is normal, the estimated annual yield of air-dry herbage production is 6,000 to 8,000 pounds per acre when this site is in excellent condition.

Sands.—This range site is on nearly level or undulating uplands that have some low dunes. The soils have a surface layer of loamy fine sand and have a sandy subsoil. The infiltration rate is high; the available water capacity ranges from low to moderate, depending upon the texture of the subsoil. Permeability is rapid or very rapid. The soils are well drained to excessively drained.

Tall grasses are the dominant species on this site. Big bluestem, sand bluestem, little bluestem, indiangrass, big sandreed, and switchgrass make up 70 to 75 percent of the potential vegetation. Various forbs make up about 5 percent of the vegetation. Although woody species make up about 5 percent of the vegetation, they are mostly in scattered clusters, or mottes.

This site is in undulating to rolling areas on uplands. The soils readily give up available moisture to plants. Overgrazing rapidly reduces the extent of big bluestem and sand bluestem. Continued overgrazing reduces the extent of indiangrass, little bluestem, big sandreed, switchgrass, and Illinois bundleflower. Severe spot grazing can be a problem because of the grazing preferences in some areas of the site, generally in depressions. In overgrazed areas, little bluestem and sideoats grama are the early increasers. The extent of these species decreases, however, if continued grazing pressure is allowed. After continued overgrazing has occurred, some areas and eventually the entire site will become dominated by lower succession species. Some of these species are blue grama, buffalograss, sand dropseed, sand paspalum, threeawns, and numerous annual forbs and poor-quality perennial forbs. Commonly, the taller, more productive species will remain in an extremely reduced condition. Two or three years of good grazing management should be applied before a decision is made to invest in range seeding. Grazing management that incorporates proper grazing use and scheduled rest periods during the growth season is necessary to maintain the productivity of this site. This

kind of management can restore the site to its potential, provided sufficient remnants of the original plant community remain.

Sandy.—This range site is on nearly level to moderately steep uplands. The soils are deep and well drained. Permeability is moderately rapid.

Mid and tall grasses are dominant when this site is in climax condition. Sand bluestem, big bluestem, little bluestem, indiangrass, and switchgrass make up 65 to 70 percent of the potential vegetation. Various forbs make up another 10 percent of the vegetation, and American plum, chickasaw plum, prairie rose, pricklypear, sand sagebrush, and small soapweed make up an additional 5 percent. In some areas the soils contain various amounts of gravel. The production of the typical species in areas where the soils have a large amount of gravel may be slightly lower than in other areas.

This site is a highly preferred grazing area in most landscapes. If continuous grazing is allowed, the condition of this site is typically lower than that of most of the adjacent sites. The typical vegetation is mixed prairie and includes a variety of tall and mid grasses and some short grasses. Short-term overgrazing by cattle rapidly reduces the extent of big bluestem or sand bluestem. These species are generally replaced by little bluestem, sideoats grama, blue grama, and sand dropseed. If continued overgrazing is allowed, the extent of little bluestem and switchgrass is reduced. Severe overgrazing over a long period of time results in a site dominated by sand dropseed, sand paspalum, threeawn, annual grasses, unpalatable forbs, and woody species. Grazing management that includes proper grazing use and scheduled deferment of grazing during the growing season can maintain the productive condition of this site. This kind of management can also restore overgrazed sites to their original production levels, provided remnants of the original species persist. Reseeding may be needed on sites where the more desirable mid and tall grasses no longer exist.

Sandy Lowland.—This range site is in nearly level alluvial areas adjacent to the rivers, creeks, and smaller streams that are subject to occasional or frequent flooding. The soils are deep and are well drained to excessively drained. They formed in stratified, moderately coarse alluvium on bottom land. They have a loamy or sandy surface layer. The water table may enter the root zone, but it is not the dominant factor controlling vegetative growth.

The natural potential vegetation on this site is a mixed-grass prairie. Sand bluestem, little bluestem, indiangrass, and switchgrass are the dominant forage

species when the site is in this condition. Combined, these species make up about 60 percent of the total annual yield.

Areas of this range site typically are not extensive but occur as isolated pockets or in long stretches along major streams. Because fencing the areas of this site may be difficult, the site typically cannot be managed by itself. If this site is fenced with other sites, cattle may overuse it, especially when they are seeking shade. After initial overgrazing of this site, the production of sand bluestem, indiagrass, and switchgrass decreases and that of western wheatgrass and blue grama increases. After the vegetation is reduced to western wheatgrass, and if overgrazing continues, kochia, Russian thistle, and other undesirable annuals typically invade the area. Most of the taller species are eliminated from the site through grazing pressure. As a result, the effects of drought are compounded. Restoring the potential vegetation through management is extremely slow and may take several decades. Where remnants of the taller species remain, grazing management that includes proper stocking and scheduled rest periods during the growing season can be quite effective in returning the site to near its potential.

Shallow Prairie.—This range site is on gently sloping to steep uplands. The soils are loamy over calcareous, silty shale. Ledges of siltstone are exposed in the sloping areas. The available water capacity is low.

The natural potential vegetation on this site is a mixed-grass prairie. Big bluestem, indiagrass, little bluestem, and sideoats grama make up 70 to 75 percent of the total production. Other grasses make up 15 to 20 percent. Perennial forbs make up the remaining 10 percent.

This site is generally in a landscape position preferred by most grazing animals during the growing season. Good grazing management and livestock distribution aids are necessary to maintain the site in its most productive condition. High-preference forage species, such as big bluestem, indiagrass, catclaw sensitivebriar, Illinois bundleflower, and Maximilian sunflower, are difficult to maintain on this site if continuous season-long grazing is allowed. If grazing management is improved, these species may regain their position in the plant community. Overgrazing by cattle rapidly reduces the extent of tall grasses, which are normally replaced by little bluestem and sideoats grama. Continued overuse may eliminate the little bluestem, sideoats grama, blue grama, buffalograss, silver bluestem, and dropseed. Little bluestem and sideoats grama are persistent on this site. They normally increase if a system of grazing management

that includes proper use and scheduled rest periods during the growing season is used. The taller species can recover if good grazing management practices are applied, especially in areas where remnant plants have survived.

Subirrigated.—This range site is in level or nearly level areas adjacent to major streams. It is characterized by deep, loamy soils that have a high water table. The soils have a surface layer and subsoil ranging from loamy sand to silty clay loam. The depth to the water table normally ranges from 1 to 4 feet. The high water table significantly affects both the kinds and amounts of potential vegetation. Although the water table fluctuates somewhat during the growing season, moisture is usually available within the root zone of the deeper rooted grasses and forbs. In some areas the soils are moderately saline. This salinity does not restrict production, but it does favor some of the salt-tolerant species.

The potential vegetation on this site is a tall grass prairie. Tall, deep-rooted grasses dominate the site. Prairie cordgrass, eastern gamagrass, big bluestem, indiagrass, and switchgrass are the major species. Combined, these species make up 60 to 70 percent of the total annual yield. Western wheatgrass, meadow dropseed, American bulrush, knotroot bristlegrass, wildrye, and sedges occur to a lesser extent. Important forbs include Maximilian sunflower, Illinois bundleflower, American licorice, and blue verbena. Woody plants, such as buttonbush, indigobush amorphia, and willows, are common. Scattered cottonwood and willow are common in some areas. This range site is commonly used for the production of native or prairie hay. Eastern gamagrass is likely to be more prominent in the southern parts of this site, and big bluestem and prairie cordgrass may be more prominent in the northern parts.

This range site is in the more level low areas along major drainageways. Because of the availability of water, the vegetation remains lush and green throughout the growing season and attracts grazing animals to the site. Special grazing management techniques are needed to prevent overgrazing. When degeneration of the vegetative composition results from overgrazing by cattle, big bluestem, eastern gamagrass, indiagrass, switchgrass, and prairie cordgrass are the primary decreaseers. Palatable forbs, including Maximilian sunflower, wholeleaf rosinweed, Illinois bundleflower, and sessile tickclover, also decrease in abundance. Principal increaseers include western wheatgrass, meadow tall dropseed, alkali sacaton, American bulrush, tall goldenrod, and woody plants. Continued regression of the plant community results in an increase in the extent of lower growing

plants, such as sideoats grama, blue grama, inland saltgrass, buffalograss, western ragweed, and heath aster. In the absence of fire and grazing by livestock, the vegetation will gradually deteriorate to heavy stands of woody plants, including cottonwood, willow, elm, dogwood, and locust. When the range site is in this condition, the understory consists of sparse Virginia wildrye, green muhly, Texas bluegrass, Kentucky bluegrass, and Scribner panicum. Grazing management that includes proper stocking rates can maintain or improve the range site. Grazing systems or scheduled periods of rest are needed, especially where other range sites are included in grazing units. The use of fire is helpful in maintaining the site for the production of high-quality forage. Fire can be utilized to manage woody species and to remove the excess growth from lightly used areas.

Windbreaks and Environmental Plantings

Loren H. Frees, resource conservationist, Natural Resources Conservation Service, helped prepare this section.

The wooded areas in Reno County generally are along streams, in upland drainageways, and in wetlands. The trees are typically eastern cottonwood, green ash, common hackberry, and black willow. Other common species are honeylocust, Russian mulberry, box elder, American elm, black locust, American plum, and sand plum. Black walnut and bur oak grow in some areas, mainly along the major tributaries of the large streams. Many of the trees can be used for wood products and firewood, but they are not sufficiently concentrated to be of commercial value.

Windbreaks protect crops, livestock, and farmsteads or ranch headquarters from hot or cold winds and from blowing snow and dirt. They protect fruit trees and sensitive garden crops and offer habitat for a variety of wildlife species. These windbreaks are rows of narrow plantings made at right angles to the prevailing winds and at specific intervals to provide maximum protection.

Field windbreaks are narrow plantings made at right angles to the prevailing winds and at specific intervals across the field. The interval depends on the erodibility of the soil. Field windbreaks protect cropland and crops from wind, help to keep snow on the fields, and provide food and cover for wildlife.

Environmental plantings help to beautify the landscape, provide water quality benefits, create wildlife habitat, and serve as living screens for noise abatement or visual effect. A wide variety of species can be used, depending on the intended purpose of

the planting. To ensure plant survival, a healthy planting stock of suitable species should be planted properly on a well prepared site and maintained in good condition.

Eliminating competition from weeds and grasses by clean tilling or using labeled herbicides between planted rows can increase the survival rate. The use of weed fabric barrier is currently the most popular method of controlling weeds and conserving soil moisture. Supplemental watering may be needed during severe dry periods. Proper site preparation before the trees or shrubs are planted can help to control competing vegetation after the trees are planted.

The trees and shrubs selected for planting should be adapted to the soils on the planting site. Selecting adapted species helps to ensure survival and maximum growth rate. Permeability, available water capacity, fertility, soil depth, and soil texture greatly affect the growth rate.

Table 13 shows the height that locally grown trees and shrubs are expected to reach in 20 years on various soils. The estimates in the table are based on measurements and observation of established plantings that have been given adequate care. Additional information on planting trees and shrubs can be obtained from the local office of the Natural Resources Conservation Service, the Cooperative Extension Service, the Kansas State Forest Service, or a commercial nursery.

Wildlife Habitat

Randy Clark, wildlife biologist, Kansas Department of Wildlife and Parks, helped prepare this section.

In the past, most of the survey area was covered by native plant communities generally described as sand prairies. These prairies are dissected by riparian habitat along the Arkansas River and the Ninnescah River. Numerous ephemeral wetlands and shallow depressions also are in the survey area. These habitats support numerous kinds of game and nongame wildlife that are dependent on a variety of habitat elements, including soils. Soils influence wildlife habitat mainly through the kind of vegetation they produce. The level of fertility in a soil directly affects the kind and amount of vegetation the soil can produce and, therefore, determines the carrying capacity of an area for wildlife.

Big game species in the county include white-tailed deer and turkey. Small game species include bobwhite quail, ring-necked pheasant, and cottontail rabbits. Migratory game birds include ducks, geese, sandhill cranes, and mourning doves. Furbearer species

include raccoon, coyote, opossum, beaver, and striped skunk.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 14, the 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 for upland habitat development, riparian buffer design, and wetland habitat development; in selecting soils that are 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 is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or 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 that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or 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 that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of grain and seed crops are corn, wheat, oats, and barley.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flooding, and slope. Soil temperature and soil moisture also are considerations. Examples of grasses and

legumes are fescue, lovegrass, bromegrass, clover, and alfalfa.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flooding. Soil temperature and soil moisture also are considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and grama.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

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 root zone, available water capacity, salinity, and soil moisture. Examples of shrubs are mountainmahogany, bitterbrush, snowberry, and big sagebrush.

Wetland plants are annual and perennial wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, wildrice, saltgrass, cordgrass, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. They are naturally wet areas or areas created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with

grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. Wildlife attracted to these areas include bobwhite quail, pheasant, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous and/or coniferous plants and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, ruffed grouse, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, shore birds, muskrat, mink, and beaver.

Habitat for rangeland wildlife consists of areas of shrubs and wild herbaceous plants. Wildlife attracted to rangeland include antelope, deer, sage grouse, meadowlark, and lark bunting.

Recreational Development

The soils of the survey area are rated in table 15 according to limitations that affect their suitability for recreation.

Rating class terms used in the table 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. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately 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. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome but generally require special design, soil reclamation, or installation procedures that may require additional expense. Fair performance and moderate or high 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.

The limitation class terms (such as “very limited”) are shown for each soil feature listed. As many as

three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

The ratings in the table 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 table 15 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.

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, waste management, construction materials, and water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

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 grain-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. Table 16 shows the degree and kind of soil limitations that affect dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping.

Rating class terms used in the table 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. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately 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. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high 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.

The limitation class terms (such as “very limited”) are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

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.

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

Table 17 shows the degree and kind of soil limitations that affect septic tank absorption fields, sewage lagoons, sanitary landfills, and daily cover for landfill.

Rating class terms used in the table indicate the extent to which the soils are limited by all of the soil features that affect the specified use. *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. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately 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. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high 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.

Limitation class terms (such as "very limited") are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

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 be 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 the 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.

Waste Management

Soil properties are important considerations in areas where soils are used as sites for the treatment and disposal of organic waste and wastewater. Selection of soils with properties that favor waste management can help to prevent environmental damage.

Table 18 shows the degree and kind of soil limitations affecting the treatment of agricultural waste, including municipal and food-processing wastewater and effluent from lagoons or storage ponds. Municipal wastewater is the waste stream from a municipality. It contains domestic waste and may contain industrial waste. It may have received primary or secondary treatment. It is rarely untreated sewage. Food-processing wastewater results from the preparation of fruits, vegetables, milk, cheese, and meats for public consumption. In places it is high in content of sodium and chloride. In the context of this table, the effluent in lagoons and storage ponds is from facilities used to treat or store food-processing wastewater or domestic or animal waste. Domestic and food-processing wastewater is very dilute, and the effluent from the facilities that treat or store it commonly is very low in content of carbonaceous and nitrogenous material; the content of nitrogen commonly ranges from 10 to 30 mg/l. The wastewater from animal waste treatment lagoons or storage ponds, however, has much higher concentrations of these materials, mainly because the manure has not been diluted as much as the domestic waste. The content of nitrogen in this wastewater generally ranges from 50 to 2,000 mg/l. When wastewater is applied, checks should be made to

ensure that nitrogen, heavy metals, and salts are not added in excessive amounts.

The ratings in the table are for waste management systems that not only dispose of and treat organic waste or wastewater but also are beneficial to crops (application of manure and food-processing waste, application of sewage sludge, and disposal of wastewater through irrigation) and for waste management systems that are designed only for the purpose of wastewater disposal and treatment (overland flow of wastewater, rapid infiltration of wastewater, and slow rate treatment of wastewater).

Rating class terms used in the table indicate the extent to which the soils are limited by all of the soil features that affect the specified use. *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. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately 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. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high 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.

Land application of manure and food-processing waste not only disposes of waste material but also improves crop production by increasing the supply of nutrients in the soils where the material is applied. Manure is the excrement of livestock and poultry, and food-processing waste is damaged fruit and vegetables and the peelings, stems, leaves, pits, and soil particles removed in food preparation. The manure and food-processing waste are either solid, slurry, or liquid. Their nitrogen content varies. A high content of nitrogen limits the application rate. Toxic or otherwise dangerous wastes, such as those mixed with the lye used in food processing, are not considered in the ratings.

The ratings are based on the soil properties that

affect absorption, plant growth, microbial activity, erodibility, the rate at which the waste is applied, and the method by which the waste is applied. The properties that affect absorption include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, and available water capacity. The properties that affect plant growth and microbial activity include reaction, the sodium adsorption ratio, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, depth to a water table, ponding, and flooding can hinder the application of waste.

Land application of municipal sewage sludge not only disposes of waste material but also improves crop production by increasing the supply of nutrients in the soils where the material is applied. In the context of this table, sewage sludge is the residual product of the treatment of municipal sewage. The solid component consists mainly of cell mass, primarily bacteria cells that developed during secondary treatment and have incorporated soluble organics into their own bodies. The sludge has small amounts of sand, silt, and other solid debris. The content of nitrogen varies. Some sludge has constituents that are toxic to plants or hazardous to the food chain, such as heavy metals and exotic organic compounds, and should be analyzed chemically prior to use.

The content of water in the sludge ranges from about 98 percent to less than 40 percent. The sludge is considered liquid if it is more than about 90 percent water, slurry if it is about 50 to 90 percent water, and solid if it is less than about 50 percent water.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, the rate at which the sludge is applied, and the method by which the sludge is applied. The properties that affect absorption, plant growth, and microbial activity include permeability, depth to a water table, ponding, the sodium adsorption ratio, depth to bedrock or a cemented pan, available water capacity, reaction, salinity, and bulk density. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, depth to a water table, ponding, and flooding can hinder the application of sludge.

Disposal of wastewater by irrigation not only disposes of municipal wastewater and wastewater from food-processing plants, lagoons, and storage ponds but also improves crop production by increasing the amount of water available to crops. The ratings in the table are based on the soil properties that affect

the design, construction, management, and performance of the irrigation system. The properties that affect design and management include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, slope, and flooding. The properties that affect construction include stones, cobbles, depth to bedrock or a cemented pan, depth to a water table, and ponding. The properties that affect performance include depth to bedrock or a cemented pan, bulk density, the sodium adsorption ratio, salinity, reaction, and the cation-exchange capacity, which is used to estimate the capacity of a soil to adsorb heavy metals.

Slow rate treatment of wastewater is a process in which wastewater is applied to land at a rate normally between 0.5 inch and 4.0 inches per week. The application rate commonly exceeds the rate needed for irrigation of cropland. The applied wastewater is treated as it moves through the soil. Much of the treated water percolates to the ground water, and some enters the atmosphere through evapotranspiration. The applied water generally is not allowed to run off the surface. Waterlogging is prevented either through control of the application rate or through the use of tile drains, or both.

The ratings in the table are based on the soil properties that affect absorption, plant growth, microbial activity, erodibility, and the application of waste. The properties that affect absorption include the sodium adsorption ratio, depth to a water table, ponding, available water capacity, permeability, depth to bedrock or a cemented pan, reaction, the cation-exchange capacity, and slope. Reaction, the sodium adsorption ratio, salinity, and bulk density affect plant growth and microbial activity. The wind erodibility group, the soil erodibility factor K, and slope are considered in estimating the likelihood of wind erosion or water erosion. Stones, cobbles, depth to a water table, ponding, and flooding can hinder the application of waste.

Rapid infiltration of wastewater is a process in which wastewater applied in a level basin at a rate of 4 to 120 inches per week percolates through the soil, eventually reaching the ground water. The application rate commonly exceeds the rate needed for irrigation of cropland. Vegetation is not a necessary part of the treatment; hence, the basins may or may not be vegetated. The thickness of the soil material needed for proper treatment of the wastewater is more than 72 inches. As a result, geologic and hydrologic investigation is needed to ensure proper design and performance and to determine the risk of ground-water pollution.

The ratings in the table are based on the soil

properties that affect the risk of pollution and the design, construction, and performance of the system. Depth to a water table, ponding, flooding, and depth to bedrock or a cemented pan affect the risk of pollution and the design and construction of the system. Slope, stones, and cobbles also affect design and construction. Permeability and reaction affect performance.

Construction Materials and Excavating

Table 19 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. The soils are also rated according to limitations that affect their suitability for shallow excavations.

The soils are rated as a *probable*, *possible*, or *improbable* source of sand and gravel. A rating of *probable* means that the source material is likely to be in or below the soil. A rating of *possible* means that the source material may be in or below the soil and further investigation is warranted. A rating of *improbable* means that the source material is unlikely to be in or below the soil.

Other rating class terms in the table indicate the extent to which the soils are limited by soil features that affect the use of the soils as a source for roadfill or topsoil or the suitability of the soils for shallow excavations. *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. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately 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. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate or high 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.

Limitation class terms (such as “very limited”) are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

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).

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.

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 the table, only the probability 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 lowest layer of the soil contains sand or gravel, the soil is rated as a probable source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, 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.

Water Management

Table 20 gives information on the soil properties and site features that affect water management. Soils are rated for pond reservoir areas, drainage, irrigation, terraces and diversions, and grassed waterways. Restrictive features that affect each soil for the specified use also are provided in the table.

Rating class terms used in the table indicate the extent to which the soils are limited by all of the soil features that affect the specified use. *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. *Slightly limited* indicates that the soil has features that are favorable for the specified use. The limitations are minor and can be easily overcome. Good performance and low maintenance can be expected. *Moderately 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. *Limited* indicates that the soil has one or more features that are significant limitations for the specified use. The limitations can be overcome but generally require special design, soil reclamation, or installation procedures that may result in additional expense. Fair performance and moderate

or high 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.

Limitation class terms (such as “very limited”) are shown for each soil feature listed. As many as three soil features may be listed for each soil component if applicable. The overall limitation rating for the soil component is based on the most severe limitation.

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.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, a cemented pan, or other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and the potential for frost action. Excavating and grading and the stability of ditchbanks are affected by depth to bedrock or a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts,

sodium, and sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to control erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind erosion or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts and sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Table 10.--Land Capability and Yields per Acre of Crops

(Yields in the "N" columns are for nonirrigated areas; those in the "I" columns are for irrigated areas. Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil.)

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Grain sorghum		Soybeans		Winter wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu
990: Abbyville-----	3s	3s	3.00	5.00	---	---	36.00	63.00	---	---	26.00	40.00
991: Abbyville-----	3s	3s	3.00	5.00	---	---	36.00	63.00	---	---	26.00	40.00
Kisiwa-----	4s	---	---	---	---	---	29.00	---	---	---	18.00	---
1004: Albion-----	3e	---	2.00	---	---	---	43.00	---	23.00	40.00	28.00	---
1011: Albion-----	3e	---	2.00	---	---	---	44.00	---	23.00	40.00	28.00	---
Shellabarger-----	2e	---	2.20	6.50	---	120.00	55.00	125.00	---	29.00	32.00	---
1057: Aquents-----	5w	---	---	---	---	---	32.00	---	---	---	18.00	---
1061: Arents-----	8	---	---	---	---	---	---	---	---	---	---	---
1062: Arents.												
1070: Avans-----	1	---	3.50	---	---	---	63.00	---	35.00	55.00	40.00	---
1071: Avans-----	1	---	3.50	---	---	---	63.00	---	35.00	55.00	40.00	---
1072: Avans-----	2e	---	3.50	---	---	---	55.00	---	32.00	50.00	38.00	---
1191: Blazefork-----	2w	2s	3.50	6.00	---	---	62.00	110.00	40.00	60.00	45.00	---
1192: Blazefork-----	2s	2s	3.50	6.00	---	---	62.00	110.00	40.00	60.00	45.00	---
Kaskan-----	2w	---	---	---	---	---	57.00	---	---	---	40.00	---

Table 10.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Grain sorghum		Soybeans		Winter wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu
1200:												
Buhler-----	2w	2w	3.00	5.00	---	---	40.00	63.00	14.00	52.00	30.00	---
Blazefork-----	2s	2s	3.50	6.00	---	---	62.00	110.00	40.00	60.00	45.00	---
1324:												
Carway-----	2w	---	5.00	---	80.00	---	40.00	---	---	---	23.00	---
Carbika-----	2w	---	5.00	---	80.00	---	40.00	---	---	---	23.00	---
1357:												
Carway-----	2w	---	5.00	---	80.00	---	40.00	---	---	---	23.00	---
Dillhut-----	3e	3e	---	5.50	---	115.00	47.00	90.00	---	---	27.00	---
Solvay-----	2e	---	5.00	6.00	---	120.00	54.00	110.00	---	---	34.00	50.00
1359:												
Clark-----	2c	---	---	---	---	---	40.00	---	20.00	30.00	25.00	---
Ost-----	2c	---	---	---	---	---	46.00	---	20.00	30.00	28.00	---
1428:												
Crete-----	2s	2s	3.20	5.50	55.00	125.00	78.00	125.00	48.00	69.00	40.00	---
1429:												
Crete-----	2s	2s	3.20	5.50	55.00	125.00	78.00	125.00	48.00	69.00	40.00	---
1553:												
Darlow-----	4s	4s	3.00	5.00	---	---	37.00	63.00	25.00	35.00	28.00	35.00
Elmer-----	3s	3s	3.50	5.00	---	---	41.00	63.00	25.00	38.00	32.00	40.00
1554:												
Dillhut-----	3e	3e	---	5.50	---	115.00	47.00	100.00	---	---	27.00	---
1555:												
Dillhut-----	3e	3e	---	5.50	---	115.00	47.00	100.00	---	---	26.00	---
Plev-----	5w	---	---	---	---	---	26.00	---	---	---	18.00	---
1556:												
Dillhut-----	3e	3e	---	5.50	---	115.00	47.00	100.00	---	---	26.00	---
Solvay-----	2e	---	5.00	6.00	---	120.00	54.00	110.00	---	---	34.00	45.00

Table 10.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Grain sorghum		Soybeans		Winter wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu
1725:												
Farnum-----	2c	1	3.00	7.00	---	140.00	58.00	120.00	41.00	63.00	45.00	70.00
Funmar-----	2c	1	3.00	7.00	---	140.00	58.00	120.00	41.00	65.00	45.00	65.00
1727:												
Funmar-----	2c	1	3.00	7.00	---	140.00	58.00	120.00	41.00	65.00	45.00	65.00
Taver-----	2s	---	4.00	8.00	---	---	58.00	100.00	41.00	50.00	45.00	60.00
1804:												
Geary-----	2e	2e	3.40	7.00	62.00	125.00	77.00	115.00	35.00	---	44.00	---
1807:												
Geary-----	3e	3e	2.80	6.00	53.00	110.00	66.00	100.00	23.00	---	34.00	---
1985:												
Hayes-----	3e	3e	3.00	6.00	---	120.00	52.00	100.00	---	---	30.00	---
1986:												
Hayes-----	3e	3e	3.00	6.00	---	120.00	52.00	100.00	---	---	34.00	50.00
Solvay-----	2e	---	5.00	6.00	---	120.00	54.00	110.00	---	---	34.00	45.00
1987:												
Hayes-----	3e	3e	3.00	6.00	---	120.00	52.00	100.00	---	---	30.00	40.00
Turon-----	3e	3e	---	5.50	---	115.00	46.00	90.00	---	---	26.00	35.00
2204:												
Jamash-----	4e	---	---	---	---	---	---	---	---	---	26.00	---
Piedmont-----	2e	---	---	---	---	---	---	---	---	---	30.00	---
2205:												
Jamash-----	4e	---	---	---	---	---	---	---	---	---	24.00	---
Piedmont-----	3e	---	---	---	---	---	---	---	---	---	30.00	---
2206:												
Jamash-----	6e	---	---	---	---	---	---	---	---	---	20.00	---
Piedmont-----	4e	---	---	---	---	---	---	---	---	---	25.00	---

Table 10.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Grain sorghum		Soybeans		Winter wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu
2207: Jamash-----	6e	---	---	---	---	---	---	---	---	---	23.00	---
2381: Kanza-----	5w	---	---	---	---	---	27.00	---	---	---	18.00	---
Ninnescah-----	5w	---	---	---	---	---	26.00	---	---	---	20.00	---
2390: Kaskan-----	2w	---	---	---	---	---	58.00	---	---	---	40.00	---
2391: Kaskan-----	5w	---	---	---	---	---	34.00	---	---	---	20.00	---
2395: Kisiwa-----	4s	---	---	---	---	---	29.00	---	---	---	18.00	---
2509: Ladysmith-----	2s	---	3.00	---	45.00	---	69.00	---	30.00	44.00	44.00	---
2556: Langdon-----	6e	---	---	---	---	---	29.00	---	---	---	17.00	---
2587: Imano-----	3w	---	3.00	5.00	---	110.00	50.00	100.00	---	---	32.00	---
2588: Longford-----	4e	---	2.00	---	50.00	---	57.00	---	---	---	36.00	---
2812: Mahone-----	2w	---	---	---	---	---	57.00	---	---	---	40.00	---
2948: Nalim-----	2e	2e	3.50	6.50	---	---	66.00	115.00	35.00	50.00	40.00	---
2949: Naron-----	3e	3e	3.00	6.50	---	125.00	52.00	110.00	---	---	32.00	45.00
2950: Naron-----	3e	3e	3.00	6.50	---	125.00	48.00	95.00	25.00	45.00	29.00	45.00
2951: Nash-----	3e	---	---	---	---	---	40.00	---	20.00	---	29.00	---

Table 10.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Grain sorghum		Soybeans		Winter wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu
2952:												
Nash-----	4e	---	---	---	---	---	40.00	---	---	---	25.00	---
Lucien-----	6e	---	---	---	---	---	---	---	---	---	16.00	---
2953:												
Nash-----	4e	---	---	---	---	---	35.00	---	---	---	22.00	---
Lucien-----	6e	---	---	---	---	---	---	---	---	---	13.00	---
2955:												
Nickerson-----	3e	3e	3.00	7.00	---	135.00	60.00	115.00	---	---	41.00	55.00
2956:												
Nickerson-----	3e	3e	3.00	7.00	---	135.00	56.00	115.00	---	---	38.00	55.00
2957:												
Nickerson-----	3e	3e	3.00	7.00	---	135.00	59.00	115.00	---	---	40.00	50.00
Punkin-----	3s	3s	3.00	5.00	---	---	37.00	55.00	20.00	35.00	27.00	35.00
2958:												
Ninnescah-----	5w	---	---	---	---	---	---	---	---	---	15.00	---
2959:												
Ninnescah-----	5s	---	---	---	---	---	---	---	---	---	12.00	---
3051:												
Ost-----	2c	---	---	---	---	---	53.00	---	35.00	42.00	39.00	46.00
3052:												
Ost-----	2c	---	---	---	---	---	51.00	---	34.00	42.00	37.00	45.00
Clark-----	2c	---	---	---	---	---	46.00	---	35.00	46.00	35.00	---
3170:												
Penalosa-----	2c	1	3.00	7.00	---	---	60.00	120.00	42.00	60.00	45.00	70.00
3171:												
Penalosa-----	2c	1	3.00	7.00	---	---	60.00	120.00	42.00	60.00	45.00	70.00
3180:												
Pratt-----	3e	3e	---	5.50	---	115.00	47.00	90.00	---	---	26.00	---

Table 10.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Grain sorghum		Soybeans		Winter wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu
3181:												
Pratt-----	3e	3e	---	5.50	---	115.00	47.00	90.00	---	---	26.00	---
Turon-----	3e	3e	---	5.50	---	115.00	48.00	90.00	---	---	27.00	---
3190:												
Punkin-----	3s	3s	3.00	5.00	---	---	37.00	63.00	27.00	40.00	30.00	42.00
3191:												
Punkin-----	3s	3s	3.00	5.00	---	---	37.00	55.00	27.00	35.00	30.00	38.00
Taver-----	2s	---	4.00	8.00	---	---	56.00	100.00	37.00	50.00	---	---
3403:												
Sand pits.												
3469:												
Smolan-----	2e	2e	3.00	6.00	55.00	115.00	67.00	115.00	40.00	55.00	44.00	---
3510:												
Saltcreek-----	3e	1	3.00	7.00	---	130.00	57.00	120.00	35.00	50.00	45.00	65.00
Funmar-----	2c	1	3.00	7.00	---	140.00	58.00	120.00	40.00	55.00	45.00	65.00
Farnum-----	2c	1	3.00	7.00	---	140.00	58.00	120.00	38.00	52.00	43.00	65.00
3511:												
Saltcreek-----	3e	1	3.00	7.00	---	130.00	57.00	120.00	33.00	50.00	40.00	50.00
Naron-----	2e	2e	3.00	7.00	---	130.00	28.00	120.00	35.00	45.00	40.00	50.00
3512:												
Saltcreek-----	3e	1	3.00	7.00	---	130.00	58.00	120.00	35.00	50.00	40.00	50.00
Naron-----	3e	3e	3.00	6.50	---	125.00	58.00	110.00	35.00	50.00	40.00	50.00
3520:												
Saxman-----	3e	2e	3.50	7.00	---	---	57.00	90.00	---	---	37.00	52.00
3530:												
Shellabarger-----	2e	---	2.20	6.50	---	120.00	40.00	110.00	---	---	25.00	---
Albion-----	3e	---	2.00	---	---	---	35.00	---	---	---	20.00	---

Table 10.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Grain sorghum		Soybeans		Winter wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu
3531:												
Shellabarger-----	2e	---	2.20	6.50	---	120.00	48.00	90.00	---	---	28.00	---
Nalim-----	2e	2e	3.50	6.50	---	---	60.00	115.00	32.00	50.00	35.00	---
3532:												
Shellabarger-----	2e	---	2.20	6.50	---	120.00	44.00	110.00	20.00	30.00	25.00	35.00
3533:												
Shellabarger-----	2e	---	2.20	6.50	---	120.00	55.00	110.00	25.00	25.00	32.00	45.00
3534:												
Shellabarger-----	2e	---	2.20	6.50	---	120.00	55.00	110.00	25.00	30.00	32.00	---
3535:												
Shellabarger-----	2e	---	2.20	6.50	---	120.00	55.00	110.00	25.00	30.00	33.00	---
Nalim-----	2e	2e	3.50	6.50	---	---	66.00	115.00	37.00	50.00	43.00	---
3540:												
Solvay-----	2e	---	5.00	6.00	---	120.00	54.00	110.00	---	---	34.00	45.00
3550:												
Spelvin-----	2e	---	2.00	5.00	---	110.00	46.00	100.00	---	---	30.00	---
3639:												
Taver-----	2s	---	4.00	8.00	---	---	55.00	100.00	40.00	50.00	45.00	60.00
3640:												
Tivin-----	6e	---	---	---	---	---	---	---	---	---	---	---
3641:												
Tivin-----	6e	---	---	---	---	---	---	---	---	---	---	---
Dillhut-----	3e	3e	---	5.50	---	115.00	41.00	90.00	---	---	23.00	---
3642:												
Tivin-----	6e	---	---	---	---	---	---	---	---	---	---	---
Willowbrook-----	3e	2e	4.00	7.00	---	---	55.00	95.00	---	---	35.00	45.00
3643:												
Tobin-----	2w	---	---	---	60.00	125.00	63.00	120.00	35.00	45.00	40.00	50.00

Table 10.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Grain sorghum		Soybeans		Winter wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu
3644:												
Turon-----	3e	3e	---	5.50	---	115.00	45.00	90.00	---	---	26.00	---
Carway-----	2w	---	5.00	---	80.00	---	40.00	---	---	---	28.00	---
3760:												
Urban land.												
Blazefork-----	2s	2s	3.50	6.00	---	---	62.00	110.00	40.00	50.00	45.00	---
Kaskan-----	2w	---	---	---	---	---	57.00	---	---	---	---	---
3762:												
Urban land.												
Darlow-----	4s	4s	3.00	5.00	---	---	35.00	55.00	25.00	35.00	30.00	40.00
Elmer-----	3s	3s	3.50	5.00	---	---	43.00	55.00	30.00	35.00	35.00	45.00
3763:												
Urban land.												
Imano-----	3w	---	3.00	5.00	---	110.00	50.00	100.00	---	---	33.00	45.00
3764:												
Urban land.												
Mahone-----	2w	---	---	---	---	---	57.00	---	---	---	40.00	---
3765:												
Urban land.												
Saltcreek-----	3e	1	3.00	7.00	---	130.00	60.00	120.00	33.00	50.00	36.00	55.00
Naron-----	2e	2e	3.00	7.00	---	130.00	60.00	120.00	30.00	45.00	35.00	50.00
3766:												
Urban land.												
Saxman-----	3e	2e	3.50	7.00	---	---	55.00	90.00	---	---	35.00	45.00
3767:												
Urban land.												
Willowbrook-----	3e	2e	4.00	7.00	---	---	58.00	95.00	---	---	40.00	50.00

Table 10.--Land Capability and Yields per Acre of Crops--Continued

Map symbol and soil name	Land capability		Alfalfa hay		Corn		Grain sorghum		Soybeans		Winter wheat	
	N	I	N	I	N	I	N	I	N	I	N	I
			Tons	Tons	Bu	Bu	Bu	Bu	Bu	Bu	Bu	Bu
3768: Urban land.												
Yaggy-----	3e	2e	4.50	7.50	---	---	55.00	90.00	---	---	40.00	50.00
3900: Warnut-----	2w	---	5.00	---	80.00	---	40.00	---	---	---	23.00	---
3966: Willowbrook-----	3e	2e	4.00	7.00	---	---	55.00	95.00	---	---	40.00	50.00
4004: Yaggy-----	3e	2e	4.50	7.50	---	---	55.00	90.00	---	---	40.00	50.00
4005: Yaggy-----	3e	2e	4.50	7.50	---	---	55.00	90.00	---	---	40.00	50.00
Saxman-----	3e	2e	3.50	7.00	---	---	50.00	90.00	---	---	32.00	45.00
4110: Zellmont-----	2e	---	2.20	6.50	---	150.00	55.00	110.00	---	---	35.00	---
Poxmash-----	3e	---	2.00	---	---	---	44.00	---	---	---	28.00	---

Table 11.--Prime Farmland

(Only the soils considered prime farmland are listed. Urban or built-up areas of the soils listed are not considered prime farmland. If a soil is prime farmland only under certain conditions, the conditions are specified in parentheses after the soil name.)

Map symbol	Soil name
1004	Albion sandy loam, 0 to 1 percent slopes
1011	Albion-Shellabarger sandy loams, 1 to 4 percent slopes
1070	Avans loam, 0 to 1 percent slopes
1071	Avans loam, 1 to 3 percent slopes
1072	Avans loam, 3 to 7 percent slopes
1191	Blazefork silty clay loam, 0 to 1 percent slopes, rarely flooded
1192	Blazefork-Kaskan complex, 0 to 1 percent slopes, rarely flooded
1359	Clark-Ost loams, 3 to 7 percent slopes
1428	Crete silt loam, 0 to 1 percent slopes
1429	Crete silt loam, 1 to 3 percent slopes
1725	Farnum and Funmar loams, 0 to 1 percent slopes
1727	Funmar-Taver loams, 0 to 2 percent slopes
1804	Geary silt loam, 1 to 3 percent slopes
1985	Hayes fine sandy loam, 1 to 5 percent slopes
2390	Kaskan loam, 0 to 1 percent slopes, rarely flooded
2509	Ladysmith silty clay loam, 0 to 1 percent slopes
2587	Imano clay loam, 0 to 1 percent slopes, occasionally flooded
2948	Nalim loam, 0 to 1 percent slopes
2955	Nickerson fine sandy loam, 0 to 1 percent slopes
3051	Ost loam, 0 to 1 percent slopes
3052	Ost-Clark loams, 1 to 3 percent slopes
3170	Penalosa silt loam, 0 to 1 percent slopes
3171	Penalosa silt loam, 1 to 3 percent slopes
3469	Smolan silty clay loam, 1 to 3 percent slopes
3510	Saltcreek-Funmar-Farnum complex, 0 to 3 percent slopes
3511	Saltcreek and Naron fine sandy loams, 0 to 1 percent slopes
3512	Saltcreek and Naron fine sandy loams, 1 to 3 percent slopes
3533	Shellabarger sandy loam, 0 to 1 percent slopes
3534	Shellabarger sandy loam, 1 to 3 percent slopes
3535	Shellabarger-Nalim complex, 1 to 3 percent slopes
3639	Taver loam, 0 to 1 percent slopes
3640	Tobin silt loam, 0 to 1 percent slopes, occasionally flooded

Table 12.--Rangeland Productivity and Characteristic Plant Communities

(The abbreviation "pe" refers to precipitation effectivity.)

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
990:					
Abbyville-----	Saline Subirrigated (pe21-28)---	Favorable	7,000	Prairie cordgrass-----	20
		Normal	6,000	Big bluestem-----	5
		Unfavorable	5,000	Yellow indiagrass-----	5
				Inland saltgrass-----	10
				Switchgrass-----	10
				Western wheatgrass-----	5
				Alkali sacaton-----	15
				Blue grama-----	5
				Buffalograss-----	5
				Canada wildrye-----	5
				Tall dropseed-----	5
				Threadleaf sedge-----	5
				Other perennial forbs-----	5
991:					
Abbyville-----	Saline Subirrigated (pe21-28)---	Favorable	7,000	Prairie cordgrass-----	20
		Normal	6,000	Big bluestem-----	5
		Unfavorable	5,000	Yellow indiagrass-----	5
				Inland saltgrass-----	10
				Switchgrass-----	10
				Western wheatgrass-----	5
				Alkali sacaton-----	15
				Blue grama-----	5
				Buffalograss-----	5
				Canada wildrye-----	5
				Tall dropseed-----	5
				Threadleaf sedge-----	5
				Other perennial forbs-----	5
Kisiwa-----	Saline Subirrigated (pe21-28)---	Favorable	7,000	Prairie cordgrass-----	20
		Normal	6,000	Big bluestem-----	5
		Unfavorable	5,000	Yellow indiagrass-----	5
				Inland saltgrass-----	10
				Switchgrass-----	10
				Western wheatgrass-----	5
				Alkali sacaton-----	15
				Blue grama-----	5
				Buffalograss-----	5
				Canada wildrye-----	5
				Tall dropseed-----	5
				Threadleaf sedge-----	5
				Other perennial forbs-----	5
1004:					
Albion-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Sand lovegrass-----	5
		Unfavorable	2,000	Switchgrass-----	10
				Little bluestem-----	25
				Yellow indiagrass-----	10
				Other perennial grasses-----	10
				Other perennial forbs-----	10
1011:					
Albion-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Sand lovegrass-----	5
		Unfavorable	2,000	Switchgrass-----	10
				Little bluestem-----	25
				Yellow indiagrass-----	10
				Other perennial grasses-----	10
				Other perennial forbs-----	10

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
1057: Aquents-----	Subirrigated (pe24-32)-----	Favorable	9,000	Big bluestem-----	25
		Normal	8,000	Switchgrass-----	20
		Unfavorable	7,000	Yellow indiagrass-----	15
				Prairie cordgrass-----	10
				Eastern gamagrass-----	10
				Little bluestem-----	5
				Other perennial grasses-----	5
Sedge-----	5				
1070: Avans-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
Other perennial forbs-----	10				
1071: Avans-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
Other perennial forbs-----	10				
1072: Avans-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
Other perennial forbs-----	10				
1191: Blazefork-----	Clay Lowland (pe25-34)-----	Favorable	6,500	Big bluestem-----	25
		Normal	5,000	Sideoats grama-----	5
		Unfavorable	4,000	Tall dropseed-----	5
				Western wheatgrass-----	5
				Switchgrass-----	10
				Little bluestem-----	5
				Yellow indiagrass-----	10
				Eastern gamagrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
Prairie cordgrass-----	15				

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
1192: Blazefork-----	Clay Lowland (pe25-34)-----	Favorable	6,500	Big bluestem-----	25
		Normal	5,000	Sideoats grama-----	5
		Unfavorable	4,000	Tall dropseed-----	5
				Western wheatgrass-----	5
				Switchgrass-----	10
				Little bluestem-----	5
				Yellow indiangrass-----	10
				Eastern gamagrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Prairie cordgrass-----	15
Kaskan-----	Loamy Lowland (pe21-28)-----	Favorable	7,000	Big bluestem-----	30
		Normal	5,500	Eastern gamagrass-----	10
		Unfavorable	4,500	Yellow indiangrass-----	10
				Switchgrass-----	10
				Prairie cordgrass-----	5
				Little bluestem-----	5
				Threadleaf sedge-----	5
				Sideoats grama-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
1200: Buhler-----	Saline Subirrigated (pe21-28)---	Favorable	3,500	Alkali sacaton-----	30
		Normal	2,500	Switchgrass-----	25
		Unfavorable	1,800	Inland saltgrass-----	15
				Western wheatgrass-----	10
				Tall dropseed-----	5
				Alkali cordgrass-----	5
				Other perennial forbs-----	5
				Other perennial grasses-----	5
Blazefork-----	Clay Lowland (pe25-34)-----	Favorable	6,500	Big bluestem-----	25
		Normal	5,000	Sideoats grama-----	5
		Unfavorable	4,000	Tall dropseed-----	5
				Western wheatgrass-----	5
				Switchgrass-----	10
				Little bluestem-----	5
				Yellow indiangrass-----	10
				Eastern gamagrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Prairie cordgrass-----	15
1324: Carway-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Composition
		Kind of year	Dry weight		
			Lb/acre		Pct
1324: Carbika-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiagrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
Yellow bristlegrass-----	5				
1357: Carway-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiagrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
Yellow bristlegrass-----	5				
Dillhut-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
Other shrubs-----	5				
Solvay-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiagrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
Yellow bristlegrass-----	5				
1359: Clark-----	Limy Upland (pe21-28)-----	Favorable	4,500	Tall dropseed-----	5
		Normal	3,500	Blue grama-----	5
		Unfavorable	3,000	Big bluestem-----	25
				Little bluestem-----	20
				Sideoats grama-----	10
				Western wheatgrass-----	5
				Switchgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiagrass-----	10

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
1359: Ost-----	Loamy Upland (pe24-32)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
1428: Crete-----	Clay Upland (pe25-34)-----	Favorable	5,000	Little bluestem-----	15
		Normal	3,500	Big bluestem-----	25
		Unfavorable	2,500	Sideoats grama-----	10
				Switchgrass-----	10
				Blue grama-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiangrass-----	10
				Tall dropseed-----	5
1429: Crete-----	Clay Upland (pe25-34)-----	Favorable	5,000	Little bluestem-----	15
		Normal	3,500	Big bluestem-----	25
		Unfavorable	2,500	Sideoats grama-----	10
				Switchgrass-----	10
				Blue grama-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiangrass-----	10
				Tall dropseed-----	5
1553: Darlow-----	Claypan (pe21-28)-----	Favorable	3,500	Big bluestem-----	20
		Normal	2,500	Sideoats grama-----	15
		Unfavorable	1,800	Switchgrass-----	15
				Little bluestem-----	15
				Yellow indiangrass-----	10
				Tall dropseed-----	10
				Buffalograss-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	5
Elmer-----	Loamy Terrace (pe21-28)-----	Favorable	5,500	Big bluestem-----	20
		Normal	5,000	Little bluestem-----	10
		Unfavorable	3,400	Yellow indiangrass-----	10
				Switchgrass-----	10
				Eastern gamagrass-----	5
				Sideoats grama-----	5
				Blue grama-----	5
				Western wheatgrass-----	5
				Tall dropseed-----	5
				Buffalograss-----	5
				Plains muhly-----	5
				Threadleaf sedge-----	5
				Canada wildrye-----	5
				Other perennial forbs-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
1554: Dillhut-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
				Other shrubs-----	5
1555: Dillhut-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
				Other shrubs-----	5
Plev-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5
1556: Dillhut-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
Solvay-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
1725: Farnum-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
Funmar-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
1727: Funmar-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
Taver-----	Clay Upland (pe21-28)-----	Favorable	5,000	Little bluestem-----	15
		Normal	3,500	Big bluestem-----	25
		Unfavorable	2,500	Sideoats grama-----	10
				Switchgrass-----	10
				Blue grama-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiangrass-----	10
				Tall dropseed-----	5
1804: Geary-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
1807: Geary-----	Loamy Upland (pe25-34)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
1985: Hayes-----	Sandy (pe21-28)-----	Favorable	4,000	Big bluestem-----	10
		Normal	3,000	Sand bluestem-----	20
		Unfavorable	2,000	Sand lovegrass-----	5
				Blue grama-----	5
				Switchgrass-----	10
				Little bluestem-----	20
				Yellow indiangrass-----	10
				Sand dropseed-----	10
				Other perennial grasses-----	5
				Other perennial forbs-----	5
1986: Hayes-----	Sandy (pe21-28)-----	Favorable	4,000	Big bluestem-----	10
		Normal	3,000	Sand bluestem-----	20
		Unfavorable	2,000	Sand lovegrass-----	5
				Blue grama-----	5
				Switchgrass-----	10
				Little bluestem-----	20
				Yellow indiangrass-----	10
				Sand dropseed-----	10
				Other perennial grasses-----	5
				Other perennial forbs-----	5
Solvay-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5
1987: Hayes-----	Sandy (pe21-28)-----	Favorable	4,000	Big bluestem-----	10
		Normal	3,000	Sand bluestem-----	20
		Unfavorable	2,000	Sand lovegrass-----	5
				Blue grama-----	5
				Switchgrass-----	10
				Little bluestem-----	20
				Yellow indiangrass-----	10
				Sand dropseed-----	10
				Other perennial grasses-----	5
				Other perennial forbs-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
1987:					
Turon-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
				Other shrubs-----	5
2204:					
Jamash-----	Shallow Prairie (pe24-32)-----	Favorable	3,200	Little bluestem-----	40
		Normal	2,400	Sideoats grama-----	10
		Unfavorable	1,700	Big bluestem-----	10
				Yellow indiangrass-----	5
				Canada wildrye-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
Piedmont-----	Clay Upland (pe24-32)-----	Favorable	5,000	Little bluestem-----	15
		Normal	3,500	Big bluestem-----	25
		Unfavorable	2,500	Sideoats grama-----	10
				Switchgrass-----	10
				Blue grama-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiangrass-----	10
				Tall dropseed-----	5
2205:					
Jamash-----	Shallow Prairie (pe24-32)-----	Favorable	3,200	Little bluestem-----	40
		Normal	2,400	Sideoats grama-----	10
		Unfavorable	1,700	Big bluestem-----	10
				Yellow indiangrass-----	5
				Canada wildrye-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
Piedmont-----	Clay Upland (pe24-32)-----	Favorable	5,000	Little bluestem-----	15
		Normal	3,500	Big bluestem-----	25
		Unfavorable	2,500	Sideoats grama-----	10
				Switchgrass-----	10
				Blue grama-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiangrass-----	10
				Tall dropseed-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
2206: Jamash-----	Shallow Prairie (pe24-32)-----	Favorable	3,200	Little bluestem-----	40
		Normal	2,400	Sideoats grama-----	10
		Unfavorable	1,700	Big bluestem-----	10
				Yellow indiangrass-----	5
				Canada wildrye-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
Piedmont-----	Clay Upland (pe24-32)-----	Favorable	5,000	Little bluestem-----	15
		Normal	3,500	Big bluestem-----	25
		Unfavorable	2,500	Sideoats grama-----	10
				Switchgrass-----	10
				Blue grama-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiangrass-----	10
				Tall dropseed-----	5
2207: Jamash-----	Shallow Prairie (pe24-32)-----	Favorable	3,200	Little bluestem-----	40
		Normal	2,400	Sideoats grama-----	10
		Unfavorable	1,700	Big bluestem-----	10
				Yellow indiangrass-----	5
				Canada wildrye-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
2381: Kanza-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
		Yellow bristlegrass-----	5		
Ninnescah-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
		Yellow bristlegrass-----	5		

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
2390: Kaskan-----	Loamy Lowland (pe21-28)-----	Favorable	7,000	Big bluestem-----	30
		Normal	5,500	Eastern gamagrass-----	10
		Unfavorable	4,500	Yellow indiangrass-----	10
				Switchgrass-----	10
				Prairie cordgrass-----	5
				Little bluestem-----	5
				Threadleaf sedge-----	5
				Sideoats grama-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
2391: Kaskan-----	Loamy Lowland (pe21-28)-----	Favorable	7,000	Big bluestem-----	30
		Normal	5,500	Eastern gamagrass-----	10
		Unfavorable	4,500	Yellow indiangrass-----	10
				Switchgrass-----	10
				Prairie cordgrass-----	5
				Little bluestem-----	5
				Threadleaf sedge-----	5
				Sideoats grama-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
2395: Kisiwa-----	Saline Subirrigated (pe21-28)---	Favorable	7,000	Prairie cordgrass-----	20
		Normal	6,000	Big bluestem-----	5
		Unfavorable	5,000	Yellow indiangrass-----	5
				Inland saltgrass-----	10
				Switchgrass-----	10
				Western wheatgrass-----	5
				Alkali sacaton-----	15
				Blue grama-----	5
				Buffalograss-----	5
				Canada wildrye-----	5
				Tall dropseed-----	5
				Threadleaf sedge-----	5
				Other perennial forbs-----	5
2509: Ladysmith-----	Clay Upland (pe25-34)-----	Favorable	5,000	Little bluestem-----	15
		Normal	3,500	Big bluestem-----	25
		Unfavorable	2,500	Sideoats grama-----	10
				Switchgrass-----	10
				Blue grama-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiangrass-----	10
				Tall dropseed-----	5
2556: Langdon-----	Choppy Sands (pe21-28)-----	Favorable	3,000	Sand bluestem-----	40
		Normal	2,150	Little bluestem-----	20
		Unfavorable	1,550	Other perennial forbs-----	10
				Sand dropseed-----	5
				Prairie sandreed-----	5
				Sand lovegrass-----	5
				Other shrubs-----	5
				Blue grama-----	5
				Switchgrass-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
2587: Imano-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
			Switchgrass-----	10	
			Spikerush-----	5	
			Pennsylvania smartweed-----	5	
			Yellow indiagrass-----	5	
			Prairie cordgrass-----	5	
			Other shrubs-----	5	
			Prairie bundleflower-----	5	
Yellow bristlegrass-----	5				
2588: Longford-----	Loamy Upland (pe25-34)-----	Favorable	5,000	Big bluestem-----	25
		Normal	3,500	Little bluestem-----	20
		Unfavorable	2,500	Switchgrass-----	10
			Blue grama-----	10	
			Western wheatgrass-----	10	
			Yellow indiagrass-----	5	
			Sideoats grama-----	5	
			Tall dropseed-----	5	
			Leadplant-----	5	
			Missouri goldenrod-----	5	
2812: Mahone-----	Loamy Lowland (pe21-28)-----	Favorable	7,000	Big bluestem-----	30
		Normal	5,500	Eastern gamagrass-----	10
		Unfavorable	4,500	Yellow indiagrass-----	10
			Switchgrass-----	10	
			Prairie cordgrass-----	5	
			Little bluestem-----	5	
			Threadleaf sedge-----	5	
			Sideoats grama-----	5	
			Tall dropseed-----	5	
			Western wheatgrass-----	5	
Other perennial forbs-----	10				
2948: Nalim-----	Loamy Upland (pe24-32)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
			Sideoats grama-----	10	
			Eastern gamagrass-----	5	
			Little bluestem-----	15	
			Switchgrass-----	5	
			Tall dropseed-----	5	
			Western wheatgrass-----	5	
			Other perennial grasses-----	5	
Other perennial forbs-----	10				
2949: Naron-----	Sandy (pe21-28)-----	Favorable	4,500	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Switchgrass-----	15
			Yellow indiagrass-----	15	
			Big bluestem-----	10	
Sand lovegrass-----	5				

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
2950: Naron-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Switchgrass-----	15
				Yellow indiangrass-----	15
				Big bluestem-----	10
				Sand lovegrass-----	5
2951: Nash-----	Loamy Upland (pe24-32)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
2952: Nash-----	Loamy Upland (pe24-32)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
Lucien-----	Shallow Prairie (pe24-32)-----	Favorable	3,200	Little bluestem-----	40
		Normal	2,400	Sideoats grama-----	10
		Unfavorable	1,700	Big bluestem-----	10
				Yellow indiangrass-----	5
				Canada wildrye-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
2953: Nash-----	Loamy Upland (pe24-32)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
2953: Lucien-----	Shallow Prairie (pe24-32)-----	Favorable	3,200	Little bluestem-----	40
		Normal	2,400	Sideoats grama-----	10
		Unfavorable	1,700	Big bluestem-----	10
				Yellow indiangrass-----	5
				Canada wildrye-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
2955: Nickerson-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	20
		Unfavorable	2,000	Sand lovegrass-----	20
				Big bluestem-----	10
				Switchgrass-----	10
2956: Nickerson-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	20
		Unfavorable	2,000	Sand lovegrass-----	20
				Big bluestem-----	10
				Switchgrass-----	10
2957: Nickerson-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	20
		Unfavorable	2,000	Sand lovegrass-----	20
				Big bluestem-----	10
				Switchgrass-----	10
Punkin-----	Saline Subirrigated (pe21-28)---	Favorable	3,500	Big bluestem-----	20
		Normal	2,500	Sideoats grama-----	15
		Unfavorable	1,800	Switchgrass-----	10
				Little bluestem-----	10
				Yellow indiangrass-----	10
				Inland saltgrass-----	10
				Alkali sacaton-----	10
				Western wheatgrass-----	5
				Other perennial forbs-----	5
				Other perennial grasses-----	5
2958: Ninnescah-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
		Yellow bristlegrass-----	5		

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
2959: Ninnescah-----	Saline Subirrigated (pe21-28)---	Favorable	7,000	Prairie cordgrass-----	20
		Normal	6,000	Big bluestem-----	5
		Unfavorable	5,000	Yellow indiangrass-----	5
				Inland saltgrass-----	10
				Switchgrass-----	10
				Western wheatgrass-----	5
				Alkali sacaton-----	15
				Blue grama-----	5
				Buffalograss-----	5
				Canada wildrye-----	5
				Tall dropseed-----	5
				Threadleaf sedge-----	5
				Other perennial forbs-----	5
3051: Ost-----	Loamy Upland (pe24-32)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
3052: Ost-----	Loamy Upland (pe24-32)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
Clark-----	Limy Upland (pe21-28)-----	Favorable	4,500	Tall dropseed-----	5
		Normal	3,500	Blue grama-----	5
		Unfavorable	3,000	Big bluestem-----	25
				Little bluestem-----	20
				Sideoats grama-----	10
				Western wheatgrass-----	5
				Switchgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiangrass-----	10

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
3170: Penalosa-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
3171: Penalosa-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
3180: Pratt-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
				Other shrubs-----	5
3181: Pratt-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
				Other shrubs-----	5
Turon-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
				Other shrubs-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
3190: Punkin-----	Claypan (pe21-28)-----	Favorable	3,500	Big bluestem-----	20
		Normal	2,500	Sideoats grama-----	15
		Unfavorable	1,800	Switchgrass-----	10
				Little bluestem-----	10
				Yellow indiangrass-----	10
				Inland saltgrass-----	15
				Alkali sacaton-----	10
				Other perennial forbs-----	5
				Other perennial grasses-----	5
3191: Punkin-----	Claypan (pe21-28)-----	Favorable	3,500	Big bluestem-----	20
		Normal	2,500	Sideoats grama-----	15
		Unfavorable	1,800	Switchgrass-----	10
				Little bluestem-----	10
				Yellow indiangrass-----	10
				Inland saltgrass-----	15
				Alkali sacaton-----	10
				Other perennial forbs-----	5
				Other perennial grasses-----	5
Taver-----	Clay Upland (pe21-28)-----	Favorable	5,000	Little bluestem-----	15
		Normal	3,500	Big bluestem-----	25
		Unfavorable	2,500	Sideoats grama-----	10
				Switchgrass-----	10
				Blue grama-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiangrass-----	10
				Tall dropseed-----	5
3469: Smolan-----	Loamy Upland (pe25-34)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	10
3510: Saltcreek-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiangrass-----	15
				Switchgrass-----	10
				Big bluestem-----	10
				Sand lovegrass-----	10

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
3510: Funmar-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
			Sideoats grama-----	10	
			Eastern gamagrass-----	5	
			Little bluestem-----	15	
			Switchgrass-----	5	
			Tall dropseed-----	5	
			Western wheatgrass-----	5	
			Other perennial grasses-----	5	
Other perennial forbs-----	10				
Farnum-----	Loamy Upland (pe21-28)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
			Sideoats grama-----	10	
			Eastern gamagrass-----	5	
			Little bluestem-----	15	
			Switchgrass-----	5	
			Tall dropseed-----	5	
			Western wheatgrass-----	5	
			Other perennial grasses-----	5	
Other perennial forbs-----	10				
3511: Saltcreek-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiagrass-----	15
			Switchgrass-----	10	
			Big bluestem-----	10	
Sand lovegrass-----	10				
Naron-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Switchgrass-----	15
			Yellow indiagrass-----	15	
			Big bluestem-----	10	
Sand lovegrass-----	5				
3512: Saltcreek-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiagrass-----	15
			Switchgrass-----	10	
			Big bluestem-----	10	
Sand lovegrass-----	10				
Naron-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Switchgrass-----	15
			Yellow indiagrass-----	15	
			Big bluestem-----	10	
Sand lovegrass-----	5				

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
3520: Saxman-----	Sandy Lowland-----	Favorable	6,000	Eastern gamagrass-----	15
		Normal	4,750	Yellow indiangrass-----	10
		Unfavorable	3,500	Little bluestem-----	10
				Sand bluestem-----	20
				Switchgrass-----	15
				Prairie sandreed-----	5
				Canada wildrye-----	5
				Prairie bundleflower-----	5
				Heath aster-----	5
				Cuman ragweed-----	5
	Other shrubs-----	5			
3530: Shellabarger---	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiangrass-----	15
				Switchgrass-----	10
				Big bluestem-----	15
	Sand lovegrass-----	5			
Albion-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Sand lovegrass-----	5
		Unfavorable	2,000	Switchgrass-----	10
				Little bluestem-----	25
				Yellow indiangrass-----	10
				Other perennial grasses-----	10
				Other perennial forbs-----	10
3531: Shellabarger---	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiangrass-----	15
				Switchgrass-----	10
				Big bluestem-----	15
	Sand lovegrass-----	5			
Nalim-----	Loamy Upland (pe24-32)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiangrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
	Other perennial forbs-----	10			
3532: Shellabarger---	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiangrass-----	15
				Switchgrass-----	10
				Big bluestem-----	15
	Sand lovegrass-----	5			

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
3533: Shellabarger----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiagrass-----	15
				Switchgrass-----	10
				Big bluestem-----	15
				Sand lovegrass-----	5
3534: Shellabarger----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiagrass-----	15
				Switchgrass-----	10
				Big bluestem-----	15
				Sand lovegrass-----	5
3535: Shellabarger----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiagrass-----	15
				Switchgrass-----	10
				Big bluestem-----	15
				Sand lovegrass-----	5
Nalim-----	Loamy Upland (pe24-32)-----	Favorable	5,500	Big bluestem-----	25
		Normal	4,000	Blue grama-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
				Sideoats grama-----	10
				Eastern gamagrass-----	5
				Little bluestem-----	15
				Switchgrass-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial grasses-----	5
		Other perennial forbs-----	10		
3540: Solvay-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiagrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
		Prairie bundleflower-----	5		
		Yellow bristlegrass-----	5		
3550: Spelvin-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiagrass-----	15
				Switchgrass-----	10
				Sand lovegrass-----	5
				Big bluestem-----	15

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			<u>Lb/acre</u>		<u>Pct</u>
3639: Taver-----	Clay Upland (pe21-28)-----	Favorable	5,000	Little bluestem-----	15
		Normal	3,500	Big bluestem-----	25
		Unfavorable	2,500	Sideoats grama-----	10
				Switchgrass-----	10
				Blue grama-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Yellow indiagrass-----	10
				Tall dropseed-----	5
3640: Tivin-----	Choppy Sands (pe21-28)-----	Favorable	3,000	Sand bluestem-----	40
		Normal	2,150	Little bluestem-----	20
		Unfavorable	1,550	Other perennial forbs-----	10
				Sand dropseed-----	5
				Prairie sandreed-----	5
				Sand lovegrass-----	5
				Other shrubs-----	5
				Blue grama-----	5
				Switchgrass-----	5
3641: Tivin-----	Choppy Sands (pe21-28)-----	Favorable	3,000	Sand bluestem-----	40
		Normal	2,150	Little bluestem-----	20
		Unfavorable	1,550	Other perennial forbs-----	10
				Sand dropseed-----	5
				Prairie sandreed-----	5
				Sand lovegrass-----	5
				Other shrubs-----	5
				Blue grama-----	5
				Switchgrass-----	5
Dillhut-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
				Other shrubs-----	5
3642: Tivin-----	Choppy Sands (pe21-28)-----	Favorable	3,000	Sand bluestem-----	40
		Normal	2,150	Little bluestem-----	20
		Unfavorable	1,550	Other perennial forbs-----	10
				Sand dropseed-----	5
				Prairie sandreed-----	5
				Sand lovegrass-----	5
				Other shrubs-----	5
				Blue grama-----	5
				Switchgrass-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
3642: Willowbrook-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiagrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5
3643: Tobin-----	Loamy Lowland (pe25-34)-----	Favorable	7,000	Big bluestem-----	30
		Normal	5,500	Eastern gamagrass-----	10
		Unfavorable	4,500	Yellow indiagrass-----	10
				Switchgrass-----	10
				Prairie cordgrass-----	5
				Little bluestem-----	5
				Threadleaf sedge-----	5
				Sideoats grama-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
3644: Turon-----	Sands (pe21-28)-----	Favorable	4,500	Sand bluestem-----	35
		Normal	3,500	Canada wildrye-----	5
		Unfavorable	2,500	Yellow indiagrass-----	10
				Little bluestem-----	10
				Prairie sandreed-----	5
				Switchgrass-----	5
				Blue grama-----	5
				Sand dropseed-----	5
				Sand lovegrass-----	5
				Other perennial forbs-----	10
				Other shrubs-----	5
Carway-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiagrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
3760: Urban land.					
Blazefork-----	Clay Lowland (pe25-34)-----	Favorable	6,500	Big bluestem-----	25
		Normal	5,000	Sideoats grama-----	5
		Unfavorable	4,000	Tall dropseed-----	5
				Western wheatgrass-----	5
				Switchgrass-----	10
				Little bluestem-----	5
				Yellow indiangrass-----	10
				Eastern gamagrass-----	5
				Other perennial forbs-----	10
				Other perennial grasses-----	5
				Prairie cordgrass-----	15
Kaskan-----	Loamy Lowland (pe21-28)-----	Favorable	7,000	Big bluestem-----	30
		Normal	5,500	Eastern gamagrass-----	10
		Unfavorable	4,500	Yellow indiangrass-----	10
				Switchgrass-----	10
				Prairie cordgrass-----	5
				Little bluestem-----	5
				Threadleaf sedge-----	5
				Sideoats grama-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
3762: Urban land.					
Darlow-----	Claypan (pe21-28)-----	Favorable	3,500	Big bluestem-----	20
		Normal	2,500	Sideoats grama-----	15
		Unfavorable	1,800	Switchgrass-----	15
				Little bluestem-----	15
				Yellow indiangrass-----	10
				Tall dropseed-----	10
				Buffalograss-----	5
				Other perennial grasses-----	5
				Other perennial forbs-----	5
Elmer-----	Loamy Terrace (pe21-28)-----	Favorable	5,500	Big bluestem-----	20
		Normal	5,000	Little bluestem-----	10
		Unfavorable	3,400	Yellow indiangrass-----	10
				Switchgrass-----	10
				Eastern gamagrass-----	5
				Sideoats grama-----	5
				Blue grama-----	5
				Western wheatgrass-----	5
				Tall dropseed-----	5
				Buffalograss-----	5
				Plains muhly-----	5
				Threadleaf sedge-----	5
				Canada wildrye-----	5
				Other perennial forbs-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
3763: Urban land.					
Imano-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiagrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5
3764: Urban land.					
Mahone-----	Loamy Lowland (pe21-28)-----	Favorable	7,000	Big bluestem-----	30
		Normal	5,500	Eastern gamagrass-----	10
		Unfavorable	4,500	Yellow indiagrass-----	10
				Switchgrass-----	10
				Prairie cordgrass-----	5
				Little bluestem-----	5
				Threadleaf sedge-----	5
				Sideoats grama-----	5
				Tall dropseed-----	5
				Western wheatgrass-----	5
				Other perennial forbs-----	10
3765: Urban land.					
Saltcreek-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Yellow indiagrass-----	15
				Switchgrass-----	10
				Big bluestem-----	10
				Sand lovegrass-----	10
Naron-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Little bluestem-----	25
		Unfavorable	2,000	Switchgrass-----	15
				Yellow indiagrass-----	15
				Big bluestem-----	10
				Sand lovegrass-----	5
3766: Urban land.					
Saxman-----	Sandy Lowland-----	Favorable	6,000	Eastern gamagrass-----	15
		Normal	4,750	Yellow indiagrass-----	10
		Unfavorable	3,500	Little bluestem-----	10
				Sand bluestem-----	20
				Switchgrass-----	15
				Prairie sandreed-----	5
				Canada wildrye-----	5
				Prairie bundleflower-----	5
				Heath aster-----	5
				Cuman ragweed-----	5
				Other shrubs-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
3767: Urban land.					
Willowbrook-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5
3768: Urban land.					
Yaggy-----	Sandy Lowland (pe21-28)-----	Favorable	6,000	Eastern gamagrass-----	15
		Normal	4,750	Yellow indiangrass-----	10
		Unfavorable	3,500	Little bluestem-----	10
				Sand bluestem-----	20
				Switchgrass-----	15
				Prairie sandreed-----	5
				Canada wildrye-----	5
				Prairie bundleflower-----	5
				Heath aster-----	5
				Cuman ragweed-----	5
				Other shrubs-----	5
3900: Warnut-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5
3966: Willowbrook-----	Subirrigated (pe21-28)-----	Favorable	9,500	Sand bluestem-----	25
		Normal	8,500	Eastern gamagrass-----	20
		Unfavorable	7,500	Sedge-----	15
				Switchgrass-----	10
				Spikerush-----	5
				Pennsylvania smartweed-----	5
				Yellow indiangrass-----	5
				Prairie cordgrass-----	5
				Other shrubs-----	5
				Prairie bundleflower-----	5
				Yellow bristlegrass-----	5

Table 12.--Rangeland Productivity and Characteristic Plant Communities--Continued

Map symbol and soil name	Range site	Total production		Characteristic vegetation	Compo- sition
		Kind of year	Dry weight		
			Lb/acre		Pct
4004: Yaggy-----	Sandy Lowland (pe21-28)-----	Favorable	6,000	Eastern gamagrass-----	15
		Normal	4,750	Yellow indiangrass-----	10
		Unfavorable	3,500	Little bluestem-----	10
				Sand bluestem-----	20
				Switchgrass-----	15
				Prairie sandreed-----	5
				Canada wildrye-----	5
				Prairie bundleflower-----	5
				Heath aster-----	5
				Cuman ragweed-----	5
	Other shrubs-----	5			
4005: Yaggy-----	Sandy Lowland (pe21-28)-----	Favorable	6,000	Eastern gamagrass-----	15
		Normal	4,750	Yellow indiangrass-----	10
		Unfavorable	3,500	Little bluestem-----	10
				Sand bluestem-----	20
				Switchgrass-----	15
				Prairie sandreed-----	5
				Canada wildrye-----	5
				Prairie bundleflower-----	5
				Heath aster-----	5
				Cuman ragweed-----	5
	Other shrubs-----	5			
Saxman-----	Sandy Lowland-----	Favorable	6,000	Eastern gamagrass-----	15
		Normal	4,750	Yellow indiangrass-----	10
		Unfavorable	3,500	Little bluestem-----	10
				Sand bluestem-----	20
				Switchgrass-----	15
				Prairie sandreed-----	5
				Canada wildrye-----	5
				Prairie bundleflower-----	5
				Heath aster-----	5
				Cuman ragweed-----	5
	Other shrubs-----	5			
4110: Zellman-----	Sandy (pe24-32)-----	Favorable	4,000	Big bluestem-----	10
		Normal	3,000	Sand bluestem-----	25
		Unfavorable	2,000	Blue grama-----	5
				Switchgrass-----	10
				Little bluestem-----	20
				Yellow indiangrass-----	10
				Other perennial forbs-----	10
	Other perennial grasses-----	10			
Poxmash-----	Sandy (pe21-28)-----	Favorable	4,000	Sand bluestem-----	30
		Normal	3,000	Big bluestem-----	5
		Unfavorable	2,000	Switchgrass-----	10
				Little bluestem-----	25
				Yellow indiangrass-----	10
				Blue grama-----	10
				Other perennial grasses-----	5
	Other perennial forbs-----	5			

Table 13.--Windbreaks and Environmental Plantings

(Windbreak suitability groups are described in the Field Office Technical Guide, which is available in local offices of the Natural Resources Conservation Service. Absence of an entry indicates that trees generally do not grow to the given height.)

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
990: Abbyville----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
991: Abbyville----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Kisiwa----- Group 9W	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.
1004: Albion----- Group 6G	American plum, golden currant, sumac, common lilac.	Common hackberry, red mulberry.	Austrian pine, Scotch pine, bur oak, eastern redcedar, Osageorange, ponderosa pine, lacebark elm, Siberian elm, black locust, chinkapin oak, green ash, honeylocust, northern catalpa.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1011: Albion----- Group 6G	American plum, golden currant, sumac, common lilac.	Common hackberry, red mulberry.	Austrian pine, Scotch pine, bur oak, eastern redcedar, Osageorange, ponderosa pine, lacebark elm, Siberian elm, black locust, chinkapin oak, green ash, honeylocust, northern catalpa.	---	---
Shellabarger---- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
1057: Aqents----- Group 2	---	Common chokecherry	Russian mulberry, eastern redcedar, common hackberry, baldcypress, bur oak, red mulberry.	American sycamore, Kentucky coffeetree, green ash, honeylocust, pecan, silver maple.	Cottonwood.
1070: Avans----- Group 3	Common lilac, skunkbush sumac.	Amur honeysuckle, American plum.	Redbud, Austrian pine, eastern redcedar, common hackberry.	Black locust, honeylocust, Osageorange, lacebark elm.	---
1071: Avans----- Group 3	Common lilac, skunkbush sumac.	Amur honeysuckle, American plum.	Redbud, Austrian pine, eastern redcedar, common hackberry.	Black locust, honeylocust, Osageorange, lacebark elm.	---
1072: Avans----- Group 3	Common lilac, skunkbush sumac.	Amur honeysuckle, American plum.	Redbud, Austrian pine, eastern redcedar, common hackberry.	Black locust, honeylocust, Osageorange, lacebark elm.	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1191: Blazefork----- Group 4	---	Siberian peashrub, Tatarian honeysuckle, silver buffaloberry.	Russian-olive, Russian mulberry, eastern redcedar, ponderosa pine.	Common hackberry, green ash, honeylocust.	Siberian elm, eastern cottonwood.
1192: Blazefork----- Group 4	---	Siberian peashrub, Tatarian honeysuckle, silver buffaloberry.	Russian-olive, Russian mulberry, eastern redcedar, ponderosa pine.	Common hackberry, green ash, honeylocust.	Siberian elm, eastern cottonwood.
Kaskan----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
1200: Buhler----- Group 9W	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.
Blazefork----- Group 4	---	Siberian peashrub, Tatarian honeysuckle, silver buffaloberry.	Russian-olive, Russian mulberry, eastern redcedar, ponderosa pine.	Common hackberry, green ash, honeylocust.	Siberian elm, eastern cottonwood.
1324: Carway----- Group 2	---	Common chokecherry	Russian mulberry, eastern redcedar, common hackberry, baldcypress, bur oak, red mulberry.	American sycamore, Kentucky coffeetree, green ash, honeylocust, pecan, silver maple.	Cottonwood.
Carbika----- Group 2	---	Common chokecherry	Russian mulberry, eastern redcedar, common hackberry, baldcypress, bur oak, red mulberry.	American sycamore, Kentucky coffeetree, green ash, honeylocust, pecan, silver maple.	Cottonwood.
1357: Carway----- Group 2	---	Common chokecherry	Russian mulberry, eastern redcedar, common hackberry, baldcypress, bur oak, red mulberry.	American sycamore, Kentucky coffeetree, green ash, honeylocust, pecan, silver maple.	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1357: Dillhut----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
Solvay----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
1359: Clark----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---
Ost----- Group 8	---	American plum, Amur honeysuckle.	Eastern redcedar, honeylocust, oriental arborvitae, Austrian pine, Russian-olive.	Osageorange, black locust, common hackberry.	Eastern cottonwood.
1428: Crete----- Group 4C	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1429: Crete----- Group 4C	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
1553: Darlow----- Group 8	Golden currant, sumac, American plum, black locust.	Austrian pine, lacebark elm, Russian mulberry, Russian-olive, Scotch pine, bur oak, eastern redcedar, green ash, Osageorange, ponderosa pine, red mulberry.	Honeylocust, Siberian elm, northern catalpa, chinkapin oak.	---	---
Elmer----- Group 8	Golden currant, sumac, American plum, black locust.	Austrian pine, lacebark elm, Russian mulberry, Russian-olive, Scotch pine, bur oak, eastern redcedar, green ash, Osageorange, ponderosa pine, red mulberry.	Honeylocust, Siberian elm, northern catalpa, chinkapin oak.	---	---
1554: Dillhut----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
1555: Dillhut----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1555: Plev----- Group 2	---	Common chokecherry	Russian mulberry, eastern redcedar, common hackberry, baldcypress, bur oak, red mulberry.	American sycamore, Kentucky coffeetree, green ash, honeylocust, pecan, silver maple.	Cottonwood.
1556: Dillhut----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
Solvay----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
1725: Farnum----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
Funmar----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1727: Funmar----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---
Taver----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---
1804: Geary----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
1807: Geary----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1985: Hayes----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
1986: Hayes----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Solvay----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
1987: Hayes----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Turon----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
2204: Jamash----- Group 6	American plum, golden currant, sumac, common lilac.	Common hackberry, red mulberry.	Austrian pine, Scotch pine, bur oak, eastern redcedar, Osageorange, ponderosa pine, lacebark elm, Siberian elm, black locust, chinkapin oak, green ash, honeylocust, northern catalpa.	---	---
Piedmont----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
2205: Jamash----- Group 6	American plum, golden currant, sumac, common lilac.	Common hackberry, red mulberry.	Austrian pine, Scotch pine, bur oak, eastern redcedar, Osageorange, ponderosa pine, lacebark elm, Siberian elm, black locust, chinkapin oak, green ash, honeylocust, northern catalpa.	---	---
Piedmont----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
2206: Jamash----- Group 6	American plum, golden currant, sumac, common lilac.	Common hackberry, red mulberry.	Austrian pine, Scotch pine, bur oak, eastern redcedar, Osageorange, ponderosa pine, lacebark elm, Siberian elm, black locust, chinkapin oak, green ash, honeylocust, northern catalpa.	---	---
Piedmont----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
2207: Jamash----- Group 6	American plum, golden currant, sumac, common lilac.	Common hackberry, red mulberry.	Austrian pine, Scotch pine, bur oak, eastern redcedar, Osageorange, ponderosa pine, lacebark elm, Siberian elm, black locust, chinkapin oak, green ash, honeylocust, northern catalpa.	---	---
2381: Kanza----- Group 2	---	Common chokecherry	Russian mulberry, eastern redcedar, common hackberry, baldcypress, bur oak, red mulberry.	American sycamore, Kentucky coffeetree, green ash, honeylocust, pecan, silver maple.	Cottonwood.
Ninnescah----- Group 9W	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.
2390: Kaskan----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
2391: Kaskan----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
2395: Kisiwa----- Group 9W	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
2509: Ladysmith----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
2556: Langdon----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
2587: Imano----- Group 9	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.
2588: Longford----- Group 3	Amur honeysuckle, common lilac.	Siberian peashrub	Manchurian crabapple, Russian-olive, eastern redcedar, common hackberry, Austrian pine, green ash.	Honeylocust, Siberian elm.	---
2812: Mahone----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
2948: Nalim----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---
2949: Naron----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
2950: Naron----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
2951: Nash----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
2952:					
Nash----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
Lucien----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
2953:					
Nash----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
Lucien----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
2955: Nickerson----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
2956: Nickerson----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
2957: Nickerson----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Punkin----- Group 9	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.
2958: Ninnescah----- Group 9W	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
2959: Ninnescah----- Group 9	Common lilac.	Rocky Mountain juniper, Russian- olive, Siberian elm, eastern redcedar, green ash.	---	---	Eastern cottonwood.
3051: Ost----- Group 8	---	American plum, Amur honeysuckle.	Eastern redcedar, honeylocust, oriental arborvitae, Austrian pine, Russian-olive.	Osageorange, black locust, common hackberry.	Eastern cottonwood.
3052: Ost----- Group 8	---	American plum, Amur honeysuckle.	Eastern redcedar, honeylocust, oriental arborvitae, Austrian pine, Russian-olive.	Osageorange, black locust, common hackberry.	Eastern cottonwood.
Clark----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---
3170: Penalosa----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3171: Penalosa----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
3180: Pratt----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
3181: Pratt----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
Turon----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
3190: Punkin----- Group 9W	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.
3191: Punkin----- Group 9W	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3191: Taver----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---
3469: Smolan----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
3510: Saltcreek----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Funmar----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3510: Farnum----- Group 4	Golden currant, American plum, common chokecherry, common lilac, sumac.	Baldcypress, common hackberry, eastern redcedar.	Austrian pine, Scotch pine, bur oak, chinkapin oak, green ash, honeylocust, Osageorange, ponderosa pine, red mulberry, lacebark elm, Russian mulberry, black locust, silver maple, Siberian elm, northern catalpa.	---	---
3511: Saltcreek----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Naron----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3512: Saltcreek----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Naron----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
3520: Saxman----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
3530: Shellabarger---- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3530: Albion----- Group 6G	American plum, golden currant, sumac, common lilac.	Common hackberry, red mulberry.	Austrian pine, Scotch pine, bur oak, eastern redcedar, Osageorange, ponderosa pine, lacebark elm, Siberian elm, black locust, chinkapin oak, green ash, honeylocust, northern catalpa.	---	---
3531: Shellabarger---- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Nalim----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---
3532: Shellabarger---- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3533: Shellabarger---- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
3534: Shellabarger---- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
3535: Shellabarger---- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Nalim----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3540: Solvay----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
3550: Spelvin----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
3639: Taver----- Group 3	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	---
3640: Tivin----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3641: Tivin----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
Dillhut----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
3642: Tivin----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---
Willowbrook----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
3643: Tobin----- Group 1	American plum, common lilac.	Amur honeysuckle, common chokecherry.	Austrian pine, Russian mulberry, eastern redcedar, ponderosa pine.	Common hackberry, green ash, honeylocust.	Eastern cottonwood.
3644: Turon----- Group 7	Golden currant, American plum, common chokecherry, sumac.	Russian mulberry, Scotch pine, red mulberry.	Austrian pine, lacebark elm, bur oak, eastern redcedar, honeylocust, northern catalpa, Osageorange, ponderosa pine, black locust.	---	---

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3644: Carway----- Group 2	---	Common chokecherry	Russian mulberry, eastern redcedar, common hackberry, baldcypress, bur oak, red mulberry.	American sycamore, Kentucky coffeetree, green ash, honeylocust, pecan, silver maple.	Cottonwood.
3760: Urban land.					
Blazefork----- Group 4	---	Siberian peashrub, Tatarian honeysuckle, silver buffaloberry.	Russian-olive, Russian mulberry, eastern redcedar, ponderosa pine.	Common hackberry, green ash, honeylocust.	Siberian elm, eastern cottonwood.
Kaskan----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
3762: Urban land.					
Darlow----- Group 8	Golden currant, sumac, American plum, black locust.	Austrian pine, lacebark elm, Russian mulberry, Russian-olive, Scotch pine, bur oak, eastern redcedar, green ash, Osageorange, ponderosa pine, red mulberry.	Honeylocust, Siberian elm, northern catalpa, chinkapin oak.	---	---
Elmer----- Group 8	Golden currant, sumac, American plum, black locust.	Austrian pine, lacebark elm, Russian mulberry, Russian-olive, Scotch pine, bur oak, eastern redcedar, green ash, Osageorange, ponderosa pine, red mulberry.	Honeylocust, Siberian elm, northern catalpa, chinkapin oak.	---	---
3763: Urban land.					
Imano----- Group 9	Sumac, American plum, common lilac.	Lacebark elm, bur oak, eastern redcedar, green ash, honeylocust.	Siberian elm, black locust.	---	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3764: Urban land.					
Mahone----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
3765: Urban land.					
Saltcreek----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.
Naron----- Group 5	Common chokecherry, golden currant, American plum, common lilac, sumac.	Russian mulberry, eastern arborvitae, eastern redcedar, red mulberry.	Austrian pine, Scotch pine, bur oak, chinkapin oak, common hackberry, Osageorange, ponderosa pine, baldcypress, Kentucky coffeetree, lacebark elm, Siberian elm, green ash, honeylocust, northern catalpa.	---	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3766: Urban land.					
Saxman----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
3767: Urban land.					
Willowbrook----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
3768: Urban land.					
Yaggy----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
3900: Walnut----- Group 2	---	Common chokecherry	Russian mulberry, eastern redcedar, common hackberry, baldcypress, bur oak, red mulberry.	American sycamore, Kentucky coffeetree, green ash, honeylocust, pecan, silver maple.	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
3966: Willowbrook----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
4004: Yaggy----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
4005: Yaggy----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.
Saxman----- Group 1	Golden currant, American plum, common chokecherry, common lilac, sumac.	Eastern redbud, eastern arborvitae.	Austrian pine, Scotch pine, eastern redcedar, ponderosa pine, lacebark elm, Russian mulberry, baldcypress, black walnut, chinkapin oak, northern red oak, red mulberry.	Kentucky coffeetree, Siberian elm, black locust, bur oak, green ash, northern catalpa, pecan, common hackberry, honeylocust, Osageorange, silver maple.	Cottonwood.

Table 13.--Windbreaks and Environmental Plantings--Continued

Map symbol, soil name, and suitability group	Trees having predicted 20-year average height, in feet, of--				
	<8	8-15	16-25	26-35	>35
4110: Zellmont----- Group 6	American plum, golden currant, sumac, common lilac.	Common hackberry, red mulberry.	Austrian pine, Scotch pine, bur oak, eastern redcedar, Osageorange, ponderosa pine, lacebark elm, Siberian elm, black locust, chinkapin oak, green ash, honeylocust, northern catalpa.	---	---
Poxmash----- Group 6	American plum, golden currant, sumac, common lilac.	Common hackberry, red mulberry.	Austrian pine, Scotch pine, bur oak, eastern redcedar, Osageorange, ponderosa pine, lacebark elm, Siberian elm, black locust, chinkapin oak, green ash, honeylocust, northern catalpa.	---	---

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
1357:												
Carway-----	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good.
Dillhut-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Solvay-----	Fair	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
1359:												
Clark-----	Good	Good	Fair	Fair	Fair	Fair	Poor	Very poor.	Good	Good	Very poor.	Fair.
Ost-----	Good	Good	Fair	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor	Fair.
1428:												
Crete-----	Good	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.	Good.
1429:												
Crete-----	Good	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.	Good.
1553:												
Darlow-----	Fair	Fair	Poor	Fair	Poor	Poor	Good	Fair	Fair	Fair	Fair	Poor.
Elmer-----	Fair	Fair	Poor	Fair	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor.
1554:												
Dillhut-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
1555:												
Dillhut-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Plev-----	Fair	Good	Good	Good	Good	Good	Good	Fair	Good	Good	Fair	Good.
1556:												
Dillhut-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
Solvay-----	Fair	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
1725:												
Farnum-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
Funmar-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
1727:												
Funmar-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
Taver-----	Good	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor	Good.
1804:												
Geary-----	Good	Good	Good	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor	Good.
1807:												
Geary-----	Fair	Good	Good	Fair	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.	Good.

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
1985: Hayes-----	Fair	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Fair.
1986: Hayes-----	Fair	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Fair.
Solvay-----	Fair	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
1987: Hayes-----	Fair	Fair	Good	Good	Good	Good	Poor	Very poor.	Fair	Good	Very poor.	Fair.
Turon-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
2204: Jamash-----	Fair	Good	Fair	Poor	Fair	Poor	Poor	Very poor.	Fair	Poor	Very poor.	Poor.
Piedmont-----	Fair	Good	Fair	Good	Good	Poor	Poor	Very poor.	Fair	Good	Very poor.	Poor.
2205: Jamash-----	Fair	Good	Fair	Poor	Fair	Poor	Poor	Very poor.	Fair	Poor	Very poor.	Poor.
Piedmont-----	Fair	Good	Fair	Good	Good	Poor	Poor	Very poor.	Fair	Good	Very poor.	Poor.
2206: Jamash-----	Fair	Good	Fair	Poor	Fair	Poor	Poor	Very poor.	Fair	Poor	Very poor.	Poor.
Piedmont-----	Fair	Good	Fair	Good	Good	Poor	Poor	Very poor.	Fair	Good	Very poor.	Poor.
2207: Jamash-----	Fair	Good	Fair	Poor	Fair	Poor	Poor	Very poor.	Fair	Poor	Very poor.	Poor.
2381: Kanza-----	Very poor.	Poor	Fair	Fair	Fair	Fair	Good	Good	Poor	Good	Good	Fair.
Ninnescah-----	Poor	Fair	Fair	Fair	Poor	Fair	Good	Good	Fair	Fair	Good	Fair.
2390: Kaskan-----	Good	Good	Good	Good	Fair	Good	Fair	Good	Good	Good	Fair	Poor.
2391: Kaskan-----	Good	Good	Good	Good	Fair	Good	Fair	Good	Good	Good	Fair	Poor.
2395: Kisiwa-----	Poor	Fair	Poor	Fair	Fair	Very poor.	Good	Good	Fair	Fair	Good	Poor.
2509: Ladysmith-----	Fair	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor	Good.

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
2556: Langdon-----	Poor	Poor	Fair	Good	Fair	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
2587: Imano-----	Fair	Fair	Good	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Good.
2588: Longford-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
2812: Mahone-----	Good	Good	Good	Good	Good	Good	Fair	Good	Good	Good	Fair	Poor.
2948: Nalim-----	Good	Good	Good	Good	Good	Fair	Fair	Poor	Good	Good	Poor	Fair.
2949: Naron-----	Good	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Fair	Very poor.	Good.
2950: Naron-----	Good	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Fair	Very poor.	Good.
2951: Nash-----	Fair	Good	Good	Fair	Fair	Fair	Poor	Very poor.	Good	Poor	Very poor.	Fair.
2952: Nash-----	Fair	Good	Good	Fair	Fair	Fair	Poor	Very poor.	Good	Poor	Very poor.	Fair.
Lucien-----	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Very poor.	Fair	Fair	Very poor.	Poor.
2953: Nash-----	Fair	Good	Good	Fair	Fair	Fair	Poor	Very poor.	Good	Poor	Very poor.	Fair.
Lucien-----	Poor	Poor	Fair	Fair	Fair	Poor	Poor	Very poor.	Fair	Fair	Very poor.	Poor.
2955: Nickerson-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Fair	Poor	Good.
2956: Nickerson-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Fair	Poor	Good.
2957: Nickerson-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Fair	Poor	Good.
Punkin-----	Fair	Fair	Poor	Fair	Fair	Poor	Good	Fair	Fair	Poor	Fair	Poor.
2958: Ninnescah-----	Poor	Fair	Fair	Fair	Poor	Fair	Good	Good	Fair	Fair	Good	Fair.
2959: Ninnescah-----	Poor	Poor	Poor	Poor	Poor	Fair	Good	Good	Fair	Poor	Good	Fair.
3051: Ost-----	Good	Good	Fair	Fair	Fair	Fair	Poor	Poor	Good	Fair	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
3052: Ost-----	Good	Good	Fair	Fair	Fair	Fair	Poor	Poor	Good	Fair	Poor	Fair.
Clark-----	Good	Good	Fair	Fair	Fair	Fair	Poor	Very poor.	Good	Good	Very poor.	Fair.
3170: Penalosa-----	Good	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor	Good.
3171: Penalosa-----	Good	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor	Good.
3180: Pratt-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
3181: Pratt-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
Turon-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
3190: Punkin-----	Fair	Fair	Poor	Fair	Fair	Poor	Good	Fair	Fair	Poor	Fair	Poor.
3191: Punkin-----	Fair	Fair	Poor	Fair	Fair	Poor	Good	Fair	Fair	Poor	Fair	Poor.
Taver-----	Good	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor	Good.
3403: Sand pits.												
3469: Smolan-----	Good	Good	Fair	Good	Good	Fair	Poor	Fair	Good	Good	Poor	Fair.
3510: Saltcreek-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Fair.
Funmar-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
Farnum-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
3511: Saltcreek-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Fair.
Naron-----	Good	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Fair	Very poor.	Good.
3512: Saltcreek-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Fair.
Naron-----	Good	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Fair	Very poor.	Good.
3520: Saxman-----	Fair	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	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
3530: Shellabarger-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
Albion-----	Fair	Good	Fair	Poor	Poor	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
3531: Shellabarger-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
Nalim-----	Good	Good	Good	Good	Good	Fair	Fair	Poor	Good	Good	Poor	Fair.
3532: Shellabarger-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
3533: Shellabarger-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
3534: Shellabarger-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
3535: Shellabarger-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
Nalim-----	Good	Good	Good	Good	Good	Fair	Fair	Poor	Good	Good	Poor	Fair.
3540: Solvay-----	Fair	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor	Good.
3550: Spelvin-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Good.
3639: Taver-----	Good	Good	Good	Good	Fair	Fair	Poor	Poor	Good	Fair	Poor	Good.
3640: Tivin-----	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
3641: Tivin-----	Poor	Poor	Fair	Fair	Fair	Poor	Very poor.	Very poor.	Poor	Poor	Very poor.	Poor.
Dillhut-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.	Fair.
3642: Tivin-----	Poor	Poor	Fair	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Poor.
Willowbrook-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Fair	Fair	Poor	Fair.
3643: Tobin-----	Good	Good	Good	Good	Good	Good	Poor	Fair	Good	Good	Poor	Good.

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
3644: Turon-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.
Carway-----	Fair	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good	Good.
3760: Urban land.												
Blazefork-----	Good	Good	Fair	Good	Good	Good	Good	Poor	Fair	Good	Fair	Fair.
Kaskan-----	Good	Good	Good	Good	Fair	Good	Fair	Good	Good	Good	Fair	Poor.
3762: Urban land.												
Darlow-----	Fair	Fair	Poor	Fair	Poor	Poor	Good	Fair	Fair	Fair	Fair	Poor.
Elmer-----	Fair	Fair	Poor	Fair	Poor	Poor	Poor	Poor	Fair	Fair	Poor	Poor.
3763: Urban land.												
Imano-----	Fair	Fair	Good	Fair	Fair	Good	Fair	Fair	Fair	Fair	Fair	Good.
3764: Urban land.												
Mahone-----	Good	Good	Good	Good	Good	Good	Fair	Good	Good	Good	Fair	Poor.
3765: Urban land.												
Saltcreek-----	Good	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.	Fair.
Naron-----	Good	Good	Good	Good	Good	Fair	Poor	Very poor.	Good	Fair	Very poor.	Good.
3766: Urban land.												
Saxman-----	Fair	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
3767: Urban land.												
Willowbrook-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Fair	Fair	Poor	Fair.
3768: Urban land.												
Yaggy-----	Poor	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
3900: Warnut-----	Fair	Good	Good	Good	Good	Good	Good	Fair	Good	Good	Fair	Good.
3966: Willowbrook-----	Good	Good	Good	Good	Good	Good	Poor	Poor	Fair	Fair	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
4004: Yaggy-----	Poor	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
4005: Yaggy-----	Poor	Fair	Good	Good	Good	Good	Fair	Fair	Fair	Good	Good	Fair.
Saxman-----	Fair	Fair	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.	Fair.
4110: Zellmont-----	Good	Good	Good	Fair	Fair	Good	Poor	Very poor.	Good	Poor	Very poor.	Good.
Poxmash-----	Fair	Good	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Poor	Very poor.	Fair.

Table 15.--Recreational Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
990: Abbyville-----	Very limited: excess sodium (very limited) slow percolation (limited)	Very limited: excess sodium (very limited) slow percolation (limited)	Very limited: excess sodium (very limited) slow percolation (limited)	Not limited.
991: Abbyville-----	Very limited: excess sodium (very limited) flooding (rare) (limited) slow percolation (limited)	Very limited: excess sodium (very limited) slow percolation (limited)	Very limited: excess sodium (very limited) slow percolation (limited)	Not limited.
Kisiwa-----	Very limited: ponded (wetness) (very limited) excess sodium (very limited) flooding (common) (very limited)	Very limited: ponded (wetness) (very limited) excess sodium (very limited) wetness (very limited)	Very limited: excess sodium (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)
1004: Albion-----	Not limited-----	Not limited-----	Slightly limited: small stones (slightly limited)	Not limited.
1011: Albion-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited) small stones (slightly limited)	Not limited.
Shellabarger-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited.
1057: Aquents-----	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (moderately limited)
1061: Arents.				
1062: Arents-----	Very limited: slope >15% (very limited) v. slow percolation (very limited)	Very limited: slope >15% (very limited) v. slow percolation (very limited)	Very limited: v. slow percolation (very limited) slope >6% (very limited)	Very limited: slope >25% (very limited) erodes easily (very limited)

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
1070: Avans-----	Slightly limited: too acid (slightly limited)	Slightly limited: too acid (slightly limited)	Slightly limited: too acid (slightly limited)	Not limited.
1071: Avans-----	Slightly limited: too acid (slightly limited)	Slightly limited: too acid (slightly limited)	Slightly limited: too acid (slightly limited) slope (slightly limited)	Not limited.
1072: Avans-----	Slightly limited: too acid (slightly limited)	Slightly limited: too acid (slightly limited)	Limited: slope (limited) too acid (slightly limited)	Not limited.
1191: Blazefork-----	Limited: flooding (rare) (limited) slow percolation (limited) too clayey (moderately limited)	Limited: slow percolation (limited) too clayey (moderately limited) too acid (slightly limited)	Limited: slow percolation (limited) too clayey (moderately limited) too acid (slightly limited)	Moderately limited: too clayey (moderately limited)
1192: Blazefork-----	Limited: flooding (rare) (limited) slow percolation (limited) too clayey (moderately limited)	Limited: slow percolation (limited) too clayey (moderately limited) too acid (slightly limited)	Limited: slow percolation (limited) too clayey (moderately limited) too acid (slightly limited)	Moderately limited: too clayey (moderately limited)
Kaskan-----	Limited: flooding (rare) (limited)	Not limited-----	Not limited-----	Not limited.
1200: Buhler-----	Very limited: excess sodium (very limited) v. slow percolation (very limited) too clayey (very limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited) too clayey (very limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited) too clayey (very limited)	Limited: too clayey (very limited)
Blazefork-----	Limited: flooding (rare) (limited) slow percolation (limited) too clayey (moderately limited)	Limited: slow percolation (limited) too clayey (moderately limited) too acid (slightly limited)	Limited: slow percolation (limited) too clayey (moderately limited) too acid (slightly limited)	Moderately limited: too clayey (moderately limited)

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
1324:				
Carway-----	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)
Carbika-----	Very limited: ponded (wetness) (very limited) wetness (very limited) v. slow percolation (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) v. slow percolation (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) v. slow percolation (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)
1357:				
Carway-----	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (moderately limited)
Dillhut-----	Very limited: too sandy (very limited) wetness (limited)	Very limited: too sandy (very limited) wetness (limited)	Very limited: too sandy (very limited) wetness (limited)	Very limited: too sandy (very limited) wetness (limited)
Solvay-----	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)
1359:				
Clark-----	Not limited-----	Not limited-----	Moderately limited: slope (moderately limited)	Not limited.
Ost-----	Moderately limited: percs slowly (moderately limited)	Moderately limited: percs slowly (moderately limited)	Limited: slope (limited) percs slowly (moderately limited)	Not limited.
1428:				
Crete-----	Limited: slow percolation (limited)	Limited: slow percolation (limited)	Limited: slow percolation (limited)	Not limited.
1429:				
Crete-----	Limited: slow percolation (limited)	Limited: slow percolation (limited)	Limited: slow percolation (limited) slope (slightly limited)	Not limited.

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
1553: Darlow-----	Very limited: excess sodium (very limited) v. slow percolation (very limited) too acid (moderately limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited) too acid (moderately limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited) too acid (moderately limited)	Not limited.
Elmer-----	Very limited: excess sodium (very limited) percs slowly (limited)	Very limited: excess sodium (very limited) percs slowly (limited)	Very limited: excess sodium (very limited) percs slowly (limited)	Not limited.
1554: Dillhut-----	Very limited: too sandy (very limited) wetness (limited)	Very limited: too sandy (very limited) wetness (limited)	Very limited: too sandy (very limited) wetness (limited) slope (slightly limited)	Very limited: too sandy (very limited) wetness (limited)
1555: Dillhut-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope (slightly limited)	Very limited: too sandy (very limited)
Plev-----	Very limited: wetness (very limited) too sandy (moderately limited)	Very limited: wetness (very limited) too sandy (moderately limited)	Very limited: wetness (very limited) too sandy (moderately limited)	Very limited: wetness (very limited) too sandy (moderately limited)
1556: Dillhut-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope (slightly limited)	Very limited: too sandy (very limited)
Solvay-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
1725: Farnum-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
Funmar-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Not limited.
1727: Funmar-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Not limited.
Taver-----	Very limited: v. slow percolation (very limited)	Very limited: v. slow percolation (very limited)	Very limited: v. slow percolation (very limited)	Not limited.

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
1804: Geary-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited.
1807: Geary-----	Moderately limited: slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: slow percolation (moderately limited) too clayey (moderately limited)	Limited: slope (limited) slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: too clayey (moderately limited)
1985: Hayes-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited.
1986: Hayes-----	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited) slope (slightly limited)	Moderately limited: too sandy (moderately limited)
Solvay-----	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)
1987: Hayes-----	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited) slope (slightly limited)	Moderately limited: too sandy (moderately limited)
Turon-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope (slightly limited)	Very limited: too sandy (very limited)
2204: Jamash-----	Limited: shallow to bedrock (limited) slow percolation (moderately limited) too clayey (moderately limited)	Limited: shallow to bedrock (limited) slow percolation (moderately limited) too clayey (moderately limited)	Very limited: bedrock <20" (very limited) slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: too clayey (moderately limited)
Piedmont-----	Very limited: v. slow percolation (very limited) too clayey (moderately limited)	Very limited: v. slow percolation (very limited) too clayey (moderately limited)	Very limited: v. slow percolation (very limited) too clayey (moderately limited) depth to bedrock (slightly limited)	Moderately limited: too clayey (moderately limited)

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
2205: Jamash-----	Limited: shallow to bedrock (limited) slow percolation (moderately limited) too clayey (moderately limited)	Limited: shallow to bedrock (limited) slow percolation (moderately limited) too clayey (moderately limited)	Very limited: bedrock <20" (very limited) slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: too clayey (moderately limited)
Piedmont-----	Very limited: v. slow percolation (very limited) too clayey (moderately limited)	Very limited: v. slow percolation (very limited) too clayey (moderately limited)	Very limited: v. slow percolation (very limited) too clayey (moderately limited) depth to bedrock (slightly limited)	Moderately limited: too clayey (moderately limited)
2206: Jamash-----	Limited: shallow to bedrock (limited) slow percolation (moderately limited) too clayey (moderately limited)	Limited: shallow to bedrock (limited) slow percolation (moderately limited) too clayey (moderately limited)	Very limited: bedrock <20" (very limited) slope (limited) slow percolation (moderately limited)	Moderately limited: too clayey (moderately limited)
Piedmont-----	Very limited: v. slow percolation (very limited) too clayey (moderately limited)	Very limited: v. slow percolation (very limited) too clayey (moderately limited)	Very limited: v. slow percolation (very limited) slope (limited) too clayey (moderately limited)	Moderately limited: too clayey (moderately limited)
2207: Jamash-----	Limited: shallow to bedrock (limited) slow percolation (moderately limited) too clayey (moderately limited)	Limited: shallow to bedrock (limited) slow percolation (moderately limited) too clayey (moderately limited)	Very limited: bedrock <20" (very limited) slope (limited) slow percolation (moderately limited)	Moderately limited: too clayey (moderately limited)
2381: Kanza-----	Very limited: flooding (common) (very limited) wetness (limited)	Limited: wetness (limited) flooding (moderately limited)	Very limited: frequent flooding (very limited) wetness (limited)	Limited: wetness (limited) flooding (moderately limited)
Ninnescah-----	Very limited: flooding (common) (very limited) wetness (moderately limited)	Slightly limited: wetness (slightly limited)	Moderately limited: occasional flooding (moderately limited) wetness (moderately limited)	Slightly limited: wetness (slightly limited)
2390: Kaskan-----	Limited: flooding (rare) (limited)	Not limited-----	Not limited-----	Not limited.

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
2391: Kaskan-----	Very limited: flooding (common) (very limited) slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: slow percolation (moderately limited) flooding (moderately limited) too clayey (moderately limited)	Very limited: frequent flooding (very limited) slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: flooding (moderately limited) too clayey (moderately limited)
2395: Kisiwa-----	Very limited: ponded (wetness) (very limited) excess sodium (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) excess sodium (very limited) wetness (very limited)	Very limited: excess sodium (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)
2509: Ladysmith-----	Very limited: v. slow percolation (very limited) too clayey (moderately limited)	Very limited: v. slow percolation (very limited) too clayey (moderately limited)	Very limited: v. slow percolation (very limited) too clayey (moderately limited)	Moderately limited: too clayey (moderately limited)
2556: Langdon-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope >6% (very limited)	Very limited: too sandy (very limited)
2587: Imano-----	Very limited: flooding (common) (very limited) slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: slow percolation (moderately limited) occasional flooding (moderately limited) too clayey (moderately limited)	Moderately limited: too clayey (moderately limited)
2588: Longford-----	Moderately limited: slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: slow percolation (moderately limited) too clayey (moderately limited) slope (moderately limited)	Moderately limited: too clayey (moderately limited)
2812: Mahone-----	Limited: flooding (rare) (limited) too sandy (moderately limited) too acid (slightly limited)	Moderately limited: too sandy (moderately limited) too acid (slightly limited)	Moderately limited: too sandy (moderately limited) too acid (slightly limited)	Moderately limited: too sandy (moderately limited)
2948: Nalim-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Not limited.

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
2949: Naron-----	Not limited-----	Not limited-----	Moderately limited: slope (moderately limited)	Not limited.
2950: Naron-----	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Very limited: slope >6% (very limited)	Not limited.
2951: Nash-----	Not limited-----	Not limited-----	Moderately limited: depth to bedrock (moderately limited) slope (slightly limited)	Not limited.
2952: Nash-----	Not limited-----	Not limited-----	Limited: slope (limited) depth to bedrock (moderately limited)	Not limited.
Lucien-----	Limited: shallow to bedrock (limited)	Limited: shallow to bedrock (limited)	Very limited: bedrock <20" (very limited) slope (limited)	Not limited.
2953: Nash-----	Moderately limited: slope (moderately limited)	Moderately limited: slope (moderately limited)	Very limited: slope >6% (very limited) depth to bedrock (moderately limited)	Very limited: erodes easily (very limited)
Lucien-----	Limited: shallow to bedrock (limited) slope (limited)	Limited: shallow to bedrock (limited) slope (limited)	Very limited: slope >6% (very limited) bedrock <20" (very limited)	Very limited: erodes easily (very limited)
2955: Nickerson-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
2956: Nickerson-----	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)
2957: Nickerson-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
Punkin-----	Very limited: excess sodium (very limited) v. slow percolation (very limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited)	Very limited: v. slow percolation (very limited) excess sodium (very limited)	Not limited.

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
2958: Ninnescah-----	Very limited: flooding (common) (very limited) wetness (moderately limited)	Slightly limited: wetness (slightly limited)	Moderately limited: occasional flooding (moderately limited) wetness (moderately limited)	Slightly limited: wetness (slightly limited)
2959: Ninnescah-----	Very limited: flooding (common) (very limited) wetness (very limited) excess salts (moderately limited)	Very limited: wetness (very limited) excess salts (moderately limited)	Very limited: wetness (very limited) occasional flooding (moderately limited) excess salts (moderately limited)	Very limited: wetness (very limited)
3051: Ost-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Not limited.
3052: Ost-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited) slope (slightly limited)	Not limited.
Clark-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited.
3170: Penalosa-----	Limited: slow percolation (limited)	Limited: slow percolation (limited)	Limited: slow percolation (limited)	Not limited.
3171: Penalosa-----	Limited: slow percolation (limited)	Limited: slow percolation (limited)	Limited: slow percolation (limited)	Not limited.
3180: Pratt-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope >6% (very limited)	Very limited: too sandy (very limited)
3181: Pratt-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope (slightly limited)	Very limited: too sandy (very limited)
Turon-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope (slightly limited)	Very limited: too sandy (very limited)

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
3190: Punkin-----	Very limited: excess sodium (very limited) v. slow percolation (very limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited)	Very limited: v. slow percolation (very limited) excess sodium (very limited)	Not limited.
3191: Punkin-----	Very limited: excess sodium (very limited) v. slow percolation (very limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited)	Very limited: v. slow percolation (very limited) excess sodium (very limited)	Not limited.
Taver-----	Very limited: percs slowly (very limited)	Very limited: percs slowly (very limited)	Very limited: percs slowly (very limited)	Not limited.
3403: Sand pits.				
3469: Smolan-----	Limited: slow percolation (limited) too clayey (moderately limited)	Limited: slow percolation (limited) too clayey (moderately limited)	Limited: slow percolation (limited) too clayey (moderately limited) slope (slightly limited)	Moderately limited: too clayey (moderately limited)
3510: Saltcreek-----	Moderately limited: too acid (moderately limited)	Moderately limited: too acid (moderately limited)	Moderately limited: too acid (moderately limited) slope (slightly limited)	Not limited.
Funmar-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Not limited.
Farnum-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3511: Saltcreek-----	Moderately limited: too acid (moderately limited)	Moderately limited: too acid (moderately limited)	Moderately limited: too acid (moderately limited)	Not limited.
Naron-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3512: Saltcreek-----	Moderately limited: too acid (moderately limited)	Moderately limited: too acid (moderately limited)	Moderately limited: too acid (moderately limited) slope (slightly limited)	Not limited.
Naron-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited.

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
3520: Saxman-----	Limited: flooding (rare) (limited) too sandy (moderately limited) too acid (moderately limited)	Moderately limited: too sandy (moderately limited) too acid (moderately limited)	Moderately limited: too sandy (moderately limited) too acid (moderately limited)	Moderately limited: too sandy (moderately limited)
3530: Shellabarger-----	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Very limited: slope >6% (very limited)	Not limited.
Albion-----	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Very limited: slope >6% (very limited) small stones (slightly limited)	Not limited.
3531: Shellabarger-----	Not limited-----	Not limited-----	Moderately limited: slope (moderately limited)	Not limited.
Nalim-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited) slope (moderately limited)	Not limited.
3532: Shellabarger-----	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited) slope (slightly limited)	Moderately limited: too sandy (moderately limited)
3533: Shellabarger-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3534: Shellabarger-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited.
3535: Shellabarger-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited.
Nalim-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited) slope (slightly limited)	Not limited.
3540: Solvay-----	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)	Moderately limited: too sandy (moderately limited)

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
3550: Spelvin-----	Moderately limited: too sandy (moderately limited)			
3639: Taver-----	Very limited: v. slow percolation (very limited)	Very limited: v. slow percolation (very limited)	Very limited: v. slow percolation (very limited)	Not limited.
3640: Tivin-----	Very limited: too sandy (very limited) slope >15% (very limited)	Very limited: too sandy (very limited) slope >15% (very limited)	Very limited: slope >6% (very limited) too sandy (very limited)	Very limited: too sandy (very limited) slope (slightly limited)
3641: Tivin-----	Very limited: too sandy (very limited) slope (slightly limited)	Very limited: too sandy (very limited) slope (slightly limited)	Very limited: too sandy (very limited) slope >6% (very limited)	Very limited: too sandy (very limited)
Dillhut-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope (slightly limited)	Very limited: too sandy (very limited)
3642: Tivin-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope (limited)	Very limited: too sandy (very limited)
Willowbrook-----	Very limited: flooding (common) (very limited)	Not limited-----	Moderately limited: occasional flooding (moderately limited)	Not limited.
3643: Tobin-----	Very limited: flooding (common) (very limited)	Not limited-----	Moderately limited: occasional flooding (moderately limited)	Not limited.
3644: Turon-----	Very limited: too sandy (very limited)	Very limited: too sandy (very limited)	Very limited: too sandy (very limited) slope (moderately limited)	Very limited: too sandy (very limited)
Carway-----	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (moderately limited)			

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
3760: Urban land.				
Blazefork-----	Limited: slow percolation (limited) too clayey (moderately limited) too acid (slightly limited)	Limited: slow percolation (limited) too clayey (moderately limited) too acid (slightly limited)	Limited: slow percolation (limited) too clayey (moderately limited) too acid (slightly limited)	Moderately limited: too clayey (moderately limited)
Kaskan-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3762: Urban land.				
Darlow-----	Very limited: excess sodium (very limited) v. slow percolation (very limited) too acid (moderately limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited) too acid (moderately limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited) too acid (moderately limited)	Not limited.
Elmer-----	Very limited: excess sodium (very limited) percs slowly (limited)	Very limited: excess sodium (very limited) percs slowly (limited)	Very limited: excess sodium (very limited) percs slowly (limited)	Not limited.
3763: Urban land.				
Imano-----	Moderately limited: slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: slow percolation (moderately limited) too clayey (moderately limited)	Moderately limited: too clayey (moderately limited)
3764: Urban land.				
Mahone-----	Moderately limited: too sandy (moderately limited) too acid (slightly limited)	Moderately limited: too sandy (moderately limited) too acid (slightly limited)	Moderately limited: too sandy (moderately limited) too acid (slightly limited)	Moderately limited: too sandy (moderately limited)
3765: Urban land.				
Saltcreek-----	Moderately limited: too acid (moderately limited)	Moderately limited: too acid (moderately limited)	Moderately limited: too acid (moderately limited)	Not limited.
Naron-----	Not limited-----	Not limited-----	Not limited-----	Not limited.

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
3766: Urban land.				
Saxman-----	Moderately limited: too sandy (moderately limited) too acid (moderately limited)	Moderately limited: too sandy (moderately limited) too acid (moderately limited)	Moderately limited: too sandy (moderately limited) too acid (moderately limited)	Moderately limited: too sandy (moderately limited)
3767: Urban land.				
Willowbrook-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3768: Urban land.				
Yaggy-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3900: Warnut-----	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (very limited)
3966: Willowbrook-----	Very limited: flooding (common) (very limited)	Not limited-----	Moderately limited: occasional flooding (moderately limited)	Not limited.
4004: Yaggy-----	Very limited: flooding (common) (very limited)	Not limited-----	Moderately limited: occasional flooding (moderately limited)	Not limited.
4005: Yaggy-----	Very limited: flooding (common) (very limited)	Not limited-----	Moderately limited: occasional flooding (moderately limited)	Not limited.
Saxman-----	Limited: flooding (rare) (limited) too sandy (moderately limited) too acid (moderately limited)	Moderately limited: too sandy (moderately limited) too acid (moderately limited)	Moderately limited: too sandy (moderately limited) too acid (moderately limited)	Moderately limited: too sandy (moderately limited)
4110: Zellmont-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited) depth to bedrock (slightly limited)	Not limited.

Table 15.--Recreational Development--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
4110: Poxmash-----	Not limited-----	Not limited-----	Slightly limited: small stones (slightly limited)	Not limited.

Table 16.--Building Site Development

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
990: Abbyville-----	Limited: shrink-swell (limited)	Limited: wetness (limited) shrink-swell (limited)	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Very limited: excess sodium (very limited)
991: Abbyville-----	Very limited: flooding (very limited) shrink-swell (limited)	Very limited: flooding (very limited) wetness (limited) shrink-swell (limited)	Very limited: flooding (very limited) shrink-swell (limited)	Very limited: strength (very low) (very limited) flooding (rare) (limited) shrink-swell (limited)	Very limited: excess sodium (very limited)
Kisiwa-----	Very limited: wetness (very limited) ponded (very limited) flooding (very limited)	Very limited: ponded (very limited) flooding (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) flooding (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) flooding (common) (very limited)	Very limited: excess sodium (very limited) wetness (very limited) ponded (wetness) (very limited)
1004: Albion-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
1011: Albion-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
Shellabarger-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
1057: Aguents-----	Very limited: wetness (very limited) ponded (very limited)	Very limited: ponded (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) droughty (limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1061: Arents.					
1062: Arents-----	Very limited: slope >15% (very limited)	Very limited: slope >15% (very limited)	Very limited: slope >8% (very limited)	Very limited: slope >15% (very limited) strength (very low) (very limited)	Very limited: slope >15% (very limited)
1070: Avans-----	Limited: shrink-swell (limited)	Not limited-----	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Slightly limited: too acid (slightly limited)
1071: Avans-----	Limited: shrink-swell (limited)	Not limited-----	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Slightly limited: too acid (slightly limited)
1072: Avans-----	Limited: shrink-swell (limited)	Not limited-----	Limited: shrink-swell (limited) slope (moderately limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Slightly limited: too acid (slightly limited)
1191: Blazefork-----	Very limited: flooding (very limited) high shrink-swell (very limited)	Very limited: flooding (very limited) shrink-swell (limited) wetness (limited)	Very limited: flooding (very limited) high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited) flooding (rare) (limited)	Moderately limited: too clayey (moderately limited) too acid (slightly limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1192: Blazefork-----	Very limited: flooding (very limited) high shrink-swell (very limited)	Very limited: flooding (very limited) shrink-swell (limited) wetness (limited)	Very limited: flooding (very limited) high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited) flooding (rare) (limited)	Moderately limited: too clayey (moderately limited) too acid (slightly limited)
Kaskan-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (slightly limited)	Very limited: flooding (very limited)	Limited: flooding (rare) (limited)	Not limited.
1200: Buhler-----	Very limited: flooding (very limited) high shrink-swell (very limited)	Very limited: flooding (very limited) high shrink-swell (very limited) wetness (slightly limited)	Very limited: flooding (very limited) high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited) flooding (rare) (limited)	Very limited: excess sodium (very limited) too clayey (very limited) excess salts (slightly limited)
Blazefork-----	Very limited: flooding (very limited) high shrink-swell (very limited)	Very limited: flooding (very limited) shrink-swell (limited) wetness (limited)	Very limited: flooding (very limited) high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited) flooding (rare) (limited)	Moderately limited: too clayey (moderately limited) too acid (slightly limited)
1324: Carway-----	Very limited: wetness (very limited) ponded (very limited)	Very limited: ponded (very limited) wetness (very limited) shrink-swell (limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1324: Carbika-----	Very limited: wetness (very limited) ponded (very limited)	Very limited: ponded (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited)
1357: Carway-----	Very limited: wetness (very limited) ponded (very limited)	Very limited: ponded (very limited) wetness (very limited) shrink-swell (limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited)
Dillhut-----	Limited: wetness (limited)	Very limited: wetness (very limited)	Limited: wetness (limited)	Limited: wetness (limited)	Limited: wetness (limited) droughty (moderately limited)
Solvay-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Not limited.
1359: Clark-----	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited) slope (slightly limited)	Limited: low strength (limited) shrink-swell (limited)	Not limited.
Ost-----	Not limited-----	Not limited-----	Moderately limited: slope (moderately limited)	Limited: low strength (limited)	Not limited.
1428: Crete-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Not limited.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1429: Crete-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Not limited.
1553: Darlow-----	Not limited-----	Not limited-----	Not limited-----	Very limited: strength (very low) (very limited)	Very limited: excess sodium (very limited) too acid (moderately limited)
Elmer-----	Not limited-----	Slightly limited: shrink-swell (slightly limited)	Not limited-----	Not limited-----	Very limited: excess sodium (very limited)
1554: Dillhut-----	Limited: wetness (limited)	Very limited: wetness (very limited)	Limited: wetness (limited)	Limited: wetness (limited)	Limited: wetness (limited) droughty (moderately limited)
1555: Dillhut-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Slightly limited: droughty (slightly limited)
Plev-----	Very limited: wetness (very limited)	Very limited: wetness (very limited)	Very limited: wetness (very limited)	Very limited: wetness (very limited)	Very limited: wetness (very limited) droughty (limited)
1556: Dillhut-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Slightly limited: droughty (slightly limited)
Solvay-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Not limited.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1725: Farnum-----	Limited: shrink-swell (limited)	Moderately limited: shrink-swell (moderately limited)	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Not limited.
Funmar-----	Not limited-----	Not limited-----	Not limited-----	Very limited: strength (very low) (very limited)	Not limited.
1727: Funmar-----	Not limited-----	Not limited-----	Not limited-----	Very limited: strength (very low) (very limited)	Not limited.
Taver-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Not limited.
1804: Geary-----	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Not limited.
1807: Geary-----	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited) slope (moderately limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Moderately limited: too clayey (moderately limited)
1985: Hayes-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
1986: Hayes-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
Solvay-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Not limited.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
1987:					
Hayes-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
Turon-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited-----	Not limited.
2204:					
Jamash-----	Limited: soft bedrock <20" (limited) shrink-swell (limited)	Very limited: soft bedrock <20" (very limited) high shrink-swell (very limited)	Limited: soft bedrock <20" (limited) shrink-swell (limited)	Very limited: strength (very low) (very limited) soft bedrock <20" (limited) shrink-swell (limited)	Very limited: bedrock <20" (very limited) droughty (limited) too clayey (moderately limited)
Piedmont-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited) soft bedrock (slightly limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited) strength (very low) (very limited)	Moderately limited: too clayey (moderately limited) depth to bedrock (slightly limited)
2205:					
Jamash-----	Limited: soft bedrock <20" (limited) shrink-swell (limited)	Very limited: soft bedrock <20" (very limited) high shrink-swell (very limited)	Limited: soft bedrock <20" (limited) shrink-swell (limited)	Very limited: strength (very low) (very limited) soft bedrock <20" (limited) shrink-swell (limited)	Very limited: bedrock <20" (very limited) droughty (limited) too clayey (moderately limited)
Piedmont-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited) soft bedrock (slightly limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited) strength (very low) (very limited)	Moderately limited: too clayey (moderately limited) depth to bedrock (slightly limited)
2206:					
Jamash-----	Limited: soft bedrock <20" (limited) shrink-swell (limited)	Very limited: soft bedrock <20" (very limited) high shrink-swell (very limited)	Limited: soft bedrock <20" (limited) shrink-swell (limited) slope (limited)	Very limited: strength (very low) (very limited) soft bedrock <20" (limited) shrink-swell (limited)	Very limited: bedrock <20" (very limited) droughty (limited) too clayey (moderately limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2206: Piedmont-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited) soft bedrock (slightly limited)	Very limited: high shrink-swell (very limited) slope (limited)	Very limited: high shrink-swell (very limited) strength (very low) (very limited)	Moderately limited: too clayey (moderately limited) depth to bedrock (slightly limited)
2207: Jamash-----	Limited: soft bedrock <20" (limited) shrink-swell (limited)	Very limited: soft bedrock <20" (very limited) high shrink-swell (very limited)	Limited: soft bedrock <20" (limited) shrink-swell (limited) slope (moderately limited)	Very limited: strength (very low) (very limited) soft bedrock <20" (limited) shrink-swell (limited)	Very limited: bedrock <20" (very limited) droughty (limited) too clayey (moderately limited)
2381: Kanza-----	Very limited: flooding (very limited) wetness (limited)	Very limited: flooding (very limited) wetness (very limited)	Very limited: flooding (very limited) wetness (limited)	Very limited: flooding (common) (very limited) wetness (limited)	Very limited: frequent flooding (very limited) wetness (limited) droughty (slightly limited)
Ninnescah-----	Very limited: flooding (very limited) wetness (slightly limited)	Very limited: flooding (very limited) wetness (very limited)	Very limited: flooding (very limited) wetness (slightly limited)	Very limited: flooding (common) (very limited) wetness (slightly limited)	Moderately limited: occasional flooding (moderately limited) wetness (slightly limited)
2390: Kaskan-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (slightly limited)	Very limited: flooding (very limited)	Limited: flooding (rare) (limited)	Not limited.
2391: Kaskan-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (slightly limited)	Very limited: flooding (very limited)	Very limited: flooding (common) (very limited)	Very limited: frequent flooding (very limited) too clayey (moderately limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2395: Kisiwa-----	Very limited: wetness (very limited) ponded (very limited) shrink-swell (limited)	Very limited: ponded (very limited) wetness (very limited) shrink-swell (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) shrink-swell (limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) strength (very low) (very limited)	Very limited: excess sodium (very limited) wetness (very limited) ponded (wetness) (very limited)
2509: Ladysmith-----	Very limited: high shrink-swell (very limited)	Very limited: wetness (very limited) shrink-swell (limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Moderately limited: too clayey (moderately limited)
2556: Langdon-----	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Limited: slope (limited)	Not limited-----	Limited: droughty (limited)
2587: Imano-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (limited)	Very limited: flooding (very limited)	Very limited: flooding (common) (very limited)	Moderately limited: occasional flooding (moderately limited) too clayey (moderately limited)
2588: Longford-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited) slope (slightly limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Moderately limited: too clayey (moderately limited)
2812: Mahone-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (slightly limited)	Very limited: flooding (very limited)	Limited: flooding (rare) (limited)	Slightly limited: too acid (slightly limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2948: Nalim-----	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Not limited.
2949: Naron-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited-----	Not limited.
2950: Naron-----	Moderately limited: slope (moderately limited)	Moderately limited: slope (moderately limited)	Very limited: slope >8% (very limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)
2951: Nash-----	Not limited-----	Limited: soft bedrock (limited)	Not limited-----	Not limited-----	Moderately limited: depth to bedrock (moderately limited)
2952: Nash-----	Not limited-----	Limited: soft bedrock (limited)	Moderately limited: slope (moderately limited)	Not limited-----	Moderately limited: depth to bedrock (moderately limited)
Lucien-----	Limited: soft bedrock <20" (limited)	Very limited: soft bedrock <20" (very limited)	Limited: soft bedrock <20" (limited) slope (limited)	Limited: soft bedrock <20" (limited)	Very limited: bedrock <20" (very limited) droughty (limited)
2953: Nash-----	Limited: slope (limited)	Limited: slope (limited) soft bedrock (limited)	Very limited: slope >8% (very limited)	Moderately limited: slope (moderately limited)	Moderately limited: depth to bedrock (moderately limited) slope (moderately limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
2953: Lucien-----	Limited: soft bedrock <20" (limited) slope (limited)	Very limited: soft bedrock <20" (very limited) slope (limited)	Very limited: slope >8% (very limited) soft bedrock <20" (limited)	Limited: soft bedrock <20" (limited) slope (limited)	Very limited: bedrock <20" (very limited) droughty (limited) slope (limited)
2955: Nickerson-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Not limited.
2956: Nickerson-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Not limited.
2957: Nickerson-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Not limited.
Punkin-----	Very limited: high shrink-swell (very limited)	Limited: shrink-swell (limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Very limited: excess sodium (very limited)
2958: Ninnescah-----	Very limited: flooding (very limited) wetness (slightly limited)	Very limited: flooding (very limited) wetness (very limited)	Very limited: flooding (very limited) wetness (slightly limited)	Very limited: flooding (common) (very limited) wetness (slightly limited)	Moderately limited: occasional flooding (moderately limited) wetness (slightly limited)
2959: Ninnescah-----	Very limited: flooding (very limited) wetness (limited)	Very limited: flooding (very limited) wetness (very limited)	Very limited: flooding (very limited) wetness (very limited)	Very limited: flooding (common) (very limited) wetness (very limited)	Very limited: wetness (very limited) occasional flooding (moderately limited) excess salts (moderately limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
3051: Ost-----	Not limited-----	Not limited-----	Not limited-----	Limited: strength (low) (limited)	Not limited.
3052: Ost-----	Not limited-----	Not limited-----	Not limited-----	Limited: strength (low) (limited)	Not limited.
Clark-----	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: strength (low) (limited) shrink-swell (limited)	Not limited.
3170: Penalosa-----	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Not limited.
3171: Penalosa-----	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Not limited.
3180: Pratt-----	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Limited: slope (limited)	Not limited-----	Moderately limited: too sandy (moderately limited)
3181: Pratt-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Moderately limited: too sandy (moderately limited)
Turon-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
3190: Punkin-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Very limited: excess sodium (very limited)
3191: Punkin-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Very limited: excess sodium (very limited)
Taver-----	Very limited: shrink-swell (very limited)	Very limited: shrink-swell (very limited)	Very limited: shrink-swell (very limited)	Very limited: low strength (very limited) shrink-swell (very limited)	Not limited.
3403: Sand pits.					
3469: Smolan-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Moderately limited: too clayey (moderately limited)
3510: Saltcreek-----	Not limited-----	Moderately limited: shrink-swell (moderately limited)	Not limited-----	Not limited-----	Moderately limited: too acid (moderately limited)
Funmar-----	Not limited-----	Not limited-----	Not limited-----	Very limited: strength (very low) (very limited)	Not limited.
Farnum-----	Limited: shrink-swell (limited)	Moderately limited: shrink-swell (moderately limited)	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Not limited.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
3511: Saltcreek-----	Not limited-----	Moderately limited: shrink-swell (moderately limited)	Not limited-----	Not limited-----	Moderately limited: too acid (moderately limited)
Naron-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3512: Saltcreek-----	Not limited-----	Moderately limited: shrink-swell (moderately limited)	Not limited-----	Not limited-----	Moderately limited: too acid (moderately limited)
Naron-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3520: Saxman-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (very limited)	Very limited: flooding (very limited)	Limited: flooding (rare) (limited)	Moderately limited: too acid (moderately limited) droughty (slightly limited)
3530: Shellabarger-----	Moderately limited: slope (moderately limited)	Moderately limited: slope (moderately limited)	Very limited: slope >8% (very limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)
Albion-----	Moderately limited: slope (moderately limited)	Moderately limited: slope (moderately limited)	Very limited: slope >8% (very limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)
3531: Shellabarger-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited-----	Not limited.
Nalim-----	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited) slope (slightly limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Not limited.
3532: Shellabarger-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
3533: Shellabarger-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3534: Shellabarger-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3535: Shellabarger-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
Nalim-----	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Very limited: strength (very low) (very limited) shrink-swell (limited)	Not limited.
3540: Solvay-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Not limited.
3550: Spelvin-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.
3639: Taver-----	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Not limited.
3640: Tivin-----	Limited: slope (limited)	Limited: slope (limited)	Very limited: slope >8% (very limited)	Very limited: slope >15% (very limited)	Very limited: slope >15% (very limited) droughty (limited)
3641: Tivin-----	Moderately limited: slope (moderately limited)	Moderately limited: slope (moderately limited)	Very limited: slope >8% (very limited)	Slightly limited: slope (slightly limited)	Limited: droughty (limited) slope (slightly limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
3641: Dillhut-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Slightly limited: droughty (slightly limited)
3642: Tivin-----	Not limited-----	Slightly limited: wetness (slightly limited)	Limited: slope (limited)	Not limited-----	Limited: droughty (limited)
Willowbrook-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (limited)	Very limited: flooding (very limited)	Very limited: flooding (common) (very limited)	Moderately limited: occasional flooding (moderately limited)
3643: Tobin-----	Very limited: flooding (very limited) shrink-swell (limited)	Very limited: flooding (very limited) shrink-swell (limited)	Very limited: flooding (very limited) shrink-swell (limited)	Very limited: flooding (common) (very limited) strength (very low) (very limited) shrink-swell (limited)	Moderately limited: occasional flooding (moderately limited)
3644: Turon-----	Not limited-----	Not limited-----	Slightly limited: slope (slightly limited)	Not limited-----	Not limited.
Carway-----	Very limited: wetness (very limited) ponded (very limited)	Very limited: ponded (very limited) wetness (very limited) shrink-swell (limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited)
3760: Urban land.					
Blazefork-----	Very limited: high shrink-swell (very limited)	Limited: shrink-swell (limited) wetness (limited)	Very limited: high shrink-swell (very limited)	Very limited: strength (very low) (very limited) high shrink-swell (very limited)	Moderately limited: too clayey (moderately limited) too acid (slightly limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
3760: Kaskan-----	Not limited-----	Slightly limited: wetness (slightly limited)	Not limited-----	Not limited-----	Not limited.
3762: Urban land.					
Darlow-----	Not limited-----	Not limited-----	Not limited-----	Very limited: strength (very low) (very limited)	Very limited: excess sodium (very limited) too acid (moderately limited)
Elmer-----	Not limited-----	Slightly limited: shrink-swell (slightly limited)	Not limited-----	Not limited-----	Very limited: excess sodium (very limited)
3763: Urban land.					
Imano-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Moderately limited: too clayey (moderately limited)
3764: Urban land.					
Mahone-----	Not limited-----	Slightly limited: wetness (slightly limited)	Not limited-----	Not limited-----	Slightly limited: too acid (slightly limited)
3765: Urban land.					
Saltcreek-----	Not limited-----	Moderately limited: shrink-swell (moderately limited)	Not limited-----	Not limited-----	Moderately limited: too acid (moderately limited)
Naron-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
3766: Urban land. Saxman-----	Not limited-----	Very limited: wetness (very limited)	Not limited-----	Not limited-----	Moderately limited: too acid (moderately limited) droughty (slightly limited)
3767: Urban land. Willowbrook-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Not limited.
3768: Urban land. Yaggy-----	Not limited-----	Limited: wetness (limited)	Not limited-----	Not limited-----	Slightly limited: droughty (slightly limited)
3900: Warnut-----	Very limited: wetness (very limited) ponded (very limited)	Very limited: ponded (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) too sandy (moderately limited)
3966: Willowbrook-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (limited)	Very limited: flooding (very limited)	Very limited: flooding (common) (very limited)	Moderately limited: occasional flooding (moderately limited)
4004: Yaggy-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (limited)	Very limited: flooding (very limited)	Very limited: flooding (common) (very limited)	Moderately limited: occasional flooding (moderately limited) droughty (slightly limited)

Table 16.--Building Site Development--Continued

Map symbol and soil name	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets	Lawns and landscaping
4005: Yaggy-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (limited)	Very limited: flooding (very limited)	Very limited: flooding (common) (very limited)	Moderately limited: occasional flooding (moderately limited) droughty (slightly limited)
Saxman-----	Very limited: flooding (very limited)	Very limited: flooding (very limited) wetness (very limited)	Very limited: flooding (very limited)	Limited: flooding (rare) (limited)	Moderately limited: too acid (moderately limited) droughty (slightly limited)
4110: Zellmont-----	Limited: shrink-swell (limited)	Moderately limited: shrink-swell (moderately limited) soft bedrock (slightly limited)	Limited: shrink-swell (limited)	Limited: shrink-swell (limited)	Slightly limited: depth to bedrock (slightly limited)
Poxmash-----	Not limited-----	Not limited-----	Not limited-----	Not limited-----	Not limited.

Table 17.--Sanitary Facilities

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
990: Abbyville-----	Limited: wetness (limited) percolation (limited)	Very limited: wetness (very limited)	Very limited: excess sodium (very limited) wetness (limited)	Slightly limited: wetness (slightly limited)	Very limited: excess sodium (very limited) wetness (slightly limited)
991: Abbyville-----	Limited: wetness (limited) percolation (limited) flooding (rare) (moderately limited)	Very limited: wetness (very limited)	Very limited: excess sodium (very limited) wetness (limited) flooding (rare) (moderately limited)	Moderately limited: flooding (rare) (moderately limited) wetness (slightly limited)	Very limited: excess sodium (very limited) wetness (slightly limited)
Kisiwa-----	Very limited: ponded (wetness) (very limited) wetness <36" (very limited) flooding (very limited)	Very limited: flooding (very limited) wetness (very limited) ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) flooding (very limited)	Very limited: flooding (very limited) wetness (very limited) ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) excess sodium (very limited)
1004: Albion-----	Very limited: poor filter (very limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited)	Limited: seepage (limited)	Very limited: too sandy (very limited) potential seepage (moderately limited)
1011: Albion-----	Very limited: poor filter (very limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Very limited: too sandy (very limited) seepage (very limited)	Limited: seepage (limited)	Very limited: too sandy (very limited) potential seepage (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
1011: Shellabarger-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Not limited-----	Not limited-----	Not limited.
1057: Aquents-----	Very limited: ponded (wetness) (very limited) wetness <36" (very limited) poor filter (very limited)	Very limited: ponded (wetness) (very limited) probable seepage (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too sandy (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) seepage (very limited)	Very limited: probable seepage (very limited) ponded (wetness) (very limited) too sandy (very limited)
1061: Arents.					
1062: Arents-----	Very limited: slope >15% (very limited) percolation (limited)	Very limited: slope >7% (very limited) probable seepage (very limited)	Very limited: slope >15% (very limited)	Very limited: slope >15% (very limited)	Very limited: slope >15% (very limited)
1070: Avans-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited)	Not limited-----	Not limited-----	Not limited.
1071: Avans-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Not limited-----	Not limited-----	Not limited.
1072: Avans-----	Slightly limited: percolation (slightly limited)	Moderately limited: slope (moderately limited) potential seepage (moderately limited)	Not limited-----	Not limited-----	Not limited.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
1191: Blazefork-----	Limited: percolation (limited) flooding (rare) (moderately limited) wetness (moderately limited)	Limited: wetness (limited)	Moderately limited: flooding (rare) (moderately limited) wetness (moderately limited) too clayey (slightly limited)	Moderately limited: flooding (rare) (moderately limited)	Moderately limited: too clayey (moderately limited)
1192: Blazefork-----	Limited: percolation (limited) flooding (rare) (moderately limited) wetness (moderately limited)	Limited: wetness (limited)	Moderately limited: flooding (rare) (moderately limited) wetness (moderately limited) too clayey (slightly limited)	Moderately limited: flooding (rare) (moderately limited)	Moderately limited: too clayey (moderately limited)
Kaskan-----	Very limited: poor filter (very limited) flooding (rare) (moderately limited) wetness (moderately limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) flooding (rare) (moderately limited)	Very limited: seepage (very limited) flooding (rare) (moderately limited)	Very limited: probable seepage (very limited) too sandy (very limited)
1200: Buhler-----	Very limited: percolation (very limited) flooding (rare) (moderately limited) wetness (moderately limited)	Moderately limited: potential seepage (moderately limited)	Very limited: excess sodium (very limited) flooding (rare) (moderately limited) wetness (moderately limited)	Moderately limited: flooding (rare) (moderately limited)	Very limited: excess sodium (very limited) too clayey (moderately limited)
Blazefork-----	Limited: percolation (limited) flooding (rare) (moderately limited) wetness (moderately limited)	Limited: wetness (limited)	Moderately limited: flooding (rare) (moderately limited) wetness (moderately limited) too clayey (slightly limited)	Moderately limited: flooding (rare) (moderately limited)	Moderately limited: too clayey (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
1324: Carway-----	Very limited: ponded (wetness) (very limited) wetness <36" (very limited) percolation (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) potential seepage (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (slightly limited)	Very limited: wetness (very limited) ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) hard to pack (very limited)
Carbika-----	Very limited: ponded (wetness) (very limited) wetness <36" (very limited) percolation (slightly limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) potential seepage (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (slightly limited)	Very limited: wetness (very limited) ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (moderately limited)
1357: Carway-----	Very limited: ponded (wetness) (very limited) wetness <36" (very limited) percolation (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) potential seepage (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (slightly limited)	Very limited: wetness (very limited) ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) hard to pack (very limited)
Dillhut-----	Very limited: wetness <36" (very limited) percolation (very limited) poor filter (very limited)	Very limited: probable seepage (very limited)	Very limited: wetness (very limited) too sandy (very limited) too acid (slightly limited)	Very limited: seepage (very limited) wetness (limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (moderately limited)
Solvay-----	Limited: wetness (limited) percolation (slightly limited)	Very limited: probable seepage (very limited) wetness (moderately limited)	Limited: wetness (limited) seepage (limited) too acid (slightly limited)	Limited: seepage (limited) wetness (slightly limited)	Moderately limited: potential seepage (moderately limited) wetness (slightly limited) too acid (slightly limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
1359: Clark-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited) slope (moderately limited)	Not limited-----	Not limited-----	Not limited.
Ost-----	Moderately limited: percolation (moderately limited)	Moderately limited: slope (moderately limited)	Not limited-----	Not limited-----	Not limited.
1428: Crete-----	Limited: percolation (limited)	Moderately limited: potential seepage (moderately limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) (moderately limited)
1429: Crete-----	Limited: percolation (limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)
1553: Darlow-----	Very limited: percolation (very limited)	Moderately limited: potential seepage (moderately limited)	Very limited: excess sodium (very limited)	Not limited-----	Very limited: excess sodium (very limited)
Elmer-----	Limited: percolation (limited)	Very limited: probable seepage (very limited)	Very limited: excess sodium (very limited) seepage (limited)	Not limited-----	Very limited: excess sodium (very limited)
1554: Dillhut-----	Very limited: wetness <36" (very limited) percolation (very limited) poor filter (very limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Very limited: wetness (very limited) too sandy (very limited) too acid (slightly limited)	Very limited: seepage (very limited) wetness (limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
1555: Dillhut-----	Very limited: poor filter (very limited) percolation (slightly limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Very limited: too sandy (very limited) seepage (very limited)	Very limited: seepage (very limited)	Very limited: too sandy (very limited)
Plev-----	Very limited: wetness <36" (very limited) poor filter (very limited) percolation (slightly limited)	Very limited: probable seepage (very limited)	Very limited: wetness (very limited) seepage (very limited) too sandy (limited)	Very limited: wetness (very limited) seepage (very limited)	Very limited: probable seepage (very limited) wetness (very limited) too sandy (limited)
1556: Dillhut-----	Very limited: poor filter (very limited) percolation (slightly limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Very limited: too sandy (very limited) seepage (very limited)	Very limited: seepage (very limited)	Very limited: too sandy (very limited)
Solvay-----	Limited: wetness (limited) percolation (slightly limited)	Very limited: probable seepage (very limited) wetness (moderately limited)	Limited: wetness (limited) seepage (limited) too acid (slightly limited)	Limited: seepage (limited) wetness (slightly limited)	Moderately limited: potential seepage (moderately limited) wetness (slightly limited) too acid (slightly limited)
1725: Farnum-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited)	Not limited-----	Not limited-----	Not limited.
Funmar-----	Limited: percolation (limited)	Not limited-----	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (slightly limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
1727: Funmar-----	Limited: percolation (limited)	Not limited-----	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (slightly limited)
Taver-----	Very limited: percolation (very limited)	Not limited-----	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)
1804: Geary-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Not limited-----	Not limited-----	Not limited.
1807: Geary-----	Slightly limited: percolation (slightly limited)	Moderately limited: slope (moderately limited) potential seepage (moderately limited)	Not limited-----	Not limited-----	Not limited.
1985: Hayes-----	Limited: percolation (limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Slightly limited: too clayey (slightly limited)	Limited: seepage (limited)	Moderately limited: potential seepage (moderately limited) too clayey (moderately limited)
1986: Hayes-----	Limited: percolation (limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Slightly limited: too clayey (slightly limited)	Limited: seepage (limited)	Moderately limited: potential seepage (moderately limited) too clayey (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
1986: Solvay-----	Limited: wetness (limited) percolation (slightly limited)	Very limited: probable seepage (very limited) wetness (moderately limited)	Limited: wetness (limited) seepage (limited) too acid (slightly limited)	Limited: seepage (limited) wetness (slightly limited)	Moderately limited: potential seepage (moderately limited) wetness (slightly limited) too acid (slightly limited)
1987: Hayes-----	Limited: percolation (limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Slightly limited: too clayey (slightly limited)	Limited: seepage (limited)	Moderately limited: potential seepage (moderately limited) too clayey (moderately limited)
Turon-----	Very limited: poor filter (very limited) percolation (moderately limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: too sandy (limited) too acid (slightly limited) too clayey (slightly limited)	Very limited: seepage (very limited)	Very limited: probable seepage (very limited) too sandy (limited) too clayey (moderately limited)
2204: Jamash-----	Very limited: bedrock <40" (very limited) percolation (limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <72" (very limited) too clayey (slightly limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) hard to pack (very limited) too clayey (slightly limited)
Piedmont-----	Very limited: bedrock <40" (very limited) percolation (very limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <72" (very limited) too clayey (moderately limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) hard to pack (very limited) too clayey (limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
2205: Jamash-----	Very limited: bedrock <40" (very limited) percolation (limited)	Very limited: bedrock <40" (very limited) slope (slightly limited)	Very limited: bedrock <72" (very limited) too clayey (slightly limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) hard to pack (very limited) too clayey (slightly limited)
Piedmont-----	Very limited: bedrock <40" (very limited) percolation (very limited)	Very limited: bedrock <40" (very limited) slope (slightly limited)	Very limited: bedrock <72" (very limited) too clayey (moderately limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) hard to pack (very limited) too clayey (limited)
2206: Jamash-----	Very limited: bedrock <40" (very limited) percolation (limited)	Very limited: bedrock <40" (very limited) slope (limited)	Very limited: bedrock <72" (very limited) too clayey (slightly limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) hard to pack (very limited) too clayey (slightly limited)
Piedmont-----	Very limited: bedrock <40" (very limited) percolation (very limited)	Very limited: bedrock <40" (very limited) slope (limited)	Very limited: bedrock <72" (very limited) too clayey (moderately limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) hard to pack (very limited) too clayey (limited)
2207: Jamash-----	Very limited: bedrock <40" (very limited) percolation (limited)	Very limited: bedrock <40" (very limited) slope (moderately limited)	Very limited: bedrock <72" (very limited) too clayey (slightly limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) hard to pack (very limited) too clayey (slightly limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
2381: Kanza-----	Very limited: flooding (very limited) wetness <36" (very limited) poor filter (very limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) too sandy (very limited) wetness (very limited)	Very limited: flooding (very limited) seepage (very limited) wetness (limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (moderately limited)
Ninnescah-----	Very limited: wetness <36" (very limited) flooding (very limited) poor filter (very limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) seepage (very limited) wetness (limited)	Very limited: flooding (very limited) seepage (very limited) wetness (limited)	Very limited: probable seepage (very limited) wetness (moderately limited)
2390: Kaskan-----	Very limited: poor filter (very limited) flooding (rare) (moderately limited) wetness (moderately limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) flooding (rare) (moderately limited)	Very limited: seepage (very limited) flooding (rare) (moderately limited)	Very limited: probable seepage (very limited) too sandy (very limited)
2391: Kaskan-----	Very limited: flooding (very limited) poor filter (very limited) wetness (moderately limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) too sandy (very limited) seepage (very limited)	Very limited: flooding (very limited) seepage (very limited)	Very limited: probable seepage (very limited) too sandy (very limited)
2395: Kisiwa-----	Very limited: ponded (wetness) (very limited) wetness <36" (very limited) percolation (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) probable seepage (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) excess sodium (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) excess sodium (very limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
2509: Ladysmith-----	Very limited: wetness <36" (very limited) percolation (very limited)	Very limited: wetness (very limited)	Limited: wetness (limited) too clayey (slightly limited)	Limited: wetness (limited)	Very limited: hard to pack (very limited) too clayey (moderately limited) wetness (moderately limited)
2556: Langdon-----	Very limited: poor filter (very limited)	Very limited: probable seepage (very limited) slope >7% (very limited)	Very limited: too sandy (very limited) seepage (very limited) too acid (slightly limited)	Very limited: seepage (very limited)	Very limited: probable seepage (very limited) too sandy (very limited) too acid (slightly limited)
2587: Imano-----	Very limited: flooding (very limited) poor filter (very limited) wetness (limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) too sandy (very limited) seepage (very limited)	Very limited: flooding (very limited) seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (slightly limited)
2588: Longford-----	Moderately limited: percolation (moderately limited)	Moderately limited: slope (moderately limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)
2812: Mahone-----	Moderately limited: flooding (rare) (moderately limited) wetness (moderately limited) percolation (slightly limited)	Very limited: probable seepage (very limited)	Very limited: seepage (very limited) flooding (rare) (moderately limited) wetness (moderately limited)	Limited: seepage (limited) flooding (rare) (moderately limited)	Moderately limited: potential seepage (moderately limited) too acid (slightly limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
2948: Nalim-----	Very limited: poor filter (very limited) percolation (moderately limited)	Very limited: probable seepage (very limited)	Very limited: seepage (very limited)	Not limited-----	Not limited.
2949: Naron-----	Very limited: poor filter (very limited) percolation (slightly limited)	Very limited: probable seepage (very limited) slope (moderately limited)	Very limited: seepage (very limited)	Not limited-----	Not limited.
2950: Naron-----	Very limited: poor filter (very limited) slope (slightly limited) percolation (slightly limited)	Very limited: probable seepage (very limited) slope >7% (very limited)	Very limited: seepage (very limited) slope (slightly limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)
2951: Nash-----	Very limited: bedrock <40" (very limited) percolation (slightly limited)	Very limited: bedrock <40" (very limited) potential seepage (moderately limited) slope (slightly limited)	Very limited: bedrock <72" (very limited) too sandy (very limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) too sandy (very limited)
2952: Nash-----	Very limited: bedrock <40" (very limited) percolation (slightly limited)	Very limited: bedrock <40" (very limited) slope (moderately limited) potential seepage (moderately limited)	Very limited: bedrock <72" (very limited) too sandy (very limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) too sandy (very limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
2952: Lucien-----	Very limited: bedrock <40" (very limited) percolation (limited)	Very limited: bedrock <40" (very limited) probable seepage (very limited) slope (limited)	Very limited: bedrock <72" (very limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited)
2953: Nash-----	Very limited: bedrock <40" (very limited) slope (moderately limited) percolation (slightly limited)	Very limited: bedrock <40" (very limited) slope >7% (very limited) potential seepage (moderately limited)	Very limited: bedrock <72" (very limited) too sandy (very limited) slope (moderately limited)	Very limited: bedrock <40" (very limited) slope (moderately limited)	Very limited: bedrock <40" (very limited) too sandy (very limited) slope (moderately limited)
Lucien-----	Very limited: bedrock <40" (very limited) percolation (limited) slope (limited)	Very limited: slope >7% (very limited) bedrock <40" (very limited) probable seepage (very limited)	Very limited: bedrock <72" (very limited) slope (limited)	Very limited: bedrock <40" (very limited) slope (limited)	Very limited: bedrock <40" (very limited) slope (limited)
2955: Nickerson-----	Very limited: poor filter (very limited) wetness (limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (limited)	Very limited: seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (slightly limited)
2956: Nickerson-----	Very limited: poor filter (very limited) wetness (limited)	Very limited: probable seepage (very limited)	Very limited: seepage (very limited) too sandy (limited) wetness (limited)	Very limited: seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (limited) wetness (slightly limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
2957: Nickerson-----	Very limited: poor filter (very limited) wetness (limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (limited)	Very limited: seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (slightly limited)
Punkin-----	Very limited: percolation (very limited) poor filter (very limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) excess sodium (very limited) seepage (very limited)	Not limited-----	Very limited: too sandy (very limited) excess sodium (very limited) too clayey (moderately limited)
2958: Ninnescah-----	Very limited: wetness <36" (very limited) flooding (very limited) poor filter (very limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) seepage (very limited) wetness (limited)	Very limited: flooding (very limited) seepage (very limited) wetness (limited)	Very limited: probable seepage (very limited) wetness (moderately limited)
2959: Ninnescah-----	Very limited: wetness <36" (very limited) flooding (very limited) poor filter (very limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) wetness (very limited) seepage (very limited)	Very limited: flooding (very limited) wetness (very limited) seepage (very limited)	Very limited: probable seepage (very limited) wetness (limited) too sandy (limited)
3051: Ost-----	Moderately limited: percolation (moderately limited)	Not limited-----	Not limited-----	Not limited-----	Not limited.
3052: Ost-----	Moderately limited: percolation (moderately limited)	Slightly limited: slope (slightly limited)	Not limited-----	Not limited-----	Not limited.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3052: Clark-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Not limited-----	Not limited-----	Not limited.
3170: Penalosa-----	Limited: percolation (limited)	Moderately limited: potential seepage (moderately limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (slightly limited)
3171: Penalosa-----	Limited: percolation (limited)	Moderately limited: potential seepage (moderately limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (slightly limited)
3180: Pratt-----	Very limited: poor filter (very limited)	Very limited: probable seepage (very limited) slope >7% (very limited)	Very limited: too sandy (very limited) seepage (very limited) too acid (slightly limited)	Very limited: seepage (very limited)	Very limited: probable seepage (very limited) too sandy (very limited) too acid (slightly limited)
3181: Pratt-----	Very limited: poor filter (very limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Very limited: too sandy (very limited) seepage (very limited) too acid (slightly limited)	Very limited: seepage (very limited)	Very limited: probable seepage (very limited) too sandy (very limited) too acid (slightly limited)
Turon-----	Very limited: poor filter (very limited) percolation (moderately limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: too sandy (limited) too acid (slightly limited) too clayey (slightly limited)	Very limited: seepage (very limited)	Very limited: probable seepage (very limited) too sandy (limited) too clayey (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3190: Punkin-----	Very limited: percolation (very limited)	Not limited-----	Very limited: excess sodium (very limited) too clayey (slightly limited)	Not limited-----	Very limited: excess sodium (very limited) hard to pack (very limited) too clayey (moderately limited)
3191: Punkin-----	Very limited: percolation (very limited)	Not limited-----	Very limited: excess sodium (very limited) too clayey (slightly limited)	Not limited-----	Very limited: excess sodium (very limited) hard to pack (very limited) too clayey (moderately limited)
Taver-----	Very limited: percolation (very limited)	Not limited-----	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)
3403: Sand pits.					
3469: Smolan-----	Limited: percolation (limited)	Slightly limited: slope (slightly limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)
3510: Saltcreek-----	Limited: percolation (limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3510: Funmar-----	Limited: percolation (limited)	Not limited-----	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (slightly limited)
Farnum-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited)	Not limited-----	Not limited-----	Not limited.
3511: Saltcreek-----	Limited: percolation (limited)	Moderately limited: potential seepage (moderately limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)
Naron-----	Very limited: poor filter (very limited) percolation (slightly limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited)	Limited: seepage (limited)	Very limited: too sandy (very limited) potential seepage (moderately limited)
3512: Saltcreek-----	Limited: percolation (limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)
Naron-----	Very limited: poor filter (very limited) percolation (slightly limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Very limited: seepage (very limited)	Not limited-----	Not limited.
3520: Saxman-----	Very limited: wetness <36" (very limited) poor filter (very limited) flooding (rare) (moderately limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (limited)	Very limited: seepage (very limited) wetness (limited) flooding (rare) (moderately limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3530: Shellabarger-----	Slightly limited: slope (slightly limited) percolation (slightly limited)	Very limited: slope >7% (very limited) potential seepage (moderately limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)
Albion-----	Very limited: poor filter (very limited) slope (slightly limited)	Very limited: probable seepage (very limited) slope >7% (very limited)	Very limited: too sandy (very limited) seepage (very limited) slope (slightly limited)	Limited: seepage (limited) slope (slightly limited)	Very limited: too sandy (very limited) potential seepage (moderately limited) slope (slightly limited)
3531: Shellabarger-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited) slope (moderately limited)	Not limited-----	Not limited-----	Not limited.
Nalim-----	Very limited: poor filter (very limited) percolation (moderately limited)	Very limited: probable seepage (very limited) slope (moderately limited)	Very limited: seepage (very limited)	Not limited-----	Not limited.
3532: Shellabarger-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Not limited-----	Not limited-----	Not limited.
3533: Shellabarger-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited)	Not limited-----	Not limited-----	Not limited.

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3534: Shellabarger-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Not limited-----	Not limited-----	Not limited.
3535: Shellabarger-----	Slightly limited: percolation (slightly limited)	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Not limited-----	Not limited-----	Not limited.
Nalim-----	Very limited: poor filter (very limited) percolation (moderately limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Very limited: seepage (very limited)	Not limited-----	Not limited.
3540: Solvay-----	Limited: wetness (limited) percolation (slightly limited)	Very limited: probable seepage (very limited) wetness (moderately limited)	Limited: wetness (limited) seepage (limited) too acid (slightly limited)	Limited: seepage (limited) wetness (slightly limited)	Moderately limited: potential seepage (moderately limited) wetness (slightly limited) too acid (slightly limited)
3550: Spelvin-----	Very limited: poor filter (very limited) percolation (slightly limited)	Very limited: probable seepage (very limited)	Very limited: seepage (very limited) too acid (slightly limited)	Limited: seepage (limited)	Moderately limited: potential seepage (moderately limited) too acid (slightly limited)
3639: Taver-----	Very limited: percolation (very limited)	Not limited-----	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3640: Tivin-----	Very limited: slope >15% (very limited) poor filter (very limited)	Very limited: slope >7% (very limited) probable seepage (very limited)	Very limited: too sandy (very limited) slope >15% (very limited) seepage (very limited)	Very limited: slope >15% (very limited) seepage (very limited)	Very limited: probable seepage (very limited) too sandy (very limited) slope >15% (very limited)
3641: Tivin-----	Very limited: poor filter (very limited) slope (slightly limited)	Very limited: probable seepage (very limited) slope >7% (very limited)	Very limited: too sandy (very limited) seepage (very limited) slope (slightly limited)	Very limited: seepage (very limited) slope (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) slope (slightly limited)
Dillhut-----	Very limited: poor filter (very limited) percolation (slightly limited)	Very limited: probable seepage (very limited) slope (slightly limited)	Very limited: too sandy (very limited) seepage (very limited)	Very limited: seepage (very limited)	Very limited: too sandy (very limited)
3642: Tivin-----	Very limited: poor filter (very limited) wetness (moderately limited)	Very limited: probable seepage (very limited) slope (limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (moderately limited)	Very limited: seepage (very limited)	Very limited: probable seepage (very limited) too sandy (very limited)
Willowbrook-----	Very limited: poor filter (very limited) flooding (very limited) wetness (limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) too sandy (very limited) seepage (very limited)	Very limited: flooding (very limited) seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (slightly limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3643: Tobin-----	Very limited: flooding (very limited) percolation (slightly limited)	Very limited: flooding (very limited) potential seepage (moderately limited)	Very limited: flooding (very limited)	Very limited: flooding (very limited)	Not limited.
3644: Turon-----	Very limited: poor filter (very limited) percolation (moderately limited)	Very limited: probable seepage (very limited) slope (moderately limited)	Limited: too sandy (limited) too acid (slightly limited) too clayey (slightly limited)	Very limited: seepage (very limited)	Very limited: probable seepage (very limited) too sandy (limited) too clayey (moderately limited)
Carway-----	Very limited: ponded (wetness) (very limited) wetness <36" (very limited) percolation (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) potential seepage (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (slightly limited)	Very limited: wetness (very limited) ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) hard to pack (very limited)
3760: Urban land.					
Blazefork-----	Limited: percolation (limited) wetness (moderately limited)	Limited: wetness (limited)	Moderately limited: wetness (moderately limited) too clayey (slightly limited)	Not limited-----	Moderately limited: too clayey (moderately limited)
Kaskan-----	Very limited: poor filter (very limited) wetness (moderately limited) percolation (slightly limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (moderately limited)	Very limited: seepage (very limited)	Very limited: probable seepage (very limited) too sandy (very limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3762: Urban land.					
Darlow-----	Very limited: percolation (very limited)	Moderately limited: potential seepage (moderately limited)	Very limited: excess sodium (very limited)	Not limited-----	Very limited: excess sodium (very limited)
Elmer-----	Limited: percolation (limited)	Very limited: probable seepage (very limited)	Very limited: excess sodium (very limited) seepage (limited)	Not limited-----	Very limited: excess sodium (very limited)
3763: Urban land.					
Imano-----	Very limited: poor filter (very limited) wetness (limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (limited)	Very limited: seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (slightly limited)
3764: Urban land.					
Mahone-----	Moderately limited: wetness (moderately limited) percolation (slightly limited)	Very limited: probable seepage (very limited)	Very limited: seepage (very limited) wetness (moderately limited) too acid (slightly limited)	Limited: seepage (limited)	Moderately limited: potential seepage (moderately limited) too acid (slightly limited)
3765: Urban land.					
Saltcreek-----	Limited: percolation (limited)	Moderately limited: potential seepage (moderately limited)	Slightly limited: too clayey (slightly limited)	Not limited-----	Very limited: hard to pack (very limited) too clayey (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3765: Naron-----	Very limited: poor filter (very limited) percolation (slightly limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited)	Limited: seepage (limited)	Very limited: too sandy (very limited) potential seepage (moderately limited)
3766: Urban land.					
Saxman-----	Very limited: wetness <36" (very limited) poor filter (very limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (limited)	Very limited: seepage (very limited) wetness (limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (moderately limited)
3767: Urban land.					
Willowbrook-----	Very limited: poor filter (very limited) wetness (limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (limited)	Very limited: seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (slightly limited)
3768: Urban land.					
Yaggy-----	Very limited: poor filter (very limited) wetness (limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (limited)	Very limited: seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) small stones >35% (very limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
3900: Warnut-----	Very limited: ponded (wetness) (very limited) wetness <36" (very limited) poor filter (very limited)	Very limited: ponded (wetness) (very limited) probable seepage (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) seepage (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) seepage (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) probable seepage (very limited)
3966: Willowbrook-----	Very limited: poor filter (very limited) flooding (very limited) wetness (limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) too sandy (very limited) seepage (very limited)	Very limited: flooding (very limited) seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (slightly limited)
4004: Yaggy-----	Very limited: flooding (very limited) poor filter (very limited) wetness (limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) too sandy (very limited) seepage (very limited)	Very limited: flooding (very limited) seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) small stones >35% (very limited)
4005: Yaggy-----	Very limited: flooding (very limited) poor filter (very limited) wetness (limited)	Very limited: flooding (very limited) probable seepage (very limited)	Very limited: flooding (very limited) too sandy (very limited) seepage (very limited)	Very limited: flooding (very limited) seepage (very limited) wetness (slightly limited)	Very limited: probable seepage (very limited) too sandy (very limited) small stones >35% (very limited)
Saxman-----	Very limited: wetness <36" (very limited) poor filter (very limited) flooding (rare) (moderately limited)	Very limited: probable seepage (very limited)	Very limited: too sandy (very limited) seepage (very limited) wetness (limited)	Very limited: seepage (very limited) wetness (limited) flooding (rare) (moderately limited)	Very limited: probable seepage (very limited) too sandy (very limited) wetness (moderately limited)

Table 17.--Sanitary Facilities--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoons	Sanitary landfill (trench)	Sanitary landfill (area)	Daily cover for landfill
4110: Zellmont-----	Very limited: bedrock <40" (very limited) percolation (limited)	Very limited: bedrock <40" (very limited) potential seepage (moderately limited)	Very limited: bedrock <72" (very limited) too acid (slightly limited)	Very limited: bedrock <40" (very limited)	Very limited: bedrock <40" (very limited) too acid (slightly limited)
Poxmash-----	Very limited: poor filter (very limited) depth to bedrock (limited)	Very limited: probable seepage (very limited) depth to bedrock (limited)	Very limited: bedrock <72" (very limited) too acid (slightly limited)	Very limited: seepage (very limited) depth to bedrock (moderately limited)	Very limited: probable seepage (very limited) depth to bedrock (moderately limited) too acid (slightly limited)

Table 18.--Waste Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
990: Abbyville-----	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (moderately limited)	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (moderately limited)	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (moderately limited)	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (moderately limited)
991: Abbyville-----	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (moderately limited)	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (moderately limited)	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (moderately limited)	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (moderately limited)
Kisiwa-----	Very limited: wetness (very limited) excess sodium (very limited) ponded (wetness) (very limited)	Very limited: wetness (very limited) percs slowly (very limited) ponded (wetness) (very limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: excess sodium (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) ground water <72" (very limited)
1004: Albion-----	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (limited) intake rate (slightly limited)			

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
1011: Albion-----	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited) slope (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited) slope (slightly limited)	Very limited: poor filter (very limited) percs slowly (limited) slope (slightly limited)
Shellabarger-----	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) intake rate (slightly limited) slope (slightly limited)
1057: Aquents-----	Very limited: wetness (very limited) ponded (wetness) (very limited) poor filter (very limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) poor filter (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) poor filter (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) poor filter (very limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) ground water <72" (very limited)
1061: Arents.					
1062: Arents-----	Very limited: slope >15% (very limited) low adsorption (very limited)	Very limited: slope >15% (very limited) low adsorption (very limited)	Very limited: slope >12% (very limited) low adsorption (very limited)	Very limited: slope >12% (very limited) low adsorption (very limited)	Very limited: slope >7% (very limited)
1070: Avans-----	Moderately limited: too acid (moderately limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) intake rate (slightly limited)			

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
1071: Avans-----	Moderately limited: too acid (moderately limited) intake rate (slightly limited)	Moderately limited: too acid (moderately limited) intake rate (slightly limited)	Moderately limited: too acid (moderately limited) intake rate (slightly limited)	Moderately limited: too acid (moderately limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) intake rate (slightly limited) slope (slightly limited)
1072: Avans-----	Moderately limited: too acid (moderately limited) intake rate (slightly limited)	Moderately limited: too acid (moderately limited) intake rate (slightly limited)	Moderately limited: too acid (moderately limited) slope (slightly limited) intake rate (slightly limited)	Moderately limited: too acid (moderately limited) slope (slightly limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) slope (moderately limited) intake rate (slightly limited)
1191: Blazefork-----	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)
1192: Blazefork-----	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)
Kaskan-----	Very limited: poor filter (very limited) flooding (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) flooding (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) flooding (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) flooding (slightly limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) poor filter (very limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
1200: Buhler-----	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: excess sodium (very limited) percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)
Blazefork-----	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)
1324: Carway-----	Very limited: wetness (very limited) ponded (wetness) (very limited) percs slowly (very limited)	Very limited: wetness (very limited) percs slowly (very limited) ponded (wetness) (very limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) percs slowly (very limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) ground water <72" (very limited)
Carbika-----	Very limited: wetness (very limited) ponded (wetness) (very limited) percs slowly (very limited)	Very limited: wetness (very limited) percs slowly (very limited) ponded (wetness) (very limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) percs slowly (very limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) ground water <72" (very limited)
1357: Carway-----	Very limited: wetness (very limited) poor filter (very limited) ponded (wetness) (very limited)	Very limited: wetness (very limited) poor filter (very limited) percs slowly (very limited)	Very limited: poor filter (very limited) percs slowly (very limited) ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) poor filter (very limited) wetness (very limited)	Very limited: poor filter (very limited) percs slowly (very limited) ponded (wetness) (very limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
1357: Dillhut-----	Very limited: poor filter (very limited) percs slowly (very limited) wetness (moderately limited)	Very limited: poor filter (very limited) percs slowly (very limited) ground water <72" (very limited)			
Solvay-----	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)			
1359: Clark-----	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited) slope (slightly limited)	Slightly limited: intake rate (slightly limited) slope (slightly limited)	Very limited: percs slowly (very limited) slope (moderately limited) intake rate (slightly limited)
Ost-----	Limited: percs slowly (limited) intake rate (slightly limited)	Limited: percs slowly (limited) intake rate (slightly limited)	Limited: percs slowly (limited) slope (slightly limited) intake rate (slightly limited)	Limited: percs slowly (limited) slope (slightly limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) slope (moderately limited) intake rate (slightly limited)
1428: Crete-----	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
1429: Crete-----	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) slope (slightly limited)
1553: Darlow-----	Very limited: excess sodium (very limited) percs slowly (very limited) too acid (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) too acid (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) too acid (limited)	Very limited: excess sodium (very limited) percs slowly (very limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)
Elmer-----	Very limited: excess sodium (very limited) percs slowly (very limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)			
1554: Dillhut-----	Very limited: poor filter (very limited) percs slowly (very limited) wetness (moderately limited)	Very limited: poor filter (very limited) percs slowly (very limited) ground water <72" (very limited)			
1555: Dillhut-----	Very limited: poor filter (very limited) intake rate (slightly limited) droughty (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) intake rate (slightly limited)			

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
1555: Plev-----	Very limited: wetness (very limited) poor filter (very limited) droughty (limited)	Very limited: wetness (very limited) poor filter (very limited) droughty (limited)	Very limited: poor filter (very limited) wetness (very limited) droughty (limited)	Very limited: poor filter (very limited) wetness (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) ground water <72" (very limited)
1556: Dillhut-----	Very limited: poor filter (very limited) intake rate (slightly limited) droughty (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited) droughty (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited) droughty (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) intake rate (slightly limited)
Solvay-----	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)
1725: Farnum-----	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Very limited: percs slowly (very limited) intake rate (slightly limited)
Funmar-----	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)
1727: Funmar-----	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
1727: Taver-----	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)
1804: Geary-----	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Very limited: percs slowly (very limited) intake rate (slightly limited) slope (slightly limited)
1807: Geary-----	Limited: percs slowly (limited) intake rate (slightly limited)	Limited: percs slowly (limited) intake rate (slightly limited)	Limited: percs slowly (limited) slope (slightly limited) intake rate (slightly limited)	Limited: percs slowly (limited) slope (slightly limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) slope (moderately limited) intake rate (slightly limited)
1985: Hayes-----	Limited: percs slowly (limited) intake rate (slightly limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (slightly limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (slightly limited) slope (slightly limited)	Limited: percs slowly (limited) intake rate (slightly limited) slope (slightly limited)	Very limited: percs slowly (very limited) slope (slightly limited) intake rate (slightly limited)
1986: Hayes-----	Very limited: poor filter (very limited) percs slowly (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
1986: Solvay-----	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)
1987: Hayes-----	Very limited: poor filter (very limited) percs slowly (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)
Turon-----	Very limited: poor filter (very limited) percs slowly (very limited) intake rate (not limited)	Very limited: poor filter (very limited) percs slowly (very limited) intake rate (not limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)
2204: Jamash-----	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: depth to bedrock (very limited) percs slowly (limited) intake rate (limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) intake rate (limited)
Piedmont-----	Very limited: percs slowly (very limited) intake rate (limited) depth to bedrock (slightly limited)	Very limited: percs slowly (very limited) intake rate (limited) depth to bedrock (slightly limited)	Very limited: percs slowly (very limited) intake rate (limited) depth to bedrock (slightly limited)	Very limited: depth to bedrock (very limited) percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) intake rate (limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
2205: Jamash-----	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: depth to bedrock (very limited) percs slowly (limited) intake rate (limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) intake rate (limited)
Piedmont-----	Very limited: percs slowly (very limited) intake rate (limited) depth to bedrock (slightly limited)	Very limited: percs slowly (very limited) intake rate (limited) depth to bedrock (slightly limited)	Very limited: percs slowly (very limited) intake rate (limited) depth to bedrock (slightly limited)	Very limited: depth to bedrock (very limited) percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) intake rate (limited)
2206: Jamash-----	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: depth to bedrock (very limited) percs slowly (limited) intake rate (limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) intake rate (limited)
Piedmont-----	Very limited: percs slowly (very limited) intake rate (limited) depth to bedrock (slightly limited)	Very limited: percs slowly (very limited) intake rate (limited) depth to bedrock (slightly limited)	Very limited: percs slowly (very limited) intake rate (limited) slope (moderately limited)	Very limited: depth to bedrock (very limited) percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) intake rate (limited)
2207: Jamash-----	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: bedrock <20" (very limited) droughty (limited) percs slowly (limited)	Very limited: depth to bedrock (very limited) percs slowly (limited) intake rate (limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) intake rate (limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
2381: Kanza-----	Very limited: flooding (very limited) poor filter (very limited) intake rate (limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) flooding (very limited)			
Ninnescah-----	Limited: flooding (limited) wetness (moderately limited) intake rate (slightly limited)	Very limited: ground water <72" (very limited) percs slowly (limited) flooding (moderately limited)			
2390: Kaskan-----	Very limited: poor filter (very limited) flooding (slightly limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) poor filter (very limited)			
2391: Kaskan-----	Very limited: flooding (very limited) poor filter (very limited) percs slowly (limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) flooding (very limited)			
2395: Kisiwa-----	Very limited: wetness (very limited) excess sodium (very limited) ponded (wetness) (very limited)	Very limited: wetness (very limited) percs slowly (very limited) ponded (wetness) (very limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: excess sodium (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) ground water <72" (very limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
2509: Ladysmith-----	Very limited: percs slowly (very limited) intake rate (limited) wetness (slightly limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)			
2556: Langdon-----	Very limited: poor filter (very limited) droughty (limited) slope (slightly limited)	Very limited: poor filter (very limited) droughty (limited) slope (slightly limited)	Very limited: poor filter (very limited) droughty (limited) slope (moderately limited)	Very limited: poor filter (very limited) slope (moderately limited) too acid (slightly limited)	Very limited: poor filter (very limited) slope >7% (very limited) too acid (slightly limited)
2587: Imano-----	Very limited: poor filter (very limited) flooding (limited) percs slowly (limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) poor filter (very limited)			
2588: Longford-----	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) slope (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) slope (slightly limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) slope (moderately limited)
2812: Mahone-----	Very limited: poor filter (very limited) too acid (moderately limited) intake rate (moderately limited)	Very limited: poor filter (very limited) too acid (moderately limited) intake rate (moderately limited)	Very limited: poor filter (very limited) too acid (moderately limited) intake rate (moderately limited)	Very limited: poor filter (very limited) too acid (moderately limited) intake rate (moderately limited)	Very limited: poor filter (very limited) percs slowly (very limited) ground water <72" (very limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
2948: Nalim-----	Limited: percs slowly (limited) intake rate (slightly limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (slightly limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (slightly limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) poor filter (very limited) intake rate (slightly limited)
2949: Naron-----	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) slope (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) slope (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) poor filter (very limited) slope (moderately limited)
2950: Naron-----	Moderately limited: slope (moderately limited) intake rate (slightly limited) poor filter (moderately limited)	Moderately limited: slope (moderately limited) intake rate (slightly limited) poor filter (moderately limited)	Limited: slope (limited) intake rate (slightly limited) poor filter (moderately limited)	Limited: slope (limited) intake rate (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) slope >7% (very limited) poor filter (very limited)
2951: Nash-----	Moderately limited: depth to bedrock (moderately limited) intake rate (slightly limited)	Moderately limited: depth to bedrock (moderately limited) intake rate (slightly limited)	Moderately limited: depth to bedrock (moderately limited) intake rate (slightly limited)	Very limited: depth to bedrock (very limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) intake rate (slightly limited)
2952: Nash-----	Moderately limited: depth to bedrock (moderately limited) intake rate (slightly limited)	Moderately limited: depth to bedrock (moderately limited) intake rate (slightly limited)	Moderately limited: depth to bedrock (moderately limited) slope (slightly limited) intake rate (slightly limited)	Very limited: depth to bedrock (very limited) slope (slightly limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) slope (moderately limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
2952: Lucien-----	Very limited: bedrock <20" (very limited) droughty (limited) intake rate (moderately limited)	Very limited: bedrock <20" (very limited) droughty (limited) intake rate (moderately limited)	Very limited: bedrock <20" (very limited) droughty (limited) intake rate (moderately limited)	Very limited: depth to bedrock (very limited) intake rate (moderately limited) slope (moderately limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) slope (limited)
2953: Nash-----	Limited: slope (limited) depth to bedrock (moderately limited) intake rate (slightly limited)	Limited: slope (limited) depth to bedrock (moderately limited) intake rate (slightly limited)	Limited: slope (limited) depth to bedrock (moderately limited) intake rate (slightly limited)	Very limited: depth to bedrock (very limited) slope (limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) slope >7% (very limited)
Lucien-----	Very limited: bedrock <20" (very limited) droughty (limited) slope (limited)	Very limited: bedrock <20" (very limited) droughty (limited) slope (limited)	Very limited: bedrock <20" (very limited) slope (limited) droughty (limited)	Very limited: depth to bedrock (very limited) slope (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) slope >7% (very limited) depth to bedrock (very limited)
2955: Nickerson-----	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) ground water <72" (very limited)			
2956: Nickerson-----	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) ground water <72" (very limited)			

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
2957: Nickerson-----	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) ground water <72" (very limited)			
Punkin-----	Very limited: percs slowly (very limited) excess sodium (very limited) poor filter (very limited)	Very limited: percs slowly (very limited) excess sodium (very limited) poor filter (very limited)	Very limited: percs slowly (very limited) excess sodium (very limited) poor filter (very limited)	Very limited: percs slowly (very limited) excess sodium (very limited) poor filter (very limited)	Very limited: percs slowly (very limited) poor filter (very limited) intake rate (limited)
2958: Ninnescah-----	Limited: flooding (limited) wetness (moderately limited) intake rate (slightly limited)	Very limited: ground water <72" (very limited) percs slowly (limited) flooding (moderately limited)			
2959: Ninnescah-----	Limited: wetness (limited) flooding (limited) intake rate (slightly limited)	Limited: wetness (limited) flooding (limited) intake rate (slightly limited)	Limited: wetness (limited) flooding (limited) intake rate (slightly limited)	Limited: wetness (limited) flooding (limited) intake rate (slightly limited)	Very limited: ground water <72" (very limited) percs slowly (limited) flooding (moderately limited)
3051: Ost-----	Limited: percs slowly (limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) intake rate (slightly limited)			

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3052: Ost-----	Limited: percs slowly (limited) intake rate (slightly limited)	Limited: percs slowly (limited) intake rate (slightly limited)	Limited: percs slowly (limited) intake rate (slightly limited)	Limited: percs slowly (limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) intake rate (slightly limited) slope (slightly limited)
Clark-----	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Slightly limited: intake rate (slightly limited)	Very limited: percs slowly (very limited) intake rate (slightly limited) slope (slightly limited)
3170: Penalosa-----	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)
3171: Penalosa-----	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited)
3180: Pratt-----	Very limited: poor filter (very limited) slope (slightly limited) too acid (slightly limited)	Very limited: poor filter (very limited) slope (slightly limited) too acid (slightly limited)	Very limited: poor filter (very limited) slope (moderately limited) too acid (slightly limited)	Very limited: poor filter (very limited) slope (moderately limited) too acid (slightly limited)	Very limited: poor filter (very limited) slope (limited) intake rate (not limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3181: Pratt-----	Very limited: poor filter (very limited) too acid (slightly limited) intake rate (not limited)	Very limited: poor filter (very limited) too acid (slightly limited) intake rate (not limited)	Very limited: poor filter (very limited) too acid (slightly limited) slope (slightly limited)	Very limited: poor filter (very limited) too acid (slightly limited) slope (slightly limited)	Very limited: poor filter (very limited) slope (slightly limited) intake rate (not limited)
Turon-----	Very limited: poor filter (very limited) percs slowly (very limited) intake rate (not limited)	Very limited: poor filter (very limited) percs slowly (very limited) intake rate (not limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)
3190: Punkin-----	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)
3191: Punkin-----	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)
Taver-----	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)
3403: Sand pits.					

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3469: Smolan-----	Very limited: percs slowly (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) slope (slightly limited)			
3510: Saltcreek-----	Very limited: percs slowly (very limited) too acid (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) slope (slightly limited)			
Funmar-----	Very limited: percs slowly (very limited) intake rate (moderately limited)				
Farnum-----	Slightly limited: intake rate (slightly limited)	Very limited: percs slowly (very limited) intake rate (slightly limited)			
3511: Saltcreek-----	Very limited: percs slowly (very limited) too acid (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) poor filter (moderately limited)			

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3511: Naron-----	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) poor filter (very limited) intake rate (slightly limited)
3512: Saltcreek-----	Very limited: percs slowly (very limited) too acid (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) too acid (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) too acid (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) too acid (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) slope (slightly limited)
Naron-----	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) poor filter (very limited) intake rate (slightly limited)
3520: Saxman-----	Very limited: poor filter (very limited) too acid (limited) flooding (slightly limited)	Very limited: poor filter (very limited) too acid (limited) flooding (slightly limited)	Very limited: poor filter (very limited) too acid (limited) flooding (slightly limited)	Very limited: poor filter (very limited) too acid (limited) flooding (slightly limited)	Very limited: poor filter (very limited) ground water <72" (very limited) too acid (slightly limited)
3530: Shellabarger-----	Moderately limited: slope (moderately limited) intake rate (slightly limited) too acid (slightly limited)	Moderately limited: slope (moderately limited) intake rate (slightly limited) too acid (slightly limited)	Limited: slope (limited) intake rate (slightly limited) too acid (slightly limited)	Limited: slope (limited) intake rate (slightly limited) too acid (slightly limited)	Very limited: percs slowly (very limited) slope >7% (very limited) intake rate (slightly limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3530: Albion-----	Very limited: poor filter (very limited) slope (moderately limited) intake rate (slightly limited)	Very limited: poor filter (very limited) slope (moderately limited) intake rate (slightly limited)	Very limited: poor filter (very limited) slope (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) slope (limited) intake rate (slightly limited)	Very limited: slope >7% (very limited) poor filter (very limited) percs slowly (limited)
3531: Shellabarger-----	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) slope (slightly limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) slope (slightly limited)	Very limited: percs slowly (very limited) slope (moderately limited) intake rate (slightly limited)
Nalim-----	Limited: percs slowly (limited) intake rate (slightly limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (slightly limited) poor filter (moderately limited)	Limited: percs slowly (limited) intake rate (slightly limited) slope (slightly limited)	Limited: percs slowly (limited) intake rate (slightly limited) slope (slightly limited)	Very limited: percs slowly (very limited) poor filter (very limited) slope (moderately limited)
3532: Shellabarger-----	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) intake rate (slightly limited) slope (slightly limited)
3533: Shellabarger-----	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) intake rate (slightly limited) poor filter (moderately limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3534: Shellabarger-----	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) intake rate (slightly limited) slope (slightly limited)
3535: Shellabarger-----	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Slightly limited: intake rate (slightly limited) too acid (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) intake rate (slightly limited) slope (slightly limited)
Nalim-----	Limited: percs slowly (limited) intake rate (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) poor filter (very limited) intake rate (slightly limited)			
3540: Solvay-----	Limited: percs slowly (limited) intake rate (limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)			
3550: Spelvin-----	Very limited: poor filter (very limited) too acid (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) too acid (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) too acid (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) too acid (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) intake rate (slightly limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3639: Taver-----	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)	Very limited: percs slowly (very limited) intake rate (limited)
3640: Tivin-----	Very limited: poor filter (very limited) slope (limited) droughty (limited)	Very limited: poor filter (very limited) slope (limited) droughty (limited)	Very limited: poor filter (very limited) slope >12% (very limited) droughty (limited)	Very limited: poor filter (very limited) slope >12% (very limited) intake rate (not limited)	Very limited: poor filter (very limited) slope >7% (very limited) intake rate (not limited)
3641: Tivin-----	Very limited: poor filter (very limited) droughty (limited) slope (moderately limited)	Very limited: poor filter (very limited) droughty (limited) slope (moderately limited)	Very limited: poor filter (very limited) droughty (limited) slope (limited)	Very limited: poor filter (very limited) slope (limited) intake rate (not limited)	Very limited: poor filter (very limited) slope >7% (very limited) intake rate (not limited)
Dillhut-----	Very limited: poor filter (very limited) intake rate (slightly limited) droughty (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited) droughty (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited) droughty (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited) slope (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)
3642: Tivin-----	Very limited: poor filter (very limited) droughty (limited) intake rate (not limited)	Very limited: poor filter (very limited) droughty (limited) intake rate (not limited)	Very limited: poor filter (very limited) droughty (limited) slope (moderately limited)	Very limited: poor filter (very limited) slope (moderately limited) intake rate (not limited)	Very limited: poor filter (very limited) ground water <72" (very limited) slope (limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3642: Willowbrook-----	Very limited: poor filter (very limited) flooding (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) flooding (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) flooding (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) flooding (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) ground water <72" (very limited) percs slowly (limited)
3643: Tobin-----	Limited: flooding (limited) intake rate (slightly limited)	Limited: flooding (limited) intake rate (slightly limited)	Limited: flooding (limited) intake rate (slightly limited)	Limited: flooding (limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) flooding (moderately limited) intake rate (slightly limited)
3644: Turon-----	Very limited: poor filter (very limited) percs slowly (very limited) intake rate (not limited)	Very limited: poor filter (very limited) percs slowly (very limited) intake rate (not limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (slightly limited)	Very limited: poor filter (very limited) percs slowly (very limited) slope (moderately limited)
Carway-----	Very limited: wetness (very limited) poor filter (very limited) ponded (wetness) (very limited)	Very limited: wetness (very limited) poor filter (very limited) percs slowly (very limited)	Very limited: poor filter (very limited) percs slowly (very limited) ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) poor filter (very limited) wetness (very limited)	Very limited: poor filter (very limited) percs slowly (very limited) ponded (wetness) (very limited)
3760: Urban land.					
Blazefork-----	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (limited) too acid (limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) intake rate (limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3760: Kaskan-----	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) poor filter (very limited)			
3762: Urban land.					
Darlow-----	Very limited: excess sodium (very limited) percs slowly (very limited) too acid (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) too acid (limited)	Very limited: percs slowly (very limited) excess sodium (very limited) too acid (limited)	Very limited: excess sodium (very limited) percs slowly (very limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)
Elmer-----	Very limited: excess sodium (very limited) percs slowly (very limited) too acid (limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) too acid (slightly limited)			
3763: Urban land.					
Imano-----	Very limited: poor filter (very limited) percs slowly (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) poor filter (very limited)			

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3764: Urban land.					
Mahone-----	Very limited: poor filter (very limited) too acid (moderately limited) intake rate (moderately limited)	Very limited: poor filter (very limited) too acid (moderately limited) intake rate (moderately limited)	Very limited: poor filter (very limited) too acid (moderately limited) intake rate (moderately limited)	Very limited: poor filter (very limited) too acid (moderately limited) intake rate (moderately limited)	Very limited: poor filter (very limited) percs slowly (very limited) ground water <72" (very limited)
3765: Urban land.					
Saltcreek-----	Very limited: percs slowly (very limited) too acid (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) intake rate (moderately limited) poor filter (moderately limited)			
Naron-----	Slightly limited: intake rate (slightly limited) poor filter (moderately limited)	Very limited: percs slowly (very limited) poor filter (very limited) intake rate (slightly limited)			
3766: Urban land.					
Saxman-----	Very limited: poor filter (very limited) too acid (limited) wetness (slightly limited)	Very limited: poor filter (very limited) ground water <72" (very limited) too acid (slightly limited)			

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
3767: Urban land.					
Willowbrook-----	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) intake rate (slightly limited)	Very limited: poor filter (very limited) ground water <72" (very limited) percs slowly (limited)
3768: Urban land.					
Yaggy-----	Very limited: poor filter (very limited) intake rate (moderately limited) droughty (slightly limited)	Very limited: poor filter (very limited) intake rate (moderately limited) droughty (slightly limited)	Very limited: poor filter (very limited) intake rate (moderately limited) droughty (slightly limited)	Very limited: poor filter (very limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) poor filter (very limited)
3900: Warnut-----	Very limited: wetness (very limited) ponded (wetness) (very limited) intake rate (limited)	Very limited: wetness (very limited) ponded (wetness) (very limited) intake rate (limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) intake rate (limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) intake rate (limited)	Very limited: percs slowly (very limited) ponded (wetness) (very limited) ground water <72" (very limited)
3966: Willowbrook-----	Very limited: poor filter (very limited) flooding (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) flooding (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) flooding (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) flooding (limited) intake rate (slightly limited)	Very limited: poor filter (very limited) ground water <72" (very limited) percs slowly (limited)

Table 18.--Waste Management--Continued

Map symbol and soil name	Land application of manure and food processing waste	Land application of municipal sewage sludge	Disposal of wastewater by irrigation	Treatment of wastewater by slow rate process	Treatment of wastewater by rapid infiltration process
4004: Yaggy-----	Very limited: poor filter (very limited) flooding (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) poor filter (very limited)			
4005: Yaggy-----	Very limited: poor filter (very limited) flooding (limited) intake rate (moderately limited)	Very limited: percs slowly (very limited) ground water <72" (very limited) poor filter (very limited)			
Saxman-----	Very limited: poor filter (very limited) too acid (limited) flooding (slightly limited)	Very limited: poor filter (very limited) ground water <72" (very limited) too acid (slightly limited)			
4110: Zellmont-----	Limited: percs slowly (limited) depth to bedrock (slightly limited) intake rate (slightly limited)	Limited: percs slowly (limited) depth to bedrock (slightly limited) intake rate (slightly limited)	Limited: percs slowly (limited) depth to bedrock (slightly limited) intake rate (slightly limited)	Very limited: depth to bedrock (very limited) percs slowly (limited) intake rate (slightly limited)	Very limited: percs slowly (very limited) depth to bedrock (very limited) intake rate (slightly limited)
Poxmash-----	Very limited: poor filter (very limited) too acid (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) too acid (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) too acid (slightly limited) intake rate (slightly limited)	Very limited: poor filter (very limited) depth to bedrock (moderately limited) too acid (slightly limited)	Very limited: depth to bedrock (very limited) poor filter (very limited) percs slowly (limited)

Table 19.--Construction Materials and Excavating

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation. See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
990: Abbyville-----	Very limited: low strength (very limited) shrink-swell (moderately limited)	Very limited: excess sodium (very limited) excess salts (slightly limited) too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Limited: wetness (limited) cutbanks cave (slightly limited)
991: Abbyville-----	Very limited: low strength (very limited) shrink-swell (moderately limited)	Very limited: excess sodium (very limited) excess salts (slightly limited) too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Limited: wetness (limited) cutbanks cave (slightly limited)
Kisiwa-----	Very limited: wetness (very limited) low strength (very limited) shrink-swell (slightly limited)	Very limited: excess sodium (very limited) wetness (very limited) too clayey (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: ponded (wetness) (very limited) wetness (very limited) cutbanks cave (very limited)
1004: Albion-----	Not limited-----	Limited: too sandy (limited) area reclaim (limited) small stones (slightly limited)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
1011: Albion-----	Not limited-----	Limited: too sandy (limited) area reclaim (limited) small stones (slightly limited)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
1011: Shellabarger-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
1057: Aquents-----	Very limited: wetness (very limited)	Very limited: wetness (very limited) small stones >20% (very limited) area reclaim (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: ponded (wetness) (very limited) wetness (very limited) cutbanks cave (slightly limited)
1061: Arents.					
1062: Arents-----	Very limited: slope >25% (very limited) low strength (very limited)	Very limited: slope >15% (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: slope >15% (very limited)
1070: Avans-----	Very limited: low strength (very limited)	Slightly limited: too clayey (slightly limited) too acid (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
1071: Avans-----	Very limited: low strength (very limited)	Slightly limited: too clayey (slightly limited) too acid (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
1072: Avans-----	Very limited: low strength (very limited)	Slightly limited: too clayey (slightly limited) too acid (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
1191: Blazefork-----	Very limited: low strength (very limited) shrink-swell (limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Limited: wetness (limited) too clayey (moderately limited) cutbanks cave (slightly limited)
1192: Blazefork-----	Very limited: low strength (very limited) shrink-swell (limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Limited: wetness (limited) too clayey (moderately limited) cutbanks cave (slightly limited)
Kaskan-----	Not limited-----	Slightly limited: too sandy (slightly limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (slightly limited)
1200: Buhler-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: excess sodium (very limited) too clayey (limited) excess salts (moderately limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited) wetness (slightly limited)
Blazefork-----	Very limited: low strength (very limited) shrink-swell (limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Limited: wetness (limited) too clayey (moderately limited) cutbanks cave (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
1324: Carway-----	Very limited: low strength (very limited) wetness (very limited) shrink-swell (moderately limited)	Very limited: wetness (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: ponded (wetness) (very limited) wetness (very limited) cutbanks cave (slightly limited)
Carbika-----	Very limited: wetness (very limited)	Very limited: wetness (very limited) too clayey (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: ponded (wetness) (very limited) wetness (very limited) too clayey (moderately limited)
1357: Carway-----	Very limited: low strength (very limited) wetness (very limited) shrink-swell (moderately limited)	Very limited: wetness (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: ponded (wetness) (very limited) wetness (very limited) cutbanks cave (slightly limited)
Dillhut-----	Limited: wetness (limited)	Very limited: too sandy (very limited) wetness (limited) too acid (slightly limited)	Improbable source: excess fines (bottom layer) possible source (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: wetness (very limited) cutbanks cave (very limited) too clayey (slightly limited)
Solvay-----	Not limited-----	Slightly limited: too acid (slightly limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)
1359: Clark-----	Limited: low strength (limited) shrink-swell (moderately limited)	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
1359: Ost-----	Slightly limited: low strength (slightly limited)	Slightly limited: excess lime (slightly limited) too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
1428: Crete-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
1429: Crete-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
1553: Darlow-----	Very limited: low strength (very limited)	Very limited: excess sodium (very limited) excess salts (very limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
Elmer-----	Slightly limited: shrink-swell (slightly limited)	Very limited: excess sodium (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
1554: Dillhut-----	Limited: wetness (limited)	Very limited: too sandy (very limited) wetness (limited) too acid (slightly limited)	Improbable source: excess fines (bottom layer) possible source (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: wetness (very limited) cutbanks cave (very limited) too clayey (slightly limited)
1555: Dillhut-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
1555: Plev-----	Very limited: wetness (very limited)	Very limited: too sandy (very limited) wetness (very limited) too acid (slightly limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: wetness (very limited) cutbanks cave (very limited)
1556: Dillhut-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
Solvay-----	Not limited-----	Slightly limited: too acid (slightly limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)
1725: Farnum-----	Very limited: low strength (very limited) shrink-swell (slightly limited)	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
Funmar-----	Very limited: low strength (very limited)	Slightly limited: too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited) too clayey (slightly limited)
1727: Funmar-----	Very limited: low strength (very limited)	Slightly limited: too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited) too clayey (slightly limited)
Taver-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
1804: Geary-----	Very limited: low strength (very limited) shrink-swell (moderately limited)	Moderately limited: too clayey (moderately limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
1807: Geary-----	Very limited: low strength (very limited) shrink-swell (moderately limited)	Moderately limited: too clayey (moderately limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
1985: Hayes-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
1986: Hayes-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
Solvay-----	Not limited-----	Slightly limited: too acid (slightly limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)
1987: Hayes-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
Turon-----	Not limited-----	Very limited: too sandy (very limited) too acid (moderately limited)	Improbable source: excess fines (bottom layer) possible source (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) too clayey (moderately limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
2204:					
Jamash-----	Very limited: low strength (very limited) depth to bedrock (very limited) shrink-swell (very limited)	Very limited: depth to bedrock (very limited) dense layer <20" (very limited) too clayey (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: soft bedrock <20" (very limited) dense layer <20" (very limited) cutbanks cave (slightly limited)
Piedmont-----	Very limited: depth to bedrock (very limited) low strength (very limited) shrink-swell (limited)	Very limited: too clayey (very limited) depth to bedrock (limited) small stones (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Limited: dense layer (limited) too clayey (limited) cutbanks cave (slightly limited)
2205:					
Jamash-----	Very limited: low strength (very limited) depth to bedrock (very limited) shrink-swell (very limited)	Very limited: depth to bedrock (very limited) dense layer <20" (very limited) too clayey (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: soft bedrock <20" (very limited) dense layer <20" (very limited) cutbanks cave (slightly limited)
Piedmont-----	Very limited: depth to bedrock (very limited) low strength (very limited) shrink-swell (limited)	Very limited: too clayey (very limited) depth to bedrock (limited) small stones (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Limited: dense layer (limited) too clayey (limited) cutbanks cave (slightly limited)
2206:					
Jamash-----	Very limited: low strength (very limited) depth to bedrock (very limited) shrink-swell (very limited)	Very limited: depth to bedrock (very limited) dense layer <20" (very limited) too clayey (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: soft bedrock <20" (very limited) dense layer <20" (very limited) cutbanks cave (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
2206: Piedmont-----	Very limited: depth to bedrock (very limited) low strength (very limited) shrink-swell (limited)	Very limited: too clayey (very limited) depth to bedrock (limited) small stones (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Limited: dense layer (limited) too clayey (limited) cutbanks cave (slightly limited)
2207: Jamash-----	Very limited: low strength (very limited) depth to bedrock (very limited) shrink-swell (very limited)	Very limited: depth to bedrock (very limited) dense layer <20" (very limited) too clayey (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: soft bedrock <20" (very limited) dense layer <20" (very limited) cutbanks cave (slightly limited)
2381: Kanza-----	Limited: wetness (limited)	Very limited: too sandy (very limited) wetness (limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (very limited) flooding (moderately limited)
Ninnescah-----	Moderately limited: wetness (moderately limited)	Moderately limited: wetness (moderately limited) too sandy (moderately limited)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: wetness (very limited) cutbanks cave (very limited) flooding (moderately limited)
2390: Kaskan-----	Not limited-----	Slightly limited: too sandy (slightly limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
2391: Kaskan-----	Not limited-----	Very limited: too sandy (very limited)	Improbable source: excess fines (bottom layer) possible source (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: flooding (moderately limited) cutbanks cave (slightly limited) wetness (slightly limited)
2395: Kisiwa-----	Very limited: wetness (very limited) low strength (very limited) shrink-swell (slightly limited)	Very limited: excess sodium (very limited) wetness (very limited) too clayey (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: ponded (wetness) (very limited) wetness (very limited) cutbanks cave (very limited)
2509: Ladysmith-----	Very limited: low strength (very limited) shrink-swell (limited) wetness (slightly limited)	Very limited: too clayey (very limited) wetness (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: wetness (very limited) too clayey (moderately limited) cutbanks cave (slightly limited)
2556: Langdon-----	Not limited-----	Very limited: too sandy (very limited) too acid (moderately limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
2587: Imano-----	Not limited-----	Very limited: too sandy (very limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited) flooding (moderately limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
2588: Longford-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
2812: Mahone-----	Not limited-----	Moderately limited: too acid (moderately limited) too sandy (slightly limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited) wetness (slightly limited)
2948: Nalim-----	Very limited: low strength (very limited) shrink-swell (moderately limited)	Limited: dense layer (limited) too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) dense layer (limited)
2949: Naron-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
2950: Naron-----	Not limited-----	Slightly limited: slope (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) slope (slightly limited)
2951: Nash-----	Very limited: depth to bedrock (very limited)	Very limited: depth to bedrock (very limited) dense layer <20" (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: dense layer <20" (very limited) soft bedrock (limited) cutbanks cave (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
2952: Nash-----	Very limited: depth to bedrock (very limited)	Very limited: depth to bedrock (very limited) dense layer <20" (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: dense layer <20" (very limited) soft bedrock (limited) cutbanks cave (slightly limited)
Lucien-----	Very limited: depth to bedrock (very limited)	Very limited: depth to bedrock (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: soft bedrock <20" (very limited) cutbanks cave (slightly limited)
2953: Nash-----	Very limited: depth to bedrock (very limited)	Very limited: depth to bedrock (very limited) dense layer <20" (very limited) slope (moderately limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: dense layer <20" (very limited) soft bedrock (limited) slope (moderately limited)
Lucien-----	Very limited: depth to bedrock (very limited)	Very limited: depth to bedrock (very limited) slope (limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: soft bedrock <20" (very limited) slope (limited) cutbanks cave (slightly limited)
2955: Nickerson-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
2956: Nickerson-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)
2957: Nickerson-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)
Punkin-----	Limited: low strength (limited) shrink-swell (moderately limited)	Very limited: excess sodium (very limited) too clayey (very limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) too clayey (moderately limited)
2958: Ninnescah-----	Moderately limited: wetness (moderately limited)	Moderately limited: wetness (moderately limited) too sandy (moderately limited)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: wetness (very limited) cutbanks cave (very limited) flooding (moderately limited)
2959: Ninnescah-----	Very limited: wetness (very limited)	Very limited: wetness (very limited) excess salts (moderately limited) too sandy (slightly limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: wetness (very limited) cutbanks cave (very limited) flooding (moderately limited)
3051: Ost-----	Slightly limited: low strength (slightly limited)	Slightly limited: excess lime (slightly limited) too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
3052: Ost-----	Slightly limited: low strength (slightly limited)	Slightly limited: excess lime (slightly limited) too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
Clark-----	Limited: low strength (limited) shrink-swell (moderately limited)	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
3170: Penalosa-----	Very limited: low strength (very limited) shrink-swell (limited)	Limited: too clayey (limited) too acid (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited) too clayey (slightly limited)
3171: Penalosa-----	Very limited: low strength (very limited) shrink-swell (limited)	Limited: too clayey (limited) too acid (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited) too clayey (slightly limited)
3180: Pratt-----	Not limited-----	Limited: too sandy (limited) too acid (slightly limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
3181: Pratt-----	Not limited-----	Limited: too sandy (limited) too acid (slightly limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
Turon-----	Not limited-----	Very limited: too sandy (very limited) too acid (moderately limited)	Improbable source: excess fines (bottom layer) possible source (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) too clayey (moderately limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
3190: Punkin-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: excess sodium (very limited) too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
3191: Punkin-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: excess sodium (very limited) too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
Taver-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
3403: Sand pits.					
3469: Smolan-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
3510: Saltcreek-----	Very limited: low strength (very limited) shrink-swell (slightly limited)	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
Funmar-----	Very limited: low strength (very limited)	Slightly limited: too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited) too clayey (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
3510: Farnum-----	Very limited: low strength (very limited) shrink-swell (slightly limited)	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
3511: Saltcreek-----	Very limited: low strength (very limited) shrink-swell (slightly limited)	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
Naron-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
3512: Saltcreek-----	Very limited: low strength (very limited) shrink-swell (slightly limited)	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
Naron-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
3520: Saxman-----	Slightly limited: wetness (slightly limited)	Limited: too sandy (limited) wetness (slightly limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (very limited)
3530: Shellabarger-----	Not limited-----	Slightly limited: slope (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) slope (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
3530: Albion-----	Not limited-----	Limited: too sandy (limited) area reclaim (limited) small stones (slightly limited)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) slope (slightly limited)
3531: Shellabarger-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
Nalim-----	Very limited: low strength (very limited) shrink-swell (moderately limited)	Limited: dense layer (limited) too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) dense layer (limited)
3532: Shellabarger-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
3533: Shellabarger-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
3534: Shellabarger-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
3535: Shellabarger-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
Nalim-----	Very limited: low strength (very limited) shrink-swell (moderately limited)	Limited: dense layer (limited) too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) dense layer (limited)
3540: Solvay-----	Not limited-----	Slightly limited: too acid (slightly limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)
3550: Spelvin-----	Not limited-----	Moderately limited: too acid (moderately limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
3639: Taver-----	Very limited: low strength (very limited) shrink-swell (very limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
3640: Tivin-----	Slightly limited: slope (slightly limited)	Very limited: too sandy (very limited) slope >15% (very limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) slope >15% (very limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
3641: Tivin-----	Not limited-----	Very limited: too sandy (very limited) slope (slightly limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) slope (slightly limited)
Dillhut-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
3642: Tivin-----	Not limited-----	Very limited: too sandy (very limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (slightly limited)
Willowbrook-----	Not limited-----	Very limited: too sandy (very limited) area reclaim (very limited) small stones (moderately limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited) flooding (moderately limited)
3643: Tobin-----	Very limited: low strength (very limited) shrink-swell (moderately limited)	Slightly limited: too clayey (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: flooding (moderately limited) cutbanks cave (slightly limited)
3644: Turon-----	Not limited-----	Very limited: too sandy (very limited) too acid (moderately limited)	Improbable source: excess fines (bottom layer) possible source (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) too clayey (moderately limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
3644: Carway-----	Very limited: low strength (very limited) wetness (very limited) shrink-swell (moderately limited)	Very limited: wetness (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: ponded (wetness) (very limited) wetness (very limited) cutbanks cave (slightly limited)
3760: Urban land.					
Blazefork-----	Very limited: low strength (very limited) shrink-swell (limited)	Very limited: too clayey (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Limited: wetness (limited) too clayey (moderately limited) cutbanks cave (slightly limited)
Kaskan-----	Not limited-----	Slightly limited: too sandy (slightly limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (slightly limited)
3762: Urban land.					
Darlow-----	Very limited: low strength (very limited)	Very limited: excess sodium (very limited) excess salts (very limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)
Elmer-----	Slightly limited: shrink-swell (slightly limited)	Very limited: excess sodium (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
3763: Urban land.					
Imano-----	Not limited-----	Very limited: too sandy (very limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)
3764: Urban land.					
Mahone-----	Not limited-----	Moderately limited: too acid (moderately limited) too sandy (slightly limited)	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Slightly limited: cutbanks cave (slightly limited) wetness (slightly limited)
3765: Urban land.					
Saltcreek-----	Very limited: low strength (very limited) shrink-swell (slightly limited)	Not limited-----	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Moderately limited: too clayey (moderately limited) cutbanks cave (slightly limited)
Naron-----	Not limited-----	Not limited-----	Improbable source: excess fines (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited)
3766: Urban land.					
Saxman-----	Slightly limited: wetness (slightly limited)	Limited: too sandy (limited) wetness (slightly limited)	Possible source: possible source (bottom layer) possible source (thickest layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (very limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
3767: Urban land.					
Willowbrook-----	Not limited-----	Very limited: too sandy (very limited) area reclaim (very limited) small stones (moderately limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)
3768: Urban land.					
Yaggy-----	Not limited-----	Very limited: area reclaim (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited)
3900: Warnut-----	Very limited: wetness (very limited)	Very limited: wetness (very limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: ponded (wetness) (very limited) wetness (very limited) cutbanks cave (very limited)
3966: Willowbrook-----	Not limited-----	Very limited: too sandy (very limited) area reclaim (very limited) small stones (moderately limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited) flooding (moderately limited)
4004: Yaggy-----	Not limited-----	Very limited: area reclaim (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited) flooding (moderately limited)

Table 19.--Construction Materials and Excavating--Continued

Map symbol and soil name	Source for roadfill	Source for topsoil	Source for sand	Source for gravel	Shallow excavations
4005: Yaggy-----	Not limited-----	Very limited: area reclaim (very limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (limited) flooding (moderately limited)
Saxman-----	Slightly limited: wetness (slightly limited)	Limited: too sandy (limited) wetness (slightly limited)	Possible source: possible source (thickest layer) possible source (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Very limited: cutbanks cave (very limited) wetness (very limited)
4110: Zellmont-----	Very limited: depth to bedrock (very limited) shrink-swell (slightly limited)	Limited: depth to bedrock (limited) dense layer (limited) too acid (slightly limited)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Improbable source: excess fines (thickest layer) excess fines (bottom layer)	Limited: dense layer (limited) cutbanks cave (slightly limited) soft bedrock (slightly limited)
Poxmash-----	Moderately limited: depth to bedrock (moderately limited)	Very limited: small stones >20% (very limited) area reclaim (limited) dense layer (slightly limited)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Improbable source: excess fines (bottom layer) excess fines (thickest layer)	Very limited: cutbanks cave (very limited) dense layer (slightly limited)

Table 20.--Water Management

(The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation.
See text for definitions of terms used in this table. Absence of an entry indicates that no rating is applicable.)

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
990: Abbyville-----	Not limited-----	Very limited: excess sodium (very limited) slow percolation (limited)	Very limited: excess sodium (very limited) erodes easily (limited) slow percolation (limited)	Very limited: highly erodible (very limited)	Very limited: excess sodium (very limited) erodes easily (limited)
991: Abbyville-----	Not limited-----	Very limited: excess sodium (very limited) slow percolation (limited)	Very limited: excess sodium (very limited) slow percolation (limited)	Limited: erodibility (limited)	Very limited: excess sodium (very limited)
Kisiwa-----	Very limited: probable seepage (very limited)	Very limited: ponded (wetness) (very limited) excess sodium (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) excess sodium (very limited) v. slow percolation (very limited)	Very limited: highly erodible (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: wetness (very limited) excess sodium (very limited) erodes easily (limited)
1004: Albion-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Not limited-----	Very limited: too sandy (very limited) erodibility (slightly limited)	Not limited.
1011: Albion-----	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)	Very limited: too sandy (very limited) erodibility (slightly limited) slope (slightly limited)	Slightly limited: slope (slightly limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1011: Shellabarger-----	Moderately limited: potential seepage (moderately limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)	Moderately limited: erodibility (moderately limited)	Not limited.
1057: Aquents-----	Very limited: probable seepage (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) small stones (very limited)	Very limited: ponded (wetness) (very limited) erodes easily (limited) droughty (limited)	Very limited: too sandy (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: wetness (very limited) erodes easily (limited) droughty (limited)
1061: Arents.					
1062: Arents-----	Very limited: slope >12% (very limited) probable seepage (very limited)	Very limited: slope >6% (very limited) v. slow percolation (very limited)	Very limited: v. slow percolation (very limited) slope >6% (very limited) erodes easily (limited)	Very limited: slope >12% (very limited) highly erodible (very limited)	Very limited: slope >12% (very limited) erodes easily (limited)
1070: Avans-----	Moderately limited: potential seepage (moderately limited)	Not limited-----	Limited: erodes easily (limited)	Limited: erodibility (limited)	Limited: erodes easily (limited)
1071: Avans-----	Moderately limited: potential seepage (moderately limited)	Slightly limited: slope (slightly limited)	Limited: erodes easily (limited) slope (slightly limited)	Limited: erodibility (limited)	Limited: erodes easily (limited)
1072: Avans-----	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Limited: slope (limited)	Limited: erodes easily (limited) slope (limited)	Limited: erodibility (limited) slope (slightly limited)	Limited: erodes easily (limited) slope (slightly limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1191: Blazefork-----	Not limited-----	Limited: slow percolation (limited)	Limited: erodes easily (limited) slow percolation (limited) slow intake (moderately limited)	Very limited: highly erodible (very limited)	Limited: erodes easily (limited)
1192: Blazefork-----	Not limited-----	Limited: slow percolation (limited)	Limited: erodes easily (limited) slow percolation (limited) slow intake (moderately limited)	Very limited: highly erodible (very limited)	Limited: erodes easily (limited)
Kaskan-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Not limited-----	Very limited: too sandy (very limited) erodibility (limited)	Not limited.
1200: Buhler-----	Moderately limited: potential seepage (moderately limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited) erodes easily (limited)	Very limited: highly erodible (very limited)	Very limited: excess sodium (very limited) erodes easily (limited)
Blazefork-----	Not limited-----	Limited: slow percolation (limited)	Limited: erodes easily (limited) slow percolation (limited) slow intake (moderately limited)	Very limited: highly erodible (very limited)	Limited: erodes easily (limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1324: Carway-----	Moderately limited: potential seepage (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) erodibility (moderately limited)	Very limited: wetness (very limited)
Carbika-----	Moderately limited: potential seepage (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) v. slow percolation (very limited)	Very limited: ponded (wetness) (very limited) v. slow percolation (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) erodibility (limited)	Very limited: wetness (very limited)
1357: Carway-----	Moderately limited: potential seepage (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) fast intake (limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) erodibility (moderately limited)	Very limited: wetness (very limited)
Dillhut-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) wetness (moderately limited)	Very limited: fast intake (very limited) droughty (moderately limited)	Very limited: too sandy (very limited) wetness (moderately limited)	Moderately limited: wetness (moderately limited) droughty (moderately limited)
Solvay-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Limited: fast intake (limited)	Moderately limited: erodibility (moderately limited)	Not limited.
1359: Clark-----	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Moderately limited: slope (moderately limited)	Moderately limited: slope (moderately limited)	Limited: erodibility (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1359: Ost-----	Slightly limited: slope (slightly limited)	Limited: slope (limited) percs slowly (moderately limited)	Limited: slope (limited) percs slowly (moderately limited)	Limited: erodes easily (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)
1428: Crete-----	Moderately limited: potential seepage (moderately limited)	Limited: slow percolation (limited)	Limited: erodes easily (limited) slow percolation (limited)	Limited: erodibility (limited)	Limited: erodes easily (limited)
1429: Crete-----	Moderately limited: potential seepage (moderately limited)	Limited: slow percolation (limited) slope (slightly limited)	Limited: erodes easily (limited) slow percolation (limited) slope (slightly limited)	Limited: erodibility (limited)	Limited: erodes easily (limited)
1553: Darlow-----	Moderately limited: potential seepage (moderately limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited) erodes easily (limited)	Very limited: highly erodible (very limited)	Very limited: excess sodium (very limited) erodes easily (limited)
Elmer-----	Very limited: probable seepage (very limited)	Very limited: excess sodium (very limited) percs slowly (limited)	Very limited: excess sodium (very limited) percs slowly (limited)	Limited: erodes easily (limited)	Very limited: excess sodium (very limited)
1554: Dillhut-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) wetness (moderately limited) slope (slightly limited)	Very limited: fast intake (very limited) droughty (moderately limited) slope (slightly limited)	Very limited: too sandy (very limited) wetness (moderately limited)	Moderately limited: wetness (moderately limited) droughty (moderately limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1555: Dillhut-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Very limited: fast intake (very limited) droughty (slightly limited) slope (slightly limited)	Very limited: too sandy (very limited)	Slightly limited: droughty (slightly limited)
Plev-----	Very limited: probable seepage (very limited)	Very limited: wetness (very limited) cutbanks caving (limited)	Limited: droughty (limited) fast intake (limited)	Very limited: wetness (very limited) too sandy (limited)	Very limited: wetness (very limited) droughty (limited)
1556: Dillhut-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Very limited: fast intake (very limited) droughty (slightly limited) slope (slightly limited)	Very limited: too sandy (very limited)	Slightly limited: droughty (slightly limited)
Solvay-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Not limited-----	Moderately limited: erodibility (moderately limited)	Not limited.
1725: Farnum-----	Moderately limited: potential seepage (moderately limited)	Not limited-----	Not limited-----	Moderately limited: erodibility (moderately limited)	Not limited.
Funmar-----	Not limited-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Limited: erodibility (limited)	Not limited.
1727: Funmar-----	Not limited-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Limited: erodibility (limited)	Not limited.
Taver-----	Moderately limited: potential seepage (moderately limited)	Very limited: v. slow percolation (very limited)	Very limited: v. slow percolation (very limited)	Limited: erodibility (limited)	Not limited.

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1804: Geary-----	Moderately limited: potential seepage (moderately limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Very limited: highly erodible (very limited)	Not limited.
1807: Geary-----	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Limited: slope (limited) slow percolation (moderately limited)	Limited: erodes easily (limited) slope (limited) slow percolation (moderately limited)	Very limited: highly erodible (very limited) slope (slightly limited)	Limited: erodes easily (limited) slope (slightly limited)
1985: Hayes-----	Very limited: probable seepage (very limited) slope (slightly limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Slightly limited: erodibility (slightly limited) slope (slightly limited)	Slightly limited: slope (slightly limited)
1986: Hayes-----	Very limited: probable seepage (very limited) slope (slightly limited)	Slightly limited: slope (slightly limited)	Limited: fast intake (limited) slope (slightly limited)	Slightly limited: erodibility (slightly limited) slope (slightly limited)	Slightly limited: slope (slightly limited)
Solvay-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Limited: fast intake (limited)	Moderately limited: erodibility (moderately limited)	Not limited.
1987: Hayes-----	Very limited: probable seepage (very limited) slope (slightly limited)	Slightly limited: slope (slightly limited)	Limited: fast intake (limited) slope (slightly limited)	Slightly limited: erodibility (slightly limited) slope (slightly limited)	Slightly limited: slope (slightly limited)
Turon-----	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Very limited: fast intake (very limited) slope (slightly limited)	Limited: too sandy (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
2204: Jamash-----	Very limited: bedrock <20" (very limited)	Very limited: bedrock <20" (very limited) slow percolation (moderately limited)	Very limited: bedrock <20" (very limited) erodes easily (limited) droughty (limited)	Very limited: bedrock <40" (very limited) erodibility (limited)	Very limited: bedrock <20" (very limited) erodes easily (limited) droughty (limited)
Piedmont-----	Limited: depth to bedrock (limited)	Very limited: v. slow percolation (very limited) depth to bedrock (slightly limited)	Very limited: v. slow percolation (very limited) erodes easily (limited) slow intake (moderately limited)	Very limited: highly erodible (very limited) bedrock <40" (very limited)	Limited: erodes easily (limited) depth to bedrock (limited)
2205: Jamash-----	Very limited: bedrock <20" (very limited)	Very limited: bedrock <20" (very limited) slow percolation (moderately limited) slope (slightly limited)	Very limited: bedrock <20" (very limited) erodes easily (limited) droughty (limited)	Very limited: bedrock <40" (very limited) erodibility (limited)	Very limited: bedrock <20" (very limited) erodes easily (limited) droughty (limited)
Piedmont-----	Limited: depth to bedrock (limited)	Very limited: v. slow percolation (very limited) depth to bedrock (slightly limited) slope (slightly limited)	Very limited: v. slow percolation (very limited) erodes easily (limited) slow intake (moderately limited)	Very limited: highly erodible (very limited) bedrock <40" (very limited)	Limited: erodes easily (limited) depth to bedrock (limited)
2206: Jamash-----	Very limited: bedrock <20" (very limited) slope (moderately limited)	Very limited: bedrock <20" (very limited) slope (limited) slow percolation (moderately limited)	Very limited: bedrock <20" (very limited) slope (limited) erodes easily (limited)	Very limited: bedrock <40" (very limited) erodibility (limited) slope (moderately limited)	Very limited: bedrock <20" (very limited) erodes easily (limited) droughty (limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
2206: Piedmont-----	Limited: depth to bedrock (limited) slope (moderately limited)	Very limited: v. slow percolation (very limited) slope (limited) depth to bedrock (slightly limited)	Very limited: v. slow percolation (very limited) slope (limited) erodes easily (limited)	Very limited: highly erodible (very limited) bedrock <40" (very limited) slope (moderately limited)	Limited: erodes easily (limited) depth to bedrock (limited) slope (moderately limited)
2207: Jamash-----	Very limited: bedrock <20" (very limited) slope (slightly limited)	Very limited: bedrock <20" (very limited) slope (limited) slow percolation (moderately limited)	Very limited: bedrock <20" (very limited) erodes easily (limited) droughty (limited)	Very limited: bedrock <40" (very limited) erodibility (limited) slope (slightly limited)	Very limited: bedrock <20" (very limited) erodes easily (limited) droughty (limited)
2381: Kanza-----	Very limited: probable seepage (very limited)	Very limited: frequent flooding (very limited) cutbanks caving (limited) wetness (moderately limited)	Limited: frequent flooding (limited) droughty (slightly limited)	Very limited: too sandy (very limited) wetness (moderately limited) erodibility (slightly limited)	Moderately limited: wetness (moderately limited) droughty (slightly limited)
Ninnescah-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) occasional flooding (moderately limited) wetness (moderately limited)	Moderately limited: occasional flooding (moderately limited)	Moderately limited: wetness (moderately limited) erodibility (slightly limited)	Moderately limited: wetness (moderately limited)
2390: Kaskan-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Not limited-----	Very limited: too sandy (very limited) erodibility (limited)	Not limited.

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
2391: Kaskan-----	Very limited: probable seepage (very limited)	Very limited: frequent flooding (very limited) slow percolation (moderately limited)	Limited: frequent flooding (limited) erodes easily (limited) slow percolation (moderately limited)	Very limited: too sandy (very limited) erodibility (limited)	Limited: erodes easily (limited)
2395: Kisiwa-----	Very limited: probable seepage (very limited)	Very limited: ponded (wetness) (very limited) excess sodium (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) excess sodium (very limited) v. slow percolation (very limited)	Very limited: highly erodible (very limited) ponded (wetness) (very limited) wetness (very limited)	Very limited: wetness (very limited) excess sodium (very limited) erodes easily (limited)
2509: Ladysmith-----	Not limited-----	Very limited: v. slow percolation (very limited) wetness (slightly limited)	Very limited: v. slow percolation (very limited) erodes easily (limited) slow intake (moderately limited)	Limited: erodibility (limited) wetness (slightly limited)	Limited: erodes easily (limited) wetness (slightly limited)
2556: Langdon-----	Very limited: probable seepage (very limited) slope (moderately limited)	Very limited: slope >6% (very limited) cutbanks caving (limited)	Very limited: fast intake (very limited) slope >6% (very limited) droughty (limited)	Very limited: too sandy (very limited) slope (moderately limited)	Limited: droughty (limited) slope (moderately limited)
2587: Imano-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) slow percolation (moderately limited) occasional flooding (moderately limited)	Moderately limited: slow percolation (moderately limited) occasional flooding (moderately limited) slow intake (moderately limited)	Very limited: too sandy (very limited) erodibility (moderately limited)	Not limited.

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
2588: Longford-----	Slightly limited: slope (slightly limited)	Moderately limited: slow percolation (moderately limited) slope (moderately limited)	Limited: erodes easily (limited) slow percolation (moderately limited) slow intake (moderately limited)	Very limited: highly erodible (very limited) slope (slightly limited)	Limited: erodes easily (limited) slope (slightly limited)
2812: Mahone-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Limited: fast intake (limited)	Slightly limited: erodibility (slightly limited)	Not limited.
2948: Nalim-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Moderately limited: erodibility (moderately limited)	Not limited.
2949: Naron-----	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: cutbanks caving (limited) slope (moderately limited)	Moderately limited: slope (moderately limited)	Limited: erodibility (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)
2950: Naron-----	Very limited: probable seepage (very limited) slope (limited)	Very limited: slope >6% (very limited) cutbanks caving (limited)	Very limited: slope >6% (very limited)	Limited: slope (limited) erodibility (limited)	Limited: slope (limited)
2951: Nash-----	Limited: depth to bedrock (limited) potential seepage (moderately limited)	Moderately limited: depth to bedrock (moderately limited) slope (slightly limited)	Limited: erodes easily (limited) depth to bedrock (moderately limited) slope (slightly limited)	Very limited: bedrock <40" (very limited) too sandy (very limited) erodibility (limited)	Limited: erodes easily (limited) depth to bedrock (limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
2952: Nash-----	Limited: depth to bedrock (limited) potential seepage (moderately limited) slope (slightly limited)	Limited: slope (limited) depth to bedrock (moderately limited)	Limited: erodes easily (limited) slope (limited) depth to bedrock (moderately limited)	Very limited: bedrock <40" (very limited) too sandy (very limited) erodibility (limited)	Limited: erodes easily (limited) depth to bedrock (limited) slope (slightly limited)
Lucien-----	Very limited: bedrock <20" (very limited) probable seepage (very limited) slope (moderately limited)	Very limited: bedrock <20" (very limited) slope (limited)	Very limited: bedrock <20" (very limited) slope (limited) droughty (limited)	Very limited: bedrock <40" (very limited) erodibility (limited) slope (moderately limited)	Very limited: bedrock <20" (very limited) droughty (limited) erodes easily (limited)
2953: Nash-----	Limited: slope (limited) depth to bedrock (limited) potential seepage (moderately limited)	Very limited: slope >6% (very limited) depth to bedrock (moderately limited)	Very limited: slope >6% (very limited) erodes easily (limited) depth to bedrock (moderately limited)	Very limited: bedrock <40" (very limited) too sandy (very limited) slope (limited)	Limited: erodes easily (limited) slope (limited) depth to bedrock (limited)
Lucien-----	Very limited: bedrock <20" (very limited) probable seepage (very limited) slope (limited)	Very limited: slope >6% (very limited) bedrock <20" (very limited)	Very limited: bedrock <20" (very limited) slope >6% (very limited) droughty (limited)	Very limited: depth to bedrock (very limited) slope (limited) erodes easily (limited)	Very limited: bedrock <20" (very limited) slope (limited) droughty (limited)
2955: Nickerson-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Not limited-----	Very limited: too sandy (very limited) erodibility (slightly limited)	Not limited.

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
2956: Nickerson-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Limited: fast intake (limited)	Limited: too sandy (limited) erodibility (slightly limited)	Not limited.
2957: Nickerson-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Not limited-----	Very limited: too sandy (very limited) erodibility (slightly limited)	Not limited.
Punkin-----	Very limited: probable seepage (very limited)	Very limited: v. slow percolation (very limited) excess sodium (very limited) cutbanks caving (limited)	Very limited: v. slow percolation (very limited) excess sodium (very limited)	Very limited: too sandy (very limited) erodibility (limited)	Very limited: excess sodium (very limited)
2958: Ninnescah-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) occasional flooding (moderately limited) wetness (moderately limited)	Moderately limited: occasional flooding (moderately limited)	Moderately limited: wetness (moderately limited) erodibility (slightly limited)	Moderately limited: wetness (moderately limited)
2959: Ninnescah-----	Very limited: probable seepage (very limited)	Limited: wetness (limited) cutbanks caving (limited) occasional flooding (moderately limited)	Moderately limited: occasional flooding (moderately limited)	Limited: wetness (limited) too sandy (limited) erodibility (moderately limited)	Limited: wetness (limited)
3051: Ost-----	Not limited-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Limited: erodibility (limited)	Not limited.

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
3052: Ost-----	Not limited-----	Moderately limited: slow percolation (moderately limited) slope (slightly limited)	Moderately limited: slow percolation (moderately limited) slope (slightly limited)	Limited: erodibility (limited)	Not limited.
Clark-----	Moderately limited: potential seepage (moderately limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Limited: erodibility (limited)	Not limited.
3170: Penalosa-----	Moderately limited: potential seepage (moderately limited)	Limited: slow percolation (limited)	Limited: erodes easily (limited) slow percolation (limited)	Very limited: highly erodible (very limited)	Limited: erodes easily (limited)
3171: Penalosa-----	Moderately limited: potential seepage (moderately limited)	Limited: slow percolation (limited)	Limited: erodes easily (limited) slow percolation (limited)	Very limited: highly erodible (very limited)	Limited: erodes easily (limited)
3180: Pratt-----	Very limited: probable seepage (very limited) slope (moderately limited)	Very limited: slope >6% (very limited) cutbanks caving (limited)	Very limited: fast intake (very limited) slope >6% (very limited)	Very limited: too sandy (very limited) slope (moderately limited)	Moderately limited: slope (moderately limited)
3181: Pratt-----	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Very limited: fast intake (very limited) slope (slightly limited)	Very limited: too sandy (very limited) slope (slightly limited)	Slightly limited: slope (slightly limited)
Turon-----	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Very limited: fast intake (very limited) slope (slightly limited)	Limited: too sandy (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
3190: Punkin-----	Not limited-----	Very limited: v. slow percolation (very limited) excess sodium (very limited)	Very limited: v. slow percolation (very limited) excess sodium (very limited) erodes easily (limited)	Very limited: highly erodible (very limited)	Very limited: excess sodium (very limited) erodes easily (limited)
3191: Punkin-----	Not limited-----	Very limited: v. slow percolation (very limited) excess sodium (very limited)	Very limited: v. slow percolation (very limited) excess sodium (very limited) erodes easily (limited)	Very limited: highly erodible (very limited)	Very limited: excess sodium (very limited) erodes easily (limited)
Taver-----	Moderately limited: potential seepage (moderately limited)	Very limited: percs slowly (very limited)	Very limited: percs slowly (very limited)	Limited: erodes easily (limited)	Not limited.
3403: Sand pits.					
3469: Smolan-----	Not limited-----	Limited: slow percolation (limited) slope (slightly limited)	Limited: erodes easily (limited) slow percolation (limited) slow intake (moderately limited)	Limited: erodibility (limited)	Limited: erodes easily (limited)
3510: Saltcreek-----	Moderately limited: potential seepage (moderately limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Moderately limited: erodibility (moderately limited)	Not limited.
Funmar-----	Not limited-----	Moderately limited: slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited)	Limited: erodibility (limited)	Not limited.
Farnum-----	Moderately limited: potential seepage (moderately limited)	Not limited-----	Not limited-----	Moderately limited: erodibility (moderately limited)	Not limited.

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
3511: Saltcreek-----	Moderately limited: potential seepage (moderately limited)	Not limited-----	Not limited-----	Moderately limited: erodibility (moderately limited)	Not limited.
Naron-----	Moderately limited: potential seepage (moderately limited)	Very limited: percs slowly (very limited)	Very limited: percs slowly (very limited)	Limited: erodes easily (limited)	Not limited.
3512: Saltcreek-----	Moderately limited: potential seepage (moderately limited)	Slightly limited: slope (slightly limited)	Slightly limited: slope (slightly limited)	Moderately limited: erodibility (moderately limited)	Not limited.
Naron-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)	Limited: erodibility (limited)	Not limited.
3520: Saxman-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) wetness (slightly limited)	Limited: fast intake (limited) droughty (slightly limited)	Very limited: too sandy (very limited) wetness (slightly limited) erodibility (slightly limited)	Slightly limited: wetness (slightly limited) droughty (slightly limited)
3530: Shellabarger-----	Limited: slope (limited) potential seepage (moderately limited)	Very limited: slope >6% (very limited) cutbanks caving (limited)	Very limited: slope >6% (very limited)	Limited: slope (limited) erodibility (moderately limited)	Limited: slope (limited)
Albion-----	Very limited: probable seepage (very limited) slope (limited)	Very limited: slope >6% (very limited) cutbanks caving (limited)	Very limited: slope >6% (very limited)	Very limited: too sandy (very limited) slope (limited) erodibility (slightly limited)	Limited: slope (limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
3531: Shellabarger-----	Moderately limited: potential seepage (moderately limited) slope (slightly limited)	Limited: cutbanks caving (limited) slope (moderately limited)	Moderately limited: slope (moderately limited)	Moderately limited: erodibility (moderately limited) slope (slightly limited)	Slightly limited: slope (slightly limited)
Nalim-----	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: cutbanks caving (limited) slow percolation (moderately limited) slope (moderately limited)	Moderately limited: slow percolation (moderately limited) slope (moderately limited)	Moderately limited: erodibility (moderately limited) slope (slightly limited)	Slightly limited: slope (slightly limited)
3532: Shellabarger-----	Moderately limited: potential seepage (moderately limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Limited: fast intake (limited) slope (slightly limited)	Moderately limited: erodibility (moderately limited)	Not limited.
3533: Shellabarger-----	Moderately limited: potential seepage (moderately limited)	Limited: cutbanks caving (limited)	Not limited-----	Moderately limited: erodibility (moderately limited)	Not limited.
3534: Shellabarger-----	Moderately limited: potential seepage (moderately limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)	Moderately limited: erodibility (moderately limited)	Not limited.
3535: Shellabarger-----	Moderately limited: potential seepage (moderately limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)	Moderately limited: erodibility (moderately limited)	Not limited.

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
3535: Nalim-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) slow percolation (moderately limited) slope (slightly limited)	Moderately limited: slow percolation (moderately limited) slope (slightly limited)	Moderately limited: erodibility (moderately limited)	Not limited.
3540: Solvay-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Limited: fast intake (limited)	Moderately limited: erodibility (moderately limited)	Not limited.
3550: Spelvin-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Limited: fast intake (limited)	Moderately limited: erodibility (moderately limited)	Not limited.
3639: Taver-----	Moderately limited: potential seepage (moderately limited)	Very limited: v. slow percolation (very limited)	Very limited: v. slow percolation (very limited)	Limited: erodibility (limited)	Not limited.
3640: Tivin-----	Very limited: probable seepage (very limited) slope >12% (very limited)	Very limited: slope >6% (very limited) cutbanks caving (limited)	Very limited: fast intake (very limited) slope >6% (very limited) droughty (limited)	Very limited: too sandy (very limited) slope >12% (very limited)	Very limited: slope >12% (very limited) droughty (limited)
3641: Tivin-----	Very limited: probable seepage (very limited) slope (limited)	Very limited: slope >6% (very limited) cutbanks caving (limited)	Very limited: fast intake (very limited) slope >6% (very limited) droughty (limited)	Very limited: too sandy (very limited) slope (limited)	Limited: droughty (limited) slope (limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
3641: Dillhut-----	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: cutbanks caving (limited) slope (slightly limited)	Very limited: fast intake (very limited) slope (slightly limited) droughty (slightly limited)	Very limited: too sandy (very limited) slope (slightly limited)	Slightly limited: droughty (slightly limited) slope (slightly limited)
3642: Tivin-----	Very limited: probable seepage (very limited) slope (moderately limited)	Limited: slope (limited) cutbanks caving (limited)	Very limited: fast intake (very limited) slope (limited) droughty (limited)	Very limited: too sandy (very limited) slope (moderately limited)	Limited: droughty (limited) slope (moderately limited)
Willowbrook-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) occasional flooding (moderately limited)	Moderately limited: occasional flooding (moderately limited)	Very limited: too sandy (very limited) erodibility (slightly limited)	Not limited.
3643: Tobin-----	Moderately limited: potential seepage (moderately limited)	Moderately limited: occasional flooding (moderately limited)	Moderately limited: occasional flooding (moderately limited)	Limited: erodibility (limited)	Not limited.
3644: Turon-----	Very limited: probable seepage (very limited) slope (slightly limited)	Limited: cutbanks caving (limited) slope (moderately limited)	Very limited: fast intake (very limited) slope (moderately limited)	Limited: too sandy (limited) slope (slightly limited)	Slightly limited: slope (slightly limited)
Carway-----	Moderately limited: potential seepage (moderately limited)	Very limited: ponded (wetness) (very limited) wetness (very limited)	Very limited: ponded (wetness) (very limited) fast intake (limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) erodibility (moderately limited)	Very limited: wetness (very limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
3760: Urban land.					
Blazefork-----	Not limited-----	Limited: slow percolation (limited)	Limited: erodes easily (limited) slow percolation (limited) slow intake (moderately limited)	Very limited: highly erodible (very limited)	Limited: erodes easily (limited)
Kaskan-----	Very limited: probable seepage (very limited)	Limited: cutbanks cave (limited)	Not limited-----	Very limited: too sandy (very limited) erodes easily (limited)	Not limited.
3762: Urban land.					
Darlow-----	Moderately limited: potential seepage (moderately limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited)	Very limited: excess sodium (very limited) v. slow percolation (very limited) erodes easily (limited)	Very limited: highly erodible (very limited)	Very limited: excess sodium (very limited) erodes easily (limited)
Elmer-----	Very limited: probable seepage (very limited)	Very limited: excess sodium (very limited) percs slowly (limited)	Very limited: excess sodium (very limited) percs slowly (limited)	Limited: erodes easily (limited)	Very limited: excess sodium (very limited)
3763: Urban land.					
Imano-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) slow percolation (moderately limited)	Moderately limited: slow percolation (moderately limited) slow intake (moderately limited)	Very limited: too sandy (very limited) erodibility (moderately limited)	Not limited.
3764: Urban land.					
Mahone-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Limited: fast intake (limited)	Slightly limited: erodibility (slightly limited)	Not limited.

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
3765: Urban land.					
Saltcreek-----	Moderately limited: potential seepage (moderately limited)	Not limited-----	Not limited-----	Moderately limited: erodibility (moderately limited)	Not limited.
Naron-----	Moderately limited: potential seepage (moderately limited)	Very limited: percs slowly (very limited)	Very limited: percs slowly (very limited)	Limited: erodes easily (limited)	Not limited.
3766: Urban land.					
Saxman-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) wetness (slightly limited)	Limited: fast intake (limited) droughty (slightly limited)	Very limited: too sandy (very limited) wetness (slightly limited) erodibility (slightly limited)	Slightly limited: wetness (slightly limited) droughty (slightly limited)
3767: Urban land.					
Willowbrook-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Not limited-----	Very limited: too sandy (very limited) erodibility (slightly limited)	Not limited.
3768: Urban land.					
Yaggy-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited)	Slightly limited: droughty (slightly limited)	Very limited: too sandy (very limited) erodibility (slightly limited)	Slightly limited: droughty (slightly limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
3900: Warnut-----	Very limited: probable seepage (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) cutbanks caving (limited)	Very limited: ponded (wetness) (very limited) fast intake (very limited)	Very limited: ponded (wetness) (very limited) wetness (very limited) erodibility (moderately limited)	Very limited: wetness (very limited)
3966: Willowbrook-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) occasional flooding (moderately limited)	Moderately limited: occasional flooding (moderately limited)	Very limited: too sandy (very limited) erodibility (slightly limited)	Not limited.
4004: Yaggy-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) occasional flooding (moderately limited)	Moderately limited: occasional flooding (moderately limited) droughty (slightly limited)	Very limited: too sandy (very limited) erodibility (slightly limited)	Slightly limited: droughty (slightly limited)
4005: Yaggy-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) occasional flooding (moderately limited)	Moderately limited: occasional flooding (moderately limited) droughty (slightly limited)	Very limited: too sandy (very limited) erodibility (slightly limited)	Slightly limited: droughty (slightly limited)
Saxman-----	Very limited: probable seepage (very limited)	Limited: cutbanks caving (limited) wetness (slightly limited)	Limited: fast intake (limited) droughty (slightly limited)	Very limited: too sandy (very limited) wetness (slightly limited) erodibility (slightly limited)	Slightly limited: wetness (slightly limited) droughty (slightly limited)
4110: Zellmont-----	Limited: depth to bedrock (limited) potential seepage (moderately limited)	Moderately limited: slow percolation (moderately limited) depth to bedrock (slightly limited)	Moderately limited: slow percolation (moderately limited) depth to bedrock (slightly limited)	Very limited: bedrock <40" (very limited) erodibility (moderately limited)	Limited: depth to bedrock (limited)

Table 20.--Water Management--Continued

Map symbol and soil name	Pond reservoir areas	Drainage	Irrigation	Terraces and diversions	Grassed waterways
4110: Poxmash-----	Very limited: probable seepage (very limited) depth to bedrock (moderately limited)	Limited: cutbanks caving (limited) small stones (limited)	Not limited-----	Moderately limited: depth to bedrock (moderately limited) erodibility (slightly limited)	Moderately limited: depth to bedrock (moderately limited)

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories (USDA, 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 21 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 Alfisol.

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 Ustalf (*Ust*, meaning an ustic moisture regime, plus *alf*, from Alfisol).

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 Haplustalfs (*Hapl*, meaning minimal horizonation, plus *ustalf*, the suborder of the Alfisols 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. An example is Udic Haplustalfs.

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, mineral content, soil temperature regime, soil depth, and reaction. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is coarse-loamy, mixed, superactive, mesic Udic Haplustalfs.

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.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. 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" (USDA, 1993). Many of the technical terms used in the descriptions are defined in "Soil Taxonomy" (USDA, 1999) and in "Keys to Soil Taxonomy" (USDA, 1998). Following the pedon description is the range of important characteristics of the soils in the series.

Abbyville Series

The Abbyville series consists of very deep, somewhat poorly drained, slowly permeable soils that formed in loamy alluvium. These soils are on terraces and high flood plains in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 2 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Abbyville loam, on a planar slope of 1 percent, in an area of native grass in Reno County, Kansas, about 6

miles west of Hutchinson; 2,600 feet north and 300 feet east of the southwest corner of sec. 2, T. 23 S., R. 7 W.; USGS Yaggy topographic quadrangle; lat. 38 degrees 4 minutes 45 seconds N. and long. 98 degrees 4 minutes 2.5 seconds W. (colors are for dry soil unless otherwise stated):

A—0 to 8 inches; dark gray (10YR 4/1) loam, very dark gray (10YR 3/1) moist; weak fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots throughout; 17 percent clay; noneffervescent throughout (HCl, 1 normal); moderately alkaline; abrupt smooth boundary.

Btknz1—8 to 15 inches; light yellowish brown (10YR 6/4) sandy clay loam, yellowish brown (10YR 5/4) moist; common medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 23 percent clay; few distinct discontinuous brown (10YR 5/3 moist) clay films on vertical faces of peds and few prominent continuous very dark grayish brown (10YR 3/2 moist) organic coatings on faces of peds and in pores; common fine rounded black (10YR 2/1) iron-manganese concretions (pedogenic) throughout, common fine irregular carbonate concretions throughout, and common fine irregular halite crystals throughout; very slightly effervescent throughout (HCl, 1 normal); strongly alkaline; clear wavy boundary.

Btknz2—15 to 24 inches; pale brown (10YR 6/3) clay loam, brown (10YR 5/3) moist; many fine and medium prominent light brownish gray (2.5Y 6/2 moist) irregular redoximorphic depletions throughout and common fine and medium distinct yellowish brown (10YR 5/8 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few very fine and fine roots between peds; 28 percent clay; few faint continuous brown (10YR 5/3 moist) clay films on vertical faces of peds; common fine rounded iron-manganese concretions throughout, common fine irregular carbonate concretions throughout, and common fine irregular halite crystals throughout; very slightly effervescent throughout (HCl, 1 normal); strongly alkaline; gradual wavy boundary.

Btknz3—24 to 36 inches; light gray (2.5Y 7/2) clay loam, light brownish gray (2.5Y 6/2) moist;

common medium and coarse prominent yellowish brown (10YR 5/8 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; few very fine roots between peds; 32 percent clay; few distinct continuous grayish brown (2.5Y 5/2 moist) clay films on vertical faces of peds and few distinct discontinuous brown (10YR 5/3 moist) skeletalans on vertical faces of peds; few fine irregular carbonate concretions throughout, common fine irregular soft masses of iron-manganese throughout, and common fine irregular halite crystals throughout; very slightly effervescent throughout (HCl, 1 normal); strongly alkaline; gradual wavy boundary.

Btknz4—36 to 50 inches; light gray (2.5Y 7/2) (interior) clay loam, light brownish gray (2.5Y 6/2) moist; many medium and coarse prominent yellowish brown (10YR 5/8 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and plastic; 30 percent clay; few distinct discontinuous grayish brown (2.5Y 5/2 moist) clay films on vertical faces of peds and few distinct discontinuous grayish brown (10YR 5/2 moist) skeletalans on vertical faces of peds; common fine irregular carbonate concretions throughout, common fine irregular soft masses of iron-manganese throughout, and common fine irregular halite crystals throughout; noneffervescent throughout (HCl, 1 normal); strongly alkaline; gradual wavy boundary.

Btkn1—50 to 62 inches; light yellowish brown (10YR 6/4) (interior) sandy clay loam, yellowish brown (10YR 5/4) (interior) moist; many medium and coarse prominent light brownish gray (2.5Y 6/2 moist) irregular redoximorphic depletions throughout and common fine and medium distinct yellowish brown (10YR 5/8 moist) irregular redoximorphic concentrations throughout; weak medium subangular blocky structure; very hard, friable, slightly sticky and slightly plastic; 23 percent clay; few faint patchy clay films on vertical faces of peds; common fine irregular carbonate concretions throughout and few fine irregular soft masses of iron-manganese throughout; noneffervescent throughout (HCl, 1 normal); strongly alkaline; clear smooth boundary.

Btkn2—62 to 70 inches; light yellowish brown (10YR 6/4) (interior) loam, yellowish brown (10YR 5/4) (interior) moist; common fine and medium distinct light brownish gray (2.5Y 6/2 moist) irregular

redoximorphic depletions throughout and many fine and medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; very hard, friable, slightly sticky and slightly plastic; 25 percent clay; few distinct discontinuous clay films on vertical faces of peds; common fine irregular carbonate concretions throughout and common fine irregular soft masses of iron-manganese throughout; noneffervescent throughout (HCl, 1 normal); strongly alkaline; gradual wavy boundary.

Btkn3—70 to 80 inches; light yellowish brown (10YR 6/4) (interior) clay loam, yellowish brown (10YR 5/4) (interior) moist; common fine prominent light brownish gray (2.5Y 6/2 moist) irregular redoximorphic depletions throughout; weak medium prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and plastic; 32 percent clay; few distinct discontinuous clay films on vertical faces of peds; common medium irregular carbonate concretions throughout; noneffervescent throughout (HCl, 1 normal); strongly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic (bordering on thermic)

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 18 to 32 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 0 to 15 inches

Thickness of the ochric epipedon: 2 to 9 inches

Water table: Depth to top—2 to 4 feet; kind—apparent; months—February through June

Other features: Some pedons have an Ap, BC, C, 2Ab, or 2Btb horizon.

A horizon:

Hue—10YR

Value—3 to 6 dry, 2 to 4 moist

Chroma—1 or 2

Texture—loam or fine sandy loam

Sodium adsorption ratio—2 to 8

Reaction—slightly alkaline or moderately alkaline

Btkn horizon:

Hue—2.5Y or 10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—matrix, 2 to 4; redox, 6 to 8

Texture—loam, sandy clay loam, or clay loam

Content of rock fragments—0 to 2 percent

Sodium adsorption ratio—13 to 25

Reaction—moderately alkaline or strongly alkaline

Albion Series

The Albion series consists of very deep, somewhat excessively drained or well drained, moderately rapidly permeable soils on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). These soils formed in loamy Quaternary sediments over sandy alluvium at a depth of 20 to 40 inches. Slopes range from 0 to 15 percent. The mean annual temperature is 57 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Albion sandy loam (fig. 17), on a west-facing slope of 3 percent, in an area of native grass pasture in Reno County, Kansas, 6 miles east of Langdon; 2,440 feet west and 150 feet south of the northeast corner of sec. 20, T. 25 S., R. 8 W.; USGS Pretty Prairie SW topographic quadrangle; lat. 37 degrees 52 minutes 6 seconds N. and long. 98 degrees 13 minutes 24 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 9 inches; brown (7.5YR 5/3) (interior) sandy loam, dark brown (7.5YR 3/3) (interior) moist; weak fine subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots throughout; 12 percent clay; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately acid; clear smooth boundary.

Bt1—9 to 16 inches; brown (7.5YR 5/3) (interior) sandy loam, brown (7.5YR 4/3) (interior) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 16 percent clay; few distinct discontinuous brown (7.5YR 4/4 moist) clay films on faces of peds and in pores and few distinct discontinuous clay bridges between sand grains; noneffervescent throughout (HCl, 1 normal); 2 percent subrounded mixed gravel; slightly acid; gradual smooth boundary.

Bt2—16 to 27 inches; reddish brown (5YR 5/4) (interior) coarse sandy loam, reddish brown (5YR 4/4) (interior) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots throughout; 13 percent clay; very few faint patchy reddish brown (5YR 4/4 moist) clay films on faces of peds and in pores and few faint patchy clay bridges between sand grains; noneffervescent throughout (HCl, 1 normal); 5 percent subrounded mixed gravel; slightly acid; gradual smooth boundary.

BC—27 to 48 inches; light brown (7.5YR 6/4) (interior) loamy coarse sand, brown (7.5YR 5/4) (interior) moist; weak fine and medium subangular blocky structure parting to single grain; loose when moist and dry, nonsticky and nonplastic when wet; 5 percent clay; noneffervescent throughout (HCl, 1 normal); 10 percent subrounded mixed gravel; neutral; gradual smooth boundary.

C—48 to 80 inches; pale brown (10YR 6/3) (interior) sand, brown (10YR 5/3) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 1 percent clay; noneffervescent throughout (HCl, 1 normal); 5 percent subrounded mixed gravel; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic (bordering on thermic)

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 7 to 15 percent clay

Depth to bedrock: Greater than 80 inches

Thickness of the mollic epipedon: 7 to 15 inches

A horizon:

Hue—7.5YR or 10YR

Value—4 or 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—sandy loam, fine sandy loam, loamy fine sand, or loam

Content of rock fragments—0 to 15 percent

Reaction—moderately acid or slightly acid

Bt horizon:

Hue—10YR to 2.5YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 to 6

Texture—sandy loam or loam

Content of rock fragments—0 to 15 percent

Reaction—slightly acid to moderately alkaline

BC horizon:

Hue—10YR to 2.5YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 to 6

Texture—coarse sandy loam, sandy loam, loamy coarse sand, or loamy sand

Content of rock fragments—0 to 15 percent

Reaction—slightly acid to moderately alkaline

C horizon:

Hue—10YR, 7.5YR, or 5YR

Value—4 to 6 dry, 4 or 5 moist

Chroma—3 to 8

Texture—sand, coarse sand, gravelly sand, or loamy sand

Content of rock fragments—0 to 40 percent

Reaction—slightly acid to moderately alkaline

Attica Series

The Attica series consists of deep, well drained, moderately rapidly permeable soils that formed in eolian sediments. These soils are on dunes on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). The mean annual precipitation is 28 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Attica fine sandy loam, in a cultivated field in Stafford County, Kansas, 3 miles north and 1.5 miles east of Macksville; 2,490 feet east and 300 feet south of the northwest corner of sec. 2, T. 24 S., R. 15 W. (colors are for dry soil unless otherwise stated):

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

Bt—10 to 21 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; weak medium subangular blocky structure; slightly hard, friable; clay bridges between sand grains; slightly acid; clear smooth boundary.

BC—21 to 39 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 4/3) moist; massive; soft, very friable; neutral; gradual smooth boundary.

C—39 to 80 inches; light yellowish brown (10YR 6/4) fine sandy loam, yellowish brown (10YR 5/4) moist; massive; soft, very friable; neutral.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic (bordering on thermic)

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 8 to 17 percent clay

Depth to secondary calcium carbonate: Greater than 30 inches

Thickness of the ochric epipedon: 8 to 20 inches

A horizon:

Hue—7.5YR or 10YR

Value—4 to 6 dry, 3 or 4 moist

Chroma—2 or 3

Texture—fine sandy loam, sandy loam, or loamy fine sand

Reaction—moderately acid to neutral

Bt horizon:

Hue—7.5YR or 10YR
 Value—4 to 6 dry, 3 to 5 moist
 Chroma—2 to 5
 Texture—fine sandy loam or sandy loam
 Reaction—moderately acid or slightly acid

C horizon:

Hue—5YR, 7.5YR, or 10YR
 Value—5 or 6 dry, 4 or 5 moist
 Chroma—3 to 6
 Texture—fine sandy loam or loamy fine sand
 Reaction—slightly acid to moderately alkaline

Avans Series

The Avans series consists of very deep, well drained, moderately permeable soils that formed in loamy alluvium. These soils are on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 8 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Avans loam, in a cultivated field in Reno County, Kansas, 1 mile north and 3 miles west of Haven; 1,745 feet north and 90 feet east of the southwest corner of sec. 36, T. 24 S., R. 5 W.; USGS Haven topographic quadrangle; lat. 37 degrees 55 minutes 1 second N. and long. 97 degrees 49 minutes 45.1 seconds W. (colors are for dry soil unless otherwise stated):

Ap1—0 to 5 inches; grayish brown (10YR 5/2) loam, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 20 percent clay; strongly acid; abrupt smooth boundary.

Ap2—5 to 10 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common fine and medium roots throughout; 20 percent clay; strongly acid; clear smooth boundary.

BA—10 to 14 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate medium subangular blocky structure parting to moderate fine granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 22 percent clay;

common distinct continuous very dark gray (10YR 3/1 moist) organic coatings on vertical and horizontal faces of peds; strongly acid; clear smooth boundary.

Bt1—14 to 19 inches; brown (10YR 5/3) clay loam, dark brown (10YR 3/3) moist; moderate fine prismatic structure parting to moderate fine subangular blocky; slightly hard, firm, moderately sticky and moderately plastic; common fine and medium roots throughout; 30 percent clay; few faint discontinuous dark grayish brown (10YR 4/2 moist) clay films on faces of peds and few distinct discontinuous very dark grayish brown (10YR 3/2 moist) organic coatings on faces of peds and in pores; moderately acid; gradual smooth boundary.

Bt2—19 to 30 inches; brown (7.5YR 5/3) loam, brown (7.5YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, moderately sticky and moderately plastic; common very fine roots throughout; 26.7 percent clay; 27 percent sand; few faint discontinuous brown (7.5YR 4/3 moist) clay films on faces of peds; slightly acid; clear smooth boundary.

Bt3—30 to 43 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; few fine distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 22 percent clay; few faint discontinuous brown (7.5YR 4/3 moist) clay films on faces of peds; neutral; gradual smooth boundary.

Bt4—43 to 53 inches; strong brown (7.5YR 5/6) silt loam, strong brown (7.5YR 4/6) moist; few fine distinct strong brown (7.5YR 5/8 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; 20 percent clay; very few faint patchy brown (7.5YR 4/3 moist) clay films on faces of peds; neutral; gradual smooth boundary.

Btk1—53 to 65 inches; strong brown (7.5YR 5/6) silt loam, strong brown (7.5YR 4/6) moist; few fine distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 22 percent clay; very few faint patchy brown (7.5YR 4/4 moist) clay films in root channels and/or in pores, very few distinct discontinuous dark grayish brown (10YR 4/2

moist) organic coatings on faces of peds and in pores, and few distinct continuous carbonate coatings in root channels and/or in pores; neutral; clear smooth boundary.

Btk2—65 to 80 inches; strong brown (7.5YR 5/6) loam, strong brown (7.5YR 4/6) moist; few fine distinct reddish brown (5YR 4/4 moist) irregular redoximorphic concentrations throughout; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 21 percent clay; very few faint patchy brown (7.5YR 4/4 moist) clay films in root channels and in pores, few distinct discontinuous organic coatings in root channels and in pores, and few distinct continuous carbonate coatings in root channels and pores; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic (bordering on thermic)

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 13 to 34 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 40 inches

Thickness of the mollic epipedon: 10 to 18 inches

A horizon:

Hue—10YR

Value—4 or 5 dry, 2 or 3 moist

Chroma—1 or 2

Texture—loam or silt loam

Reaction—moderately acid or strongly acid

BA horizon:

Hue—10YR

Value—4 or 5 dry, 2 or 3 moist

Chroma—1 or 2

Texture—silt loam or loam

Reaction—moderately acid or strongly acid

Bt horizon:

Hue—10YR or 7.5YR

Value—4 to 7 dry, 3 to 5 moist

Chroma—3 to 6

Texture—loam, silty clay loam, silt loam, or clay loam

Reaction—moderately acid to neutral

Btk horizon:

Hue—7.5YR or 10YR

Value—4 to 7 dry, 3 to 5 moist

Chroma—3 to 6

Texture—loam, silty clay loam, clay loam, or silt loam

Reaction—neutral to moderately alkaline

Blazefork Series

The Blazefork series consists of very deep, moderately well drained, slowly permeable soils that formed in alluvium. These soils are on flood plains in the Central Loess Plains (MLRA 75). Slopes range from 0 to 2 percent. The mean annual precipitation is 29 inches, and the mean annual air temperature is 54 degrees F.

Typical Pedon

Blazefork silty clay loam (fig. 18), in a cultivated field in Reno County, Kansas, 3 miles east of Buhler; 498 feet west and 1,524 feet south of the northeast corner of sec. 12, T. 22 S., R. 4 W.; USGS Halstead NW topographic quadrangle; lat. 38 degrees 9 minutes 18 seconds N. and long. 97 degrees 42 minutes 12 seconds W. (colors are for dry soil unless otherwise stated):

Ap1—0 to 3 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak fine subangular blocky structure parting to weak medium granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 36.1 percent clay; very strongly acid; abrupt smooth boundary.

Ap2—3 to 7 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak medium subangular blocky structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots throughout; common fine vesicular pores; 37.4 percent clay; strongly acid; abrupt smooth boundary.

Bt—7 to 14 inches; dark gray (10YR 4/1) silty clay, black (10YR 2/1) moist; moderate medium subangular blocky structure; very hard, very firm, very sticky and very plastic; common very fine roots throughout; 43 percent clay; very few faint continuous very dark gray (10YR 3/1 moist) clay films on vertical and horizontal faces of peds; slightly acid; clear smooth boundary.

Btss—14 to 23 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; very hard, extremely firm, very sticky and very plastic; common very fine roots throughout; common very fine tubular pores with moderate continuity; 44 percent clay; few faint patchy very dark gray (10YR 3/1 moist) clay films on vertical and horizontal faces of peds and few distinct patchy nonintersecting slickensides on horizontal faces of peds; neutral; gradual wavy boundary.

B't1—23 to 30 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium

- subangular blocky structure; very hard, firm, very sticky and very plastic; common very fine roots throughout; 44.8 percent clay; very few faint patchy black (10YR 2/1 moist) clay films on vertical and horizontal faces of peds; common fine rounded iron-manganese concretions throughout; slightly alkaline; clear wavy boundary.
- B 1t2—30 to 35 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; common medium faint very dark grayish brown (10YR 3/2 moist) irregular mottles throughout; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots throughout; 44.7 percent clay; very few faint patchy black (10YR 2/1 moist) clay films on vertical and horizontal faces of peds; slightly alkaline; clear wavy boundary.
- B 1t3—35 to 41 inches; gray (10YR 5/1) silty clay, very dark gray (10YR 3/1) moist; moderate medium subangular blocky structure; very hard, firm, very sticky and very plastic; few very fine roots throughout; 41.9 percent clay; few faint patchy black (10YR 2/1 moist) clay films on vertical and horizontal faces of peds; common fine rounded carbonate concretions throughout and few fine irregular masses of carbonate throughout; moderately alkaline; clear wavy boundary.
- B 1t4—41 to 49 inches; grayish brown (10YR 5/2) silty clay loam, dark grayish brown (10YR 4/2) moist; few fine prominent yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout and common medium distinct yellowish brown (10YR 5/4 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, very sticky and very plastic; few very fine roots throughout; 35.2 percent clay; very few distinct patchy dark grayish brown (10YR 4/2 moist) clay films on vertical and horizontal faces of peds; common fine rounded iron-manganese concretions throughout, few fine and medium irregular carbonate concretions throughout, and few fine irregular masses of carbonate throughout; moderately alkaline; gradual wavy boundary.
- 2Bt5—49 to 62 inches; light gray (10YR 7/2) clay loam, grayish brown (10YR 5/2) moist; few fine prominent dark yellowish brown (10YR 4/6 moist) irregular redoximorphic concentrations throughout and common medium distinct dark yellowish brown (10YR 4/4 moist) irregular redoximorphic concentrations throughout; moderate medium prismatic structure; hard, firm, slightly sticky and slightly plastic; few very fine roots throughout; 29.2 percent clay; common faint continuous dark grayish brown (10YR 4/2 moist) clay films on vertical faces of peds, few faint discontinuous brown (10YR 4/3 moist) clay films on horizontal faces of peds, and few distinct patchy black (10YR 2/1 moist) manganese or iron-manganese stains on horizontal faces of peds; common fine rounded iron-manganese concretions throughout, few medium irregular masses of carbonate throughout, and common fine and medium rounded carbonate concretions throughout; moderately alkaline; gradual wavy boundary.
- 2Bt6—62 to 78 inches; light yellowish brown (10YR 6/4) loam, dark yellowish brown (10YR 4/4) moist; common fine distinct dark yellowish brown (10YR 4/6 moist) irregular redoximorphic concentrations throughout and common fine distinct grayish brown (10YR 5/2 moist) irregular redoximorphic depletions throughout; weak medium prismatic structure parting to moderate medium angular blocky and moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few fine roots throughout; common fine tubular pores; 26.4 percent clay; few faint patchy brown (10YR 4/3 moist) clay films on horizontal faces of peds, common distinct discontinuous dark grayish brown (10YR 4/2 moist) clay films on vertical faces of peds, and few distinct patchy black (10YR 2/1 moist) manganese or iron-manganese stains on vertical and horizontal faces of peds; common fine rounded iron-manganese concretions throughout and few fine and medium irregular masses of carbonate throughout; slightly alkaline; clear wavy boundary.
- 2Bt7—78 to 80 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; common medium distinct dark grayish brown (10YR 4/2 moist) irregular redoximorphic depletions throughout; moderate coarse prismatic structure parting to moderate medium angular blocky and moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots throughout; common fine tubular pores; 28.5 percent clay; very few distinct patchy dark gray (10YR 4/1 moist) clay films on vertical faces of peds, very few distinct patchy dark grayish brown (10YR 4/2 moist) clay films on horizontal faces of peds, and very few distinct patchy black (10YR 2/1 moist) manganese or iron-manganese stains on vertical faces of peds; common medium rounded iron-manganese concretions throughout; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 32 to 50 percent clay

Depth to nonparalithic contact: Greater than 80 inches

Depth to secondary calcium carbonate: 30 to 60 inches

Thickness of the mollic epipedon: 20 to 60 inches

A horizon:

Hue—10YR

Value—3 or 4 dry, 2 or 3 moist

Chroma—1 or 2

Texture—silty clay loam or silt loam

Reaction—slightly acid to strongly acid

Bt horizon:

Hue—10YR

Value—3 to 5 dry, 2 to 4 moist

Chroma—1 or 2

Texture—silty clay, silty clay loam, or clay

Carbonate concretions—0 to 10 percent

Reaction—moderately alkaline to slightly acid

2Bt horizon:

Hue—10YR

Value—5 to 7 dry, 2 to 4 moist

Chroma—2 to 4

Texture—clay loam or loam

Carbonate concretions—5 to 15 percent

Redoximorphic features—5 to 15 percent

Reaction—slightly alkaline or moderately alkaline

Buhler Series

The Buhler series consists of very deep, somewhat poorly drained, very slowly permeable, sodic soils that formed in alluvium. These soils are on flood plains in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 2 percent. The mean annual precipitation is 29 inches, and the mean annual air temperature is 56 degrees F.

Typical Pedon

Buhler silty clay loam (fig. 19), in a cultivated field in Reno County, Kansas, 1 mile east of Medora; 130 feet east and 2,540 feet north of the southwest corner of sec. 12, T. 22 S., R. 5 W.; USGS Buhler topographic quadrangle; lat. 38 degrees 9 minutes 6 seconds N. and long. 97 degrees 49 minutes 46 seconds W. (colors are for dry soil unless otherwise stated):

Ay—0 to 3 inches; dark brown (10YR 3/3) silty clay loam, very dark grayish brown (10YR 3/2) moist;

weak medium subangular blocky structure; very hard, firm, slightly sticky and slightly plastic; many very fine and fine roots throughout; 39.9 percent clay; few fine irregular gypsum threads throughout; moderately acid; abrupt smooth boundary.

Anyz—3 to 8 inches; dark grayish brown (10YR 4/2) silty clay, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky and moderate medium angular blocky; extremely hard, very firm, slightly sticky and slightly plastic; common medium roots between peds and many very fine roots between peds; 40 percent clay; few distinct patchy black (10YR 2/1 moist) organic coatings on vertical faces of peds; many fine irregular gypsum threads throughout and common fine and medium irregular salt masses throughout; slightly acid; clear smooth boundary.

Eny—8 to 12 inches; dark grayish brown (10YR 4/2) silt loam, very dark gray (10YR 3/1) moist; few fine distinct dark yellowish brown (10YR 4/4 moist) irregular mottles throughout; moderate thin platy structure parting to weak very fine subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots throughout; 15.9 percent clay; few fine irregular gypsum threads throughout and few fine and medium irregular masses of gypsum throughout; neutral; abrupt smooth boundary.

Bt_{ny}1—12 to 16 inches; very dark grayish brown (10YR 3/2) silt loam, very dark gray (10YR 3/1) moist; common fine distinct dark yellowish brown (10YR 4/4 moist) irregular mottles throughout; weak medium and coarse prismatic structure parting to weak fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine roots between peds; many fine vesicular pores with moderate continuity; 23.2 percent clay; very few distinct patchy clay films on vertical faces of peds; few fine irregular gypsum threads throughout and few fine irregular nests of gypsum throughout; neutral; clear smooth boundary.

Bt_{ny}2—16 to 25 inches; very dark grayish brown (10YR 3/2) clay loam, very dark gray (10YR 3/1) moist; few fine prominent light gray (10YR 7/2 moist) irregular redoximorphic depletions throughout; moderate medium prismatic structure parting to moderate fine subangular blocky; very hard, firm, slightly sticky and slightly plastic; common fine roots between peds; 31 percent clay; few distinct patchy black (10YR 2/1 moist) clay films on faces of peds; few fine platelike gypsum crystals throughout; slightly alkaline; clear wavy boundary.

Btkny—25 to 37 inches; dark brown (10YR 3/3) silty clay loam, very dark grayish brown (10YR 3/2) moist; few fine distinct dark yellowish brown (10YR 4/4 moist) irregular redoximorphic concentrations throughout; moderate medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, slightly sticky and slightly plastic; few very fine roots between peds; 36.6 percent clay; few distinct patchy clay films on vertical and horizontal faces of peds; many fine irregular masses of gypsum throughout, many fine irregular gypsum threads throughout, and common fine irregular masses of carbonate throughout; slightly alkaline; gradual smooth boundary.

Btknyss—37 to 42 inches; dark brown (10YR 3/3) silty clay loam, very dark grayish brown (10YR 3/2) moist; few fine faint brown (10YR 4/3 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky and moderately plastic; few very fine roots between peds; 37.9 percent clay; few distinct discontinuous very dark gray (10YR 3/1 moist) clay films on vertical and horizontal faces of peds and very few distinct continuous intersecting slickensides; common medium irregular masses of carbonate throughout, many fine irregular nests of gypsum throughout, and many fine irregular gypsum threads throughout; slightly alkaline; clear wavy boundary.

Bknyss—42 to 50 inches; dark grayish brown (10YR 4/2) clay, very dark grayish brown (10YR 3/2) moist; few fine faint brown (10YR 4/3 moist) irregular redoximorphic concentrations throughout; weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots between peds; 40.1 percent clay; few distinct continuous dark gray (10YR 4/1 moist) intersecting slickensides; few fine cylindrical gypsum crystals throughout, few fine irregular carbonate concretions throughout, and few fine irregular iron-manganese concretions throughout; strongly alkaline; clear wavy boundary.

2Bkss—50 to 59 inches; brown (10YR 4/3) and dark yellowish brown (10YR 4/4) clay loam, very dark grayish brown (10YR 3/2), crushed, moist; common medium distinct strong brown (7.5YR 4/6 moist) irregular redoximorphic concentrations throughout; weak medium angular blocky and weak medium subangular blocky structure; very hard, very firm, very sticky and very plastic; few very fine roots throughout; 28.4 percent clay; very few faint continuous very dark grayish brown (10YR 3/2 moist) intersecting slickensides on

horizontal faces of peds; few medium irregular carbonate concretions throughout and common fine irregular iron-manganese concretions throughout; strongly alkaline; gradual smooth boundary.

2C1—59 to 77 inches; yellowish brown (10YR 5/4) and pale brown (10YR 6/3) fine sandy loam, dark yellowish brown (10YR 4/4) and brown (10YR 5/3) moist; common medium distinct strong brown (7.5YR 4/6 moist) irregular redoximorphic concentrations throughout; massive; very hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 17.6 percent clay; few fine irregular iron-manganese concretions throughout; moderately alkaline; clear wavy boundary.

2C2—77 to 80 inches; yellowish brown (10YR 5/4) and pale brown (10YR 6/3) loam, dark yellowish brown (10YR 4/4) and brown (10YR 5/3) moist; common medium distinct dark yellowish brown (10YR 4/6 moist) irregular redoximorphic concentrations throughout; massive; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 20.8 percent clay; common medium irregular carbonate concretions throughout; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 20 to 35 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 5 to 20 inches

Depth to salt accumulations: 10 to 15 inches

Depth to redox concentrations: 16 to 30 inches

Depth to redox depletions: 25 to 40 inches

Thickness of the mollic epipedon: 20 to 50 inches

Water table: Depth to top—2 to 4 feet; kind—apparent; months—November through May

A horizon:

Hue—10YR

Value—3 or 4 dry, 2 or 3 moist

Chroma—1 to 3

Texture—silty clay loam or silty clay

Sodium adsorption ratio—0 to 10

Gypsum—0 to 3 percent

Reaction—moderately acid to neutral

Eny horizon:

Hue—10YR

Value—3 to 5 dry, 2 to 4 moist

Chroma—1 to 3

Texture—silt loam or silty clay loam

Sodium adsorption ratio—5 to 10

Gypsum—1 to 5 percent
Reaction—slightly acid or neutral

Btn horizon:

Hue—10YR
Value—3 to 5 dry, 2 to 4 moist
Chroma—1 to 3
Texture—silt loam, silty clay loam, or clay loam
Redoximorphic features—1 to 5 percent
Calcium carbonate equivalent—1 to 5 percent
Sodium adsorption ratio—15 to 25
Gypsum—0 to 5 percent
Reaction—neutral or slightly alkaline

Bkn and 2Bkn horizons:

Hue—10YR
Value—3 to 5 dry, 2 to 4 moist
Chroma—1 to 4
Texture—clay, silty clay loam, or clay loam
Calcium carbonate equivalent—1 to 5 percent
Sodium adsorption ratio—5 to 10
Gypsum—0 to 5 percent
Reaction—slightly alkaline to strongly alkaline

2C horizon:

Hue—10YR or 7.5YR
Value—4 to 6 dry, 3 to 5 moist
Chroma—3 to 6
Texture—loam, fine sandy loam, or sandy clay loam
Redoximorphic features—5 to 15 percent
Reaction—slightly alkaline or moderately alkaline

Carbika Series

The Carbika series consists of very deep, poorly drained, very slowly permeable soils that formed in loamy eolian sediments over alluvium. These soils are in interdunal depressions on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes are 0 to 1 percent. The mean annual air temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Carbika silt loam, in Reno County, Kansas, 5 miles west of Hutchinson; 2,200 feet south and 800 feet east of the northwest corner of sec. 24, T. 23 S., R. 7 W.; USGS Yaggy topographic quadrangle; lat. 38 degrees 2 minutes 12.1 seconds N. and long. 98 degrees 2 minutes 52.4 seconds W. (colors are for moist soil unless otherwise stated):

A—0 to 11 inches; very dark grayish brown (10YR 3/2) (interior) silt loam, dark grayish brown (10YR 4/2)

(interior) dry; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 18 percent clay; common fine dendritic dark yellowish brown (10YR 4/6) masses of iron accumulation throughout and common medium irregular gray (10YR 5/1) iron depletions throughout; noneffervescent throughout (HCl, 1 normal); very strongly acid; abrupt smooth boundary.

Bt1—11 to 15 inches; very dark gray (2.5Y 3/1) (interior) clay loam, dark gray (2.5Y 4/1) (interior) dry; weak coarse subangular blocky structure parting to moderate fine angular blocky; hard, firm, moderately sticky and moderately plastic; common very fine roots throughout; 36 percent clay; few distinct continuous very dark gray (2.5Y 3/1) clay films on vertical and horizontal faces of peds and few distinct discontinuous pressure faces on vertical and horizontal faces of peds; common fine and medium irregular dark yellowish brown (10YR 4/4) masses of iron accumulation throughout, common fine irregular black (10YR 2/1) iron-manganese concretions throughout, and common fine and medium irregular gray (2.5Y 5/1) iron depletions in cracks; noneffervescent throughout (HCl, 1 normal); moderately acid; clear smooth boundary.

Bt2—15 to 22 inches; dark grayish brown (2.5Y 4/2) (interior) clay loam, grayish brown (2.5Y 5/2) (interior) dry; weak fine and medium prismatic structure parting to moderate medium angular blocky; very hard, firm, moderately sticky and moderately plastic; common very fine roots throughout; 36 percent clay; few distinct discontinuous dark grayish brown (2.5Y 4/2) clay films on vertical and horizontal faces of peds; common fine and medium irregular dark yellowish brown (10YR 4/6) masses of iron accumulation throughout, common medium irregular gray (2.5Y 5/1) iron depletions throughout, and common fine and medium rounded very dark brown (10YR 2/2) iron-manganese concretions throughout; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; slightly acid; clear smooth boundary.

Bt3—22 to 34 inches; dark grayish brown (10YR 4/2) (interior) clay loam, grayish brown (10YR 5/2) (interior) dry; weak fine and medium prismatic structure parting to moderate medium angular blocky; very hard, firm, moderately sticky and moderately plastic; few very fine roots throughout; 36 percent clay; few distinct discontinuous dark grayish brown (10YR 4/2) clay films on vertical

and horizontal faces of peds; common fine and medium rounded black (10YR 2/1) masses of iron-manganese accumulation throughout and common medium irregular dark yellowish brown (10YR 4/6) masses of iron accumulation throughout; noneffervescent throughout (HCl, 1 normal); neutral; clear smooth boundary.

Bt4—34 to 41 inches; brown (10YR 4/3) (interior) clay loam, brown (10YR 5/3) (interior) dry; weak medium prismatic structure parting to weak fine subangular blocky; very hard, firm, moderately sticky and moderately plastic; 34 percent clay; few distinct discontinuous dark grayish brown (10YR 4/2) clay films on vertical faces of peds; common fine irregular dark gray (10YR 4/1) masses of iron accumulation throughout and few fine irregular black (10YR 2/1) masses of iron-manganese accumulation throughout; noneffervescent throughout (HCl, 1 normal); neutral; clear smooth boundary.

Bt5—41 to 60 inches; dark yellowish brown (10YR 4/4) (interior) clay loam, yellowish brown (10YR 5/4) (interior) dry; weak medium and coarse subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; 34 percent clay; few distinct discontinuous brown (10YR 4/3) clay films on vertical faces of peds; few fine and medium rounded very dark brown (10YR 2/2) iron-manganese concretions throughout, few fine and medium irregular very dark brown (10YR 2/2) masses of iron-manganese accumulation throughout, and common fine irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout; noneffervescent throughout (HCl, 1 normal); neutral; clear smooth boundary.

Btk—60 to 80 inches; brown (7.5YR 4/4) (interior) clay loam, brown (7.5YR 5/4) (interior) dry; weak medium and coarse subangular blocky structure; very hard, firm, moderately sticky and moderately plastic; 34 percent clay; few distinct discontinuous brown (10YR 4/3) clay films on vertical faces of peds; few fine irregular very dark brown (10YR 2/2) masses of iron-manganese accumulation throughout, common fine irregular carbonate concretions throughout, and common fine irregular carbonate nodules throughout; noneffervescent throughout (HCl, 1 normal); slightly alkaline.

Range in Characteristics

Soil moisture regime: Aquic

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 25 to 35 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 16 to 80 inches

Thickness of the mollic epipedon: 10 to 18 inches

Water table: Depth to top—0.5 foot to 2.0 feet; kind—perched; months—December through June

Other features: Some pedons have a 3BC, 3BCg, 3Bck, 3BCgk, or 3C horizon.

A horizon:

Hue—10YR

Value—3 moist, 4 or 5 dry

Chroma—1 or 2

Texture—silt loam, loam, or fine sandy loam

Reaction—neutral to strongly alkaline

Bt horizon:

Hue—10YR to 5Y

Value—3 to 6 moist, 4 to 7 dry

Chroma—1 or 2; ranges to 3 in the lower part of the horizon

Texture—clay, silty clay loam, silty clay, or clay loam

Calcium carbonate equivalent—0 to 5 percent

Reaction—moderately acid to moderately alkaline

Btk horizon:

Hue—7.5YR to 5Y

Value—4 to 6 moist, 5 to 7 dry

Chroma—2 to 6

Texture—sandy clay loam, loam, or clay loam

Calcium carbonate equivalent—0 to 5 percent

Reaction—slightly alkaline or moderately alkaline

Carway Series

The Carway series consists of very deep, somewhat poorly drained soils that formed in loamy eolian sediments over a buried alluvial soil. Permeability is moderate in the upper part and very slow in the lower part. These soils are in interdunal depressions on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes are 0 to 1 percent. The mean annual air temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Carway fine sandy loam, in a cultivated field in Reno County, Kansas, 2 miles north and 1 mile east of Plevna; 2,375 feet east and 1,500 feet south of the northwest corner of sec. 2, T. 24 S., R. 9 W.; USGS Plevna topographic quadrangle; lat. 37 degrees 59 minutes 42.5 seconds N. and long. 98 degrees 16 minutes 47.7 seconds W. (colors are for moist soil unless otherwise stated):

Ap—0 to 7 inches; dark gray (10YR 4/1) (interior) fine

- sandy loam, gray (10YR 6/1) (interior) dry; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout and common fine and medium roots throughout; 10 percent clay; common fine dendritic brown (7.5YR 4/4) masses of iron accumulation throughout and common fine irregular gray (5Y 5/1) iron depletions; noneffervescent throughout (HCl, 1 normal); moderately acid; clear smooth boundary.
- Bt1—7 to 10 inches; grayish brown (2.5Y 5/2) (interior) sandy clay loam, light brownish gray (2.5Y 6/2) (interior) dry; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 23 percent clay; few distinct discontinuous grayish brown (2.5Y 5/2 moist) clay films on vertical and horizontal faces of peds and common prominent continuous very dark gray (2.5Y 3/1 moist) organic coatings on vertical faces of peds; common fine and medium dendritic brown (7.5YR 4/4) masses of iron accumulation between peds; noneffervescent throughout (HCl, 1 normal); slightly acid; clear wavy boundary.
- Bt2—10 to 15 inches; light brownish gray (10YR 6/2) (interior) sandy clay loam, light brownish gray (2.5Y 6/2) (interior) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 23 percent clay; few distinct discontinuous grayish brown (10YR 5/2) clay films on faces of peds and in pores and few prominent continuous dark gray (10YR 4/1) organic coatings in root channels and/or pores; common fine dendritic strong brown (7.5YR 4/6) masses of iron accumulation throughout and common medium irregular gray (10YR 6/1) iron depletions throughout; noneffervescent throughout (HCl, 1 normal); slightly acid; clear wavy boundary.
- Bt3—15 to 22 inches; grayish brown (10YR 5/2) (interior) fine sandy loam, light gray (2.5Y 7/2) (interior) dry; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, nonsticky and nonplastic; 24 percent clay; few distinct discontinuous gray (10YR 5/1) clay films on faces of peds and in pores and few prominent continuous dark gray (10YR 4/1) organic coatings in root channels and/or pores; many medium and coarse irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout and many medium irregular gray (10YR 6/1) iron depletions throughout; noneffervescent throughout (HCl, 1 normal); slightly acid; gradual wavy boundary.
- Bt4—22 to 35 inches; 60 percent brown (10YR 5/3) (interior) and 40 percent grayish brown (10YR 5/2) (interior) fine sandy loam, light gray (2.5Y 7/2) (interior) dry; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; 22 percent clay; few faint discontinuous grayish brown (10YR 5/2) clay films on faces of peds and in pores and very few prominent continuous dark gray (10YR 4/1) organic coatings in root channels and/or pores; many medium and coarse irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout, common medium and coarse irregular gray (2.5Y 6/1) iron depletions throughout, and common medium and coarse irregular black (7.5YR 2/1) masses of iron-manganese accumulation throughout; noneffervescent throughout (HCl, 1 normal); neutral; clear wavy boundary.
- 2Btb1—35 to 40 inches; light brownish gray (2.5Y 6/2) (interior) clay loam, light gray (2.5Y 7/2) (interior) dry; weak medium prismatic structure parting to moderate fine and medium angular blocky; extremely hard, very firm, moderately sticky and moderately plastic; 35 percent clay; few distinct discontinuous grayish brown (2.5Y 5/2 moist) clay films on vertical and horizontal faces of peds and few faint discontinuous pressure faces on vertical faces of peds; many coarse irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout, common medium irregular light gray (2.5Y 7/1) iron depletions throughout, and common medium and coarse irregular black (7.5YR 2/1) masses of iron-manganese accumulation throughout; noneffervescent throughout (HCl, 1 normal); neutral; clear wavy boundary.
- 2Btb2—40 to 54 inches; gray (5Y 6/1) (interior) clay loam, light gray (5Y 7/1) (interior) dry; weak medium prismatic structure parting to weak fine and medium subangular blocky; extremely hard, very firm, moderately sticky and moderately plastic; 38 percent clay; few faint discontinuous clay films on vertical and horizontal faces of peds and few faint discontinuous pressure faces on vertical faces of peds; many medium and coarse irregular strong brown (7.5YR 5/8) masses of iron accumulation throughout and common medium and coarse irregular black (7.5YR 2/1) iron-manganese concretions throughout; noneffervescent throughout (HCl, 1 normal); slightly alkaline; gradual wavy boundary.
- 2Btb3—54 to 63 inches; gray (5Y 6/1) (interior) clay loam, light gray (5Y 7/1) (interior) dry; weak medium prismatic structure parting to weak fine

and medium subangular blocky; extremely hard, very firm, moderately sticky and moderately plastic; 39 percent clay; few faint discontinuous olive gray (5Y 5/2) clay films on vertical and horizontal faces of peds and few faint discontinuous pressure faces on vertical faces of peds; many medium irregular reddish brown (5YR 5/4) soft masses of iron accumulation (pedogenic) throughout and common medium irregular black (7.5YR 2/1) iron-manganese concretions throughout; noneffervescent throughout (HCl, 1 normal); slightly alkaline; gradual wavy boundary.

2Btb4—63 to 72 inches; gray (5Y 6/1) (interior) clay loam, light gray (5Y 7/2) (interior) dry; weak medium prismatic structure parting to weak fine and medium angular blocky; extremely hard, very firm, moderately sticky and moderately plastic; 37 percent clay; few faint discontinuous clay films on vertical and horizontal faces of peds and few faint discontinuous pressure faces on vertical faces of peds; many medium irregular reddish brown (5YR 5/4) masses of iron accumulation throughout and common fine and medium irregular black (7.5YR 2/1) masses of iron-manganese accumulation throughout; noneffervescent throughout (HCl, 1 normal); slightly alkaline; gradual wavy boundary.

2Btkb—72 to 80 inches; pale brown (10YR 6/3) (interior) clay loam, very pale brown (10YR 7/3) (interior) dry; weak medium prismatic structure parting to weak fine and medium angular blocky; extremely hard, very firm, moderately sticky and moderately plastic; 32 percent clay; few faint discontinuous clay films on vertical and horizontal faces of peds and few faint discontinuous pressure faces on vertical faces of peds; many medium and coarse irregular strong brown (7.5YR 5/8) masses of iron accumulation throughout, common medium and coarse irregular masses of lime throughout, and common medium irregular gray (5Y 6/1) iron depletions throughout; noneffervescent throughout (HCl, 1 normal); slightly alkaline.

Range in Characteristics

Soil moisture regime: Aquic

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 20 to 35 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 20 to 80 inches

Depth to lithologic discontinuity: 7 to 35 inches

Thickness of the ochric epipedon: 3 to 15 inches

Water table: Depth to top—0 to 2 feet; kind—perched; months—December through June

A horizon:

Hue—10YR

Value—3 to 5 moist, 4 to 6 dry

Chroma—1 to 3

Texture—fine sandy loam, sandy loam, loamy fine sand, fine sand, or sand

Redoximorphic features—0 to 10 percent

Reaction—moderately acid to neutral

Bt horizon:

Hue—2.5Y to 7.5YR

Value—3 to 5 moist, 4 to 7 dry

Chroma—1 or 2 in the upper part, 2 or 3 in the lower part

Texture—sandy clay loam, loam, clay loam, or fine sandy loam

Redoximorphic features—5 to 50 percent

Reaction—slightly acid or neutral

2Bt horizon:

Hue—10YR to 5Y

Value—4 to 6 moist, 5 to 7 dry

Chroma—1 to 3

Texture—silty clay loam, clay loam, or silty clay

Redoximorphic features—5 to 60 percent

Reaction—neutral or slightly alkaline

Btk horizon:

Hue—7.5YR or 10YR

Value—4 to 6 moist, 5 to 7 dry

Chroma—3 to 6

Texture—sandy clay loam, sandy loam, clay loam, or loam

Calcium carbonate equivalent—0 to 5 percent

Redoximorphic features—5 to 50 percent

Reaction—neutral or slightly alkaline

Clark Series

The Clark series consists of very deep, well drained soils that formed in alluvium. These soils are on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 15 percent. The mean annual precipitation is about 26 inches, and the mean annual temperature is about 58 degrees F.

Typical Pedon

Clark loam, on a slope of 1 percent, in an area of cropland at an elevation of 1,640 feet, in Reno County, Kansas, about 6 miles south of Arlington; about 100 feet north and 150 feet west of the southeast corner of sec. 1, T. 26 S., R. 8 W.; USGS Pretty Prairie SW quadrangle; lat. 37 degrees 48 minutes 22 seconds N. and long. 98 degrees 8 minutes 14 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 11 inches; very dark grayish brown (10YR 3/2) loam, very dark brown (10YR 2/2) moist; weak fine granular structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 21.3 percent clay; strongly effervescent throughout; moderately alkaline; clear wavy boundary.

Bw—11 to 16 inches; brown (10YR 5/3) loam, brown (10YR 4/3) moist; moderate medium granular structure; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 26.5 percent clay; few medium and coarse rounded carbonate concretions; strongly effervescent throughout; moderately alkaline; clear wavy boundary.

Bk1—16 to 28 inches; very pale brown (10YR 7/3) loam, brown (10YR 5/3) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 20.5 percent clay; many fine and medium irregular carbonate concretions throughout; violently effervescent throughout; moderately alkaline; gradual wavy boundary.

Bk2—28 to 45 inches; very pale brown (10YR 7/4) fine sandy loam, light yellowish brown (10YR 6/4) moist; weak fine subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 16.9 percent clay; many medium and coarse irregular white (10YR 8/1) carbonate nodules throughout; violently effervescent throughout; strongly alkaline; gradual wavy boundary.

Bck1—45 to 65 inches; very pale brown (10YR 8/4) fine sandy loam, very pale brown (10YR 7/4) moist; massive; hard, friable, nonsticky and nonplastic; 9.1 percent clay; many medium irregular carbonate threads throughout; violently effervescent throughout; strongly alkaline; gradual wavy boundary.

Bck2—65 to 80 inches; reddish yellow (7.5YR 6/6) very fine sandy loam, strong brown (7.5YR 5/6) moist; massive; hard, friable, nonsticky and nonplastic; 8.4 percent clay; common medium and coarse irregular carbonate threads throughout; violently effervescent throughout; strongly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 15 to 30 percent clay

Depth to calcic horizon: 10 to 19 inches

Depth to secondary calcium carbonate: 0 to 12 inches

Thickness of the mollic epipedon: 10 to 19 inches

Thickness of the calcic horizon: 35 to 80 inches

Thickness of the cambic horizon: 0 to 14 inches

Ap horizon:

Hue—7.5YR or 10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—1 to 3

Texture—loam, clay loam, or fine sandy loam

Calcium carbonate equivalent—5 to 10 percent

Reaction—slightly alkaline to strongly alkaline

Bw horizon:

Hue—7.5YR or 10YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 to 4

Texture—loam, clay loam, or fine sandy loam

Calcium carbonate equivalent—5 to 10 percent

Reaction—slightly alkaline to strongly alkaline

Bk horizon:

Hue—7.5YR or 10YR

Value—4 to 7 dry, 3 to 6 moist

Chroma—2 to 4

Texture—loam, clay loam, or fine sandy loam

Calcium carbonate equivalent—15 to 40 percent

Reaction—moderately alkaline or strongly alkaline

Bck horizon:

Hue—5YR to 10YR

Value—5 to 8 dry, 4 to 7 moist

Chroma—2 to 8

Texture—fine sandy loam, very fine sandy loam, loam, or clay loam

Calcium carbonate equivalent—15 to 25 percent

Reaction—moderately alkaline or strongly alkaline

Crete Series

The Crete series consists of very deep, moderately well drained, slowly permeable soils that formed in loess. These soils are on uplands and stream terraces in the Central Loess Plains (MLRA 75). Slopes range from 0 to 11 percent. The mean annual precipitation is about 30 inches, and the mean annual temperature is about 53 degrees F.

Typical Pedon

Crete silt loam, in a cultivated field in Saline County, Nebraska, about 5.5 miles east and 1.5 miles north of Dorchester; 2,000 feet south and 100 feet west of the northeast corner of sec. 18, T. 8 N., R. 4 E. (colors are for dry soil unless otherwise stated):

Ap—0 to 6 inches; very dark gray (10YR 3/1) silt loam,

- black (10YR 2/1) moist; weak very fine granular structure; slightly hard, friable; moderately acid; abrupt smooth boundary.
- A—6 to 14 inches; very dark gray (10YR 3/1) silty clay loam, black (10YR 2/1) moist; moderate medium angular blocky structure parting to moderate fine granular; hard, friable; moderately acid; clear smooth boundary.
- BA—14 to 19 inches; dark gray (10YR 4/1) silty clay loam, very dark brown (10YR 2/2) moist; moderate fine subangular blocky structure; hard, firm; faint gray coatings on faces of peds; moderately acid; clear smooth boundary.
- Bt1—19 to 28 inches; dark brown (10YR 4/3) silty clay, dark brown (10YR 3/3) moist; moderate coarse prismatic structure parting to strong medium angular blocky; very hard, very firm; few fine soft dark brown accumulations (iron and manganese oxide); slightly acid; gradual smooth boundary.
- Bt2—28 to 35 inches; brown (10YR 5/3) silty clay, dark brown (10YR 4/3) moist; moderate medium prismatic structure parting to strong medium angular blocky; very hard, very firm; few fine dark brown accumulations (iron and manganese oxide); few fine soft accumulations of calcium carbonate; neutral; gradual smooth boundary.
- BC—35 to 42 inches; light olive brown (2.5Y 5/4) silty clay, olive brown (2.5Y 4/4) moist; moderate medium angular blocky structure; very hard, very firm; many small soft accumulations of calcium carbonate; strong effervescence; slightly alkaline; clear wavy boundary.
- C—42 to 60 inches; light yellowish brown (2.5Y 6/4) silty clay loam, light olive brown (2.5Y 5/4) moist; few faint gray (10YR 6/1) and brownish yellow (10YR 6/6) iron stains in the matrix; massive; slightly hard, firm; few soft masses of calcium carbonate; strong effervescence; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 22 to 34 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 25 to 40 inches; no carbonates in some pedons

Thickness of the mollic epipedon: 20 to 36 inches

Other features: In some pedons the BC and C horizons have iron stains in the matrix. The stains have hue of 10YR or 7.5YR, value of 5 or 6 (4 or 5 moist), and chroma of 1 to 8. Some pedons do not have a BC horizon.

A horizon:

Hue—10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—1 or 2

Texture—silt loam or silty clay loam

Reaction—strongly acid or moderately acid

Upper part of the Bt horizon:

Hue—10YR

Value—4 or 5 dry, 3 moist

Chroma—2 or 3

Texture—silty clay (clay content typically ranges from 45 to 52 percent but ranges from 42 to 55 percent in some pedons); common dark organic coatings on faces of peds

Reaction—slightly acid or neutral

Lower part of the Bt horizon:

Hue—10YR or 2.5Y

Value—4 to 7 dry, 4 or 5 moist

Chroma—2 to 4

Reaction—moderately acid to slightly alkaline

Texture—silty clay loam or silty clay (clay content slightly lower than in the upper part)

BC horizon:

Hue—10YR, 2.5Y, or 5Y

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—silty clay or silty clay loam

Reaction—neutral to moderately alkaline

C horizon:

Hue—10YR, 2.5Y, or 5Y

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—silty clay loam or silt loam

Reaction—neutral to moderately alkaline

Darlow Series

The Darlow series consists of very deep, somewhat poorly drained, very slowly permeable soils that formed in loamy, calcareous alluvium. These soils are on terraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes are 0 to 1 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Darlow loam (fig. 20), in a cultivated field in Reno County, Kansas; 1,690 feet south and 235 feet west of the northeast corner of sec. 36, T. 23 S., R. 6 W.; USGS Hutchinson topographic quadrangle; lat. 38

degrees 0 minutes 32.3 seconds N. and long. 97 degrees 55 minutes 20.4 seconds W. (colors are for dry soil unless otherwise stated):

- Ap1—0 to 5 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; weak fine granular structure; soft, very friable, nonsticky and nonplastic; common fine roots; strongly acid; abrupt smooth boundary.
- Ap2—5 to 8 inches; brown (10YR 5/3) silt loam, brown or dark brown (10YR 4/3) moist; weak medium platy structure parting to weak very fine subangular blocky; soft, very friable, nonsticky and nonplastic; common fine and medium roots; strongly acid; clear smooth boundary.
- Btn—8 to 14 inches; dark grayish brown (10YR 4/2) loam, very dark grayish brown (10YR 3/2) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, moderately sticky and moderately plastic; common fine roots; very dark gray (10YR 3/1) discontinuous clay films (cutans) on faces of peds; few fine irregular nests of gypsum; slightly effervescent; neutral; abrupt smooth boundary.
- Bt_{ny}—14 to 20 inches; grayish brown (10YR 5/2) clay loam, dark grayish brown (10YR 4/2) moist; few fine prominent brown or dark brown (7.5YR 4/4) and strong brown (7.5YR 5/6) redoximorphic concentrations; moderate medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, moderately sticky and moderately plastic; common fine roots; dark grayish brown (10YR 4/2) discontinuous clay films (cutans) on faces of peds; common fine irregular nests of gypsum and few fine irregular lime nodules; slightly effervescent; moderately alkaline; clear wavy boundary.
- Btk_{nyz}—20 to 26 inches; pale brown (10YR 6/3) loam, brown (10YR 5/3) moist; few fine distinct brown or dark brown (7.5YR 4/4) and prominent strong brown (7.5YR 5/6) redoximorphic concentrations; moderate medium prismatic structure parting to weak medium subangular blocky; slightly hard, firm, moderately sticky and moderately plastic; few fine roots; few fine irregular threads of soluble salts between ped faces; common fine irregular gypsum threads and few fine irregular lime concretions; strongly effervescent; alkaline; clear wavy boundary.
- Bt_{nz}1—26 to 34 inches; very pale brown (10YR 7/3) loam, pale brown (10YR 6/3) moist; few fine prominent dark red (2.5YR 3/6) and strong brown (7.5YR 5/6) redoximorphic concentrations; moderate medium subangular blocky structure; slightly hard, firm, moderately sticky and

moderately plastic; few very fine roots; common fine irregular soft masses of iron-manganese; strongly effervescent; moderately alkaline; clear wavy boundary.

- Bt_{nz}2—34 to 44 inches; 65 percent light brown (7.5YR 6/4) and 35 percent very pale brown (10YR 7/3) loam; 65 percent strong brown (7.5YR 5/6) and 35 percent pale brown (10YR 6/3) moist; common medium prominent strong brown (7.5YR 5/6 and 4/6) redoximorphic concentrations; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots; few fine (2.5YR 4/6) iron-manganese stains on faces of peds; alkaline; clear smooth boundary.
- B¹_{tn}1—44 to 54 inches; 65 percent light brown (7.5YR 6/4) and 35 percent very pale brown (10YR 7/3) loam; 65 percent brown (7.5YR 5/4) and 35 percent pale brown (10YR 6/3) moist; common medium prominent yellowish red (5YR 5/8) redoximorphic concentrations; weak fine prismatic structure parting to weak fine angular blocky; hard, firm, moderately sticky and moderately plastic; few fine (2.5YR 4/6) iron-manganese stains on faces of peds; faint brown (7.5YR 5/4) discontinuous clay films (cutans) on faces of peds; moderately alkaline; clear wavy boundary.
- B¹_{tn}2—54 to 68 inches; brown (7.5YR 5/4) loam, brown or dark brown (7.5YR 4/4) moist; moderate medium prismatic structure parting to weak medium subangular blocky; hard, firm, slightly sticky and slightly plastic; common fine (2.5YR 3/6) iron-manganese stains on faces of peds; distinct brown (7.5YR 5/4) discontinuous clay films (cutans) in root channels and/or pores; moderately alkaline; clear wavy boundary.
- 2B_{tn}—68 to 80 inches; 65 percent light brown (7.5YR 6/4) and 35 percent pale brown (10YR 6/3) sandy loam; 65 percent brown (7.5YR 5/4) and 35 percent brown (10YR 5/3) moist; common fine and medium prominent strong brown (7.5YR 4/6) redoximorphic concentrations; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few fine (7.5YR 5/8) iron-manganese stains between peds; clay bridging between sand grains; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 20 to 35 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 0 to 10 inches

Depth to salt accumulations: 10 to 20 inches

Depth to gypsum accumulations: 8 to 15 inches

Depth to lithologic discontinuity: Greater than 40 inches

Thickness of the mollic epipedon: 8 to 19 inches

A horizon:

Hue—10YR

Value—3 to 6 dry, 2 to 5 moist

Chroma—1 to 3

Texture—loam or silt loam

Sodium adsorption ratio—0 to 5

Reaction—strongly acid to neutral

Bt horizon:

Hue—10YR or 7.5YR

Value—4 to 7 dry, 3 to 6 moist

Chroma—2 to 4

Texture—loam or clay loam

Calcium carbonate equivalent—0 to 2 percent

Sodium adsorption ratio—15 to 40

Reaction—slightly alkaline or moderately alkaline

2Bt horizon:

Hue—7.5YR or 10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—3 or 4

Texture—loam or sandy loam

Calcium carbonate equivalent—0 to 1 percent

Sodium adsorption ratio—10 to 20

Reaction—neutral to moderately alkaline

Dillhut Series

The Dillhut series consists of very deep, moderately well drained, moderately permeable soils that formed in sandy eolian deposits over a buried alluvial soil. These soils are on dunes on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 7 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Dillhut fine sand, in an area of rangeland in Reno County, Kansas, 5 miles south of Buhler; 961 feet west and 1,836 feet south of the northeast corner of sec. 8, T. 23 S., R. 4 W.; USGS Hutchinson SE topographic quadrangle; lat. 38 degrees 4 minutes 1.4 seconds N. and long. 97 degrees 46 minutes 41.6 seconds W. (colors are for dry soil unless otherwise stated):

A—0 to 4 inches; light brownish gray (10YR 6/2)

(interior) fine sand, dark grayish brown (10YR 4/2) (interior) moist; weak fine subangular blocky structure parting to single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine and fine roots throughout; 1 percent clay; moderately acid; clear smooth boundary.

AC—4 to 9 inches; brown (10YR 5/3) (interior) fine sand, brown (10YR 4/3) (interior) moist; weak fine subangular blocky structure parting to single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine and fine roots throughout; 2 percent clay; moderately acid; gradual smooth boundary.

C1—9 to 18 inches; light yellowish brown (10YR 6/4) (interior) fine sand, yellowish brown (10YR 5/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine and fine roots throughout; 3 percent clay; moderately acid; gradual wavy boundary.

C2—18 to 26 inches; light yellowish brown (10YR 6/4) (interior) fine sand, yellowish brown (10YR 5/4) (interior) moist; common fine distinct yellowish brown (10YR 5/6 moist) irregular mottles throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine roots throughout; 2 percent clay; moderately acid; abrupt smooth boundary.

2Btb1—26 to 41 inches; light brown (7.5YR 6/4) (interior) fine sandy loam, brown (7.5YR 5/4) (interior) moist; common medium and coarse distinct strong brown (7.5YR 5/6 moist) irregular mottles throughout; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, firm, slightly sticky and slightly plastic; 22 percent clay; few distinct discontinuous clay bridges between sand grains and few distinct patchy pale brown (10YR 6/3 moist) skeletal on vertical faces of peds; few fine irregular masses of iron-manganese accumulation throughout; neutral; gradual smooth boundary.

2Btb2—41 to 55 inches; light brown (7.5YR 6/4) (interior) fine sandy loam, brown (7.5YR 5/4) (interior) moist; many medium and coarse distinct strong brown (7.5YR 5/6 moist) irregular mottles throughout; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; 16 percent clay; few distinct discontinuous clay bridges between sand grains and common distinct continuous pale brown (10YR 6/3 moist) skeletal on vertical faces of

pedes; few medium cylindrical masses of iron-manganese accumulation throughout; neutral; gradual smooth boundary.

2BCb1—55 to 65 inches; light brown (7.5YR 6/3) (interior) fine sandy loam, brown (7.5YR 5/3) (interior) moist; many coarse distinct strong brown (7.5YR 5/6 moist) irregular mottles throughout; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; 14 percent clay; common prominent continuous light brownish gray (10YR 6/2 moist) skeletalans on vertical faces of pedes; neutral; gradual smooth boundary.

2BCb2—65 to 70 inches; light brown (7.5YR 6/3) (interior) fine sandy loam, brown (7.5YR 5/3) (interior) moist; many medium and coarse distinct strong brown (7.5YR 5/6 moist) irregular mottles throughout; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; 18 percent clay; common prominent continuous light brownish gray (10YR 6/2) skeletalans on vertical faces of pedes; neutral; gradual smooth boundary.

2Cg—70 to 80 inches; light gray (2.5Y 7/2) (interior) fine sandy loam, light brownish gray (2.5Y 6/2) (interior) moist; common coarse prominent yellowish brown (10YR 5/6 moist) irregular mottles throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 10 percent clay; slightly acid.

Range in Characteristics

Soil moisture regime: Ustic (bordering on Udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 1 to 30 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 40 to 80 inches

Thickness of the ochric epipedon: 4 to 17 inches

A horizon:

Hue—10YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 or 3

Texture—fine sand

Reaction—moderately acid or slightly acid

C horizon:

Hue—10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—3 or 4

Texture—fine sand or loamy fine sand

Redoximorphic features—1 to 15 percent

Reaction—moderately acid or slightly acid

2Btb horizon:

Hue—7.5YR to 2.5Y

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—sandy clay loam or fine sandy loam

Redoximorphic features—1 to 40 percent

Reaction—neutral or slightly alkaline

2BCb horizon:

Hue—7.5YR to 2.5Y

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—fine sandy loam

Redoximorphic features—2 to 25 percent

Reaction—slightly acid or neutral

2C horizon:

Hue—7.5YR to 2.5Y

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—fine sandy loam, loamy fine sand, or fine sand

Redoximorphic features—1 to 20 percent

Reaction—slightly acid or neutral

Dillwyn Series

The Dillwyn series consists of very deep, somewhat poorly drained, rapidly permeable soils that formed in eolian sand. These soils are on dunes and in interdune areas on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 3 percent. The mean annual precipitation is 24 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Dillwyn loamy fine sand, in an area of native grass in Stafford County, Kansas, 15 miles north and 10.5 miles east of St. John; 1,400 feet south and 2,440 feet east of the northwest corner of sec. 17, T. 21 S., R. 11 W. (colors are for dry soil unless otherwise stated):

A—0 to 8 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak medium granular structure; soft, very friable, nonsticky and nonplastic; neutral; clear smooth boundary.

AC—8 to 28 inches; pale brown (10YR 6/3) fine sand, brown (10YR 4/3) moist; common coarse prominent strong brown (7.5YR 5/6) redoximorphic concentrations; single grain; loose, nonsticky and nonplastic; slightly acid; gradual smooth boundary.

C1—28 to 35 inches; very pale brown (10YR 7/3) fine sand, brown (10YR 5/3) moist; common coarse

prominent reddish yellow (7.5YR 7/6) redoximorphic concentrations; single grain; loose, nonsticky and nonplastic; moderately acid; gradual smooth boundary.

C2—35 to 80 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; common coarse prominent reddish yellow (7.5YR 7/6) redoximorphic concentrations; single grain; loose, nonsticky and nonplastic; moderately acid.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 55 to 57 degrees F

Particle-size control section: 2 to 8 percent clay

Depth to redox concentrations: 4 to 10 inches

Thickness of the ochric horizon: 4 to 10 inches

Water table: Depth to top—1 to 3 feet; kind—apparent; months—January through December

A horizon:

Hue—10YR

Value—3 to 5 dry, 2 to 4 moist

Chroma—2 to 4

Texture—mainly loamy fine sand or loamy sand, but fine sandy loam and fine sand are included in the range

Reaction—moderately acid to neutral

AC horizon:

Hue—10YR

Value—5 to 8 dry, 4 to 6 moist

Chroma—3 or 4

Texture—fine sand, loamy fine sand, loamy sand, or sand

Reaction—moderately acid to moderately alkaline

C horizon:

Hue—10YR

Value—5 to 8 dry, 4 to 6 moist

Chroma—3 or 4

Texture—fine sand, loamy fine sand, loamy sand, or sand

Reaction—moderately acid to moderately alkaline

Elmer Series

The Elmer series consists of very deep, moderately well drained, slowly permeable soils that formed in stratified calcareous loamy alluvium. These soils are on terraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 2 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Elmer fine sandy loam (fig. 21), in a cultivated field in Reno County, Kansas, 1 mile south of South Hutchinson; 915 feet south and 380 feet west of the northeast corner of sec. 36, T. 23 S., R. 6 W.; USGS Hutchinson topographic quadrangle; lat. 38 degrees 0 minutes 40.7 seconds N. and long. 97 degrees 55 minutes 22.0 seconds W. (colors are for dry soil unless otherwise stated):

Ap1—0 to 6 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; moderate fine and medium subangular blocky structure; loose when moist and dry, slightly sticky and slightly plastic when wet; many very fine roots throughout; 11 percent clay; very strongly acid; abrupt smooth boundary.

Ap2—6 to 9 inches; brown (10YR 4/3) fine sandy loam, dark brown (10YR 3/3) moist; weak medium platy structure parting to weak fine and medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; many very fine roots throughout; 14.7 percent clay; very strongly acid; clear smooth boundary.

AB—9 to 19 inches; dark grayish brown (10YR 4/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 16.4 percent clay; neutral; clear wavy boundary.

Btn1—19 to 26 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; moderate very coarse prismatic structure parting to weak medium subangular blocky; very hard, firm, sticky and slightly plastic; common very fine roots between peds; 18.9 percent clay; few faint discontinuous very dark grayish brown (10YR 3/2 moist) clay films on faces of peds, few distinct discontinuous very dark gray (10YR 3/1 moist) organic coatings on vertical faces of peds, and few distinct discontinuous very dark gray (10YR 3/1 moist) organic coatings in root channels and/or pores; slightly alkaline; gradual wavy boundary.

Btn2—26 to 37 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 5/3) moist; moderate very coarse prismatic structure parting to moderate medium subangular blocky; very hard, firm, sticky and slightly plastic; common very fine roots between peds; 17.3 percent clay; very few distinct discontinuous dark grayish brown (10YR 4/2 moist) clay films on vertical faces of peds, few distinct discontinuous very dark gray (10YR 3/1 moist) organic coatings on vertical faces of peds,

and few distinct discontinuous very dark gray (10YR 3/1 moist) organic coatings in root channels and/or pores; strongly alkaline; clear wavy boundary.

B_{tnk1}—37 to 43 inches; brown (7.5YR 5/4) loam, brown (7.5YR 4/4) moist; few fine prominent yellowish red (5YR 4/6 moist) irregular redoximorphic concentrations throughout and common medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak coarse prismatic structure parting to moderate coarse subangular blocky; very hard, firm, sticky and plastic; few very fine roots between peds; 24.5 percent clay; few distinct discontinuous brown (7.5YR 4/4 moist) clay films on faces of peds; common medium and coarse irregular soft masses of lime throughout; slightly effervescent on faces of peds and in pores (HCl, 1 normal); trace of subrounded mixed gravel; strongly alkaline; gradual wavy boundary.

B_{tnk2}—43 to 51 inches; brown (7.5YR 5/4) clay loam, brown (7.5YR 4/4) moist; common fine distinct dark red (2.5YR 3/6 moist) irregular redoximorphic concentrations throughout; moderate medium subangular blocky structure; very hard, firm, sticky and plastic; few very fine roots throughout; 27.7 percent clay; few distinct discontinuous brown (7.5YR 4/4 moist) clay films on vertical faces of peds; common fine and medium irregular soft masses of lime throughout; slightly effervescent on faces of peds and in pores (HCl, 1 normal); 1 percent subrounded mixed gravel; strongly alkaline; clear smooth boundary.

B_{tnk3}—51 to 61 inches; brown (7.5YR 5/3) fine sandy loam, brown (7.5YR 4/3) moist; common medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; 19.9 percent clay; few faint discontinuous clay films on faces of peds; few medium and coarse irregular carbonate concretions throughout; very slightly effervescent on faces of peds and in pores (HCl, 1 normal); 2 percent subrounded mixed gravel; strongly alkaline; clear smooth boundary.

B_{tn1}—61 to 72 inches; brown (7.5YR 5/3) fine sandy loam, brown (7.5YR 4/3) moist; few medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; 14.4 percent clay; few faint discontinuous clay films on faces of peds; strongly alkaline; gradual smooth boundary.

B_{tn2}—72 to 80 inches; yellowish brown (10YR 5/4)

fine sandy loam, dark yellowish brown (10YR 4/4) moist; common medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak coarse subangular blocky structure; hard, friable, slightly sticky and slightly plastic; 14.4 percent clay; very few faint discontinuous clay films on faces of peds; strongly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 17 to 25 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 20 to 40 inches

Depth to salt accumulations: 15 to 25 inches

Thickness of the mollic epipedon: 10 to 19 inches

Other features: Some pedons have a BC or C horizon.

A_p horizon:

Hue—10YR

Value—4 or 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—fine sandy loam or loam

Sodium adsorption ratio—0 to 1

Reaction—strongly acid to neutral

B_{tn} horizon:

Hue—10YR or 7.5YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—3 or 4

Texture—fine sandy loam, sandy clay loam, sandy loam, loam, or clay loam

Content of rock fragments—0 to 5 percent by volume

Redoximorphic features—0 to 10 percent

Sodium adsorption ratio—1 to 2

Reaction—slightly alkaline to strongly alkaline

Farnum Series

The Farnum series consists of very deep, well drained soils that formed in alluvium. These soils are on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 6 percent. The mean annual precipitation is about 28 inches, and the mean annual temperature is about 57 degrees F.

Typical Pedon

Farnum loam, on an east-facing, convex slope of 1 percent, in a cultivated field at an elevation of 1,650

feet, in Reno County, Kansas, about 3 miles southwest of Nickerson; about 1,400 feet east and 100 feet north of the southwest corner of sec. 13, T. 22 S., R. 8 W.; Sterling USGS quadrangle; lat. 38 degrees 7 minutes 49.3 seconds N. and long. 98 degrees 9 minutes 19.9 seconds W. (colors are for dry soil unless otherwise stated):

- Ap—0 to 5 inches; brown (10YR 4/3) (interior) loam, dark brown (10YR 3/3) (interior) moist; weak medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine roots throughout; 13 percent clay; noneffervescent throughout (HCl, 1 normal); slightly acid; abrupt smooth boundary.
- A—5 to 15 inches; dark grayish brown (10YR 4/2) (interior) loam, very dark grayish brown (10YR 3/2) (interior) moist; moderate medium subangular blocky structure; soft, friable, slightly sticky and nonplastic; common very fine roots throughout; 16 percent clay; noneffervescent throughout (HCl, 1 normal); neutral; clear smooth boundary.
- Bt1—15 to 21 inches; dark grayish brown (10YR 4/2) (interior) loam, very dark grayish brown (10YR 3/2) (interior) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 22 percent clay; few distinct discontinuous clay films on vertical faces of peds; noneffervescent throughout (HCl, 1 normal); neutral; clear wavy boundary.
- Bt2—21 to 34 inches; yellowish brown (10YR 5/4) (interior) sandy clay loam, dark yellowish brown (10YR 4/4) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; 28 percent clay; few distinct discontinuous clay films on vertical and horizontal faces of peds; noneffervescent throughout (HCl, 1 normal); neutral; gradual wavy boundary.
- Bt3—34 to 48 inches; brown (10YR 5/3) (interior) loam, brown (10YR 4/3) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky and moderately plastic; 32 percent clay; few distinct discontinuous clay films on vertical faces of peds; noneffervescent throughout (HCl, 1 normal); neutral; gradual wavy boundary.
- Bt4—48 to 61 inches; brown (10YR 5/3) (interior) clay loam, brown (10YR 4/3) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky and moderately plastic; 30 percent clay; few distinct discontinuous clay films on vertical faces

of peds; noneffervescent throughout (HCl, 1 normal); neutral; clear wavy boundary.

- Bt5—61 to 68 inches; light yellowish brown (10YR 6/4) (interior) clay loam, yellowish brown (10YR 5/4) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, moderately sticky and moderately plastic; 30 percent clay; few distinct discontinuous clay films on vertical faces of peds; noneffervescent throughout (HCl, 1 normal); neutral; gradual wavy boundary.
- Btk—68 to 80 inches; light yellowish brown (10YR 6/4) (interior) loam, yellowish brown (10YR 5/4) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; 27 percent clay; few distinct discontinuous clay films on vertical faces of peds; common fine irregular carbonate threads throughout; slightly effervescent in root channels and/or pores (HCl, 1 normal); slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 20 to 34 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 36 to more than 60 inches

A horizon:

Hue—10YR or 7.5YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—loam, fine sandy loam, sandy loam, or clay loam

Reaction—moderately acid to neutral

Bt horizon:

Hue—7.5YR to 2.5Y

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 to 4

Texture—sandy clay loam, clay loam, or loam

Calcium carbonate equivalent—0 to 10 percent

Reaction—neutral to moderately alkaline

Funmar Series

The Funmar series consists of very deep, moderately well drained soils that formed in loamy, wind-modified alluvium over a buried soil. These soils are on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Permeability is moderate in the upper part and slow in the lower part. Slopes

range from 0 to 3 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Funmar loam, on a convex slope of less than 1 percent, in a cultivated field in Reno County, Kansas, 3 miles west of Yoder; 2,540 feet east and 150 feet south of the northwest corner of sec. 30, T. 24 S., R. 5 W.; USGS Elmer topographic quadrangle; lat. 37 degrees 56 minutes 26.5 seconds N. and long. 97 degrees 54 minutes 47.3 seconds W. (colors are for dry soil unless otherwise stated):

- Ap—0 to 6 inches; dark grayish brown (10YR 4/2) (interior) loam, very dark grayish brown (10YR 3/2) (interior) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout and common medium roots throughout; 20 percent clay; noneffervescent throughout (HCl, 1 normal); slightly acid; abrupt smooth boundary.
- A—6 to 12 inches; dark gray (10YR 4/1) (interior) loam, very dark gray (10YR 3/1) (interior) moist; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common medium roots throughout; 22 percent clay; few distinct patchy very dark grayish brown (10YR 3/2 moist) organic coatings on faces of peds; noneffervescent throughout (HCl, 1 normal); slightly acid; gradual wavy boundary.
- Bt1—12 to 17 inches; dark gray (10YR 4/1) (interior) loam, very dark gray (10YR 3/1) (interior) moist; moderate medium angular blocky structure; hard, friable, slightly sticky and slightly plastic; common medium roots throughout; 25 percent clay; few faint patchy dark brown (10YR 3/3 moist) clay films on vertical and horizontal faces of peds and few distinct patchy very dark grayish brown (10YR 3/2 moist) organic coatings on vertical faces of peds; noneffervescent throughout (HCl, 1 normal); neutral; gradual wavy boundary.
- Bt2—17 to 26 inches; dark grayish brown (10YR 4/2) (interior) clay loam, 60 percent dark brown (10YR 3/3) (interior) and 40 percent very dark grayish brown (10YR 3/2) (interior) moist; moderate medium prismatic structure parting to moderate medium subangular blocky and moderate medium angular blocky; hard, friable, moderately sticky and moderately plastic; common fine and medium roots throughout; 29 percent clay; common faint discontinuous very dark grayish brown (10YR 3/2 moist) clay films on vertical and horizontal faces of

peds and few distinct patchy very dark grayish brown (10YR 3/2) organic coatings on vertical faces of peds; noneffervescent throughout (HCl, 1 normal); neutral; clear wavy boundary.

- Bt3—26 to 32 inches; light brownish gray (10YR 6/2) (interior) loam, dark grayish brown (10YR 4/2) (interior) moist; common medium prominent strong brown (7.5YR 5/6 moist) irregular mottles throughout; moderate fine and medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common fine roots throughout; 26 percent clay; few faint patchy dark brown (10YR 3/3 moist) clay films on vertical and horizontal faces of peds; common fine rounded very dark brown (10YR 2/2) masses of iron-manganese accumulation (pedogenic) throughout; noneffervescent throughout (HCl, 1 normal); slightly alkaline; gradual smooth boundary.
- 2Ab—32 to 38 inches; gray (10YR 5/1) (interior) silty clay loam, very dark gray (10YR 3/1) (interior) moist; common fine and medium prominent strong brown (7.5YR 5/6 moist) irregular mottles throughout; moderate medium angular blocky and moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine and fine roots throughout; 32 percent clay; common fine and medium rounded very dark brown (10YR 2/2) hard iron-manganese concretions (pedogenic) throughout; noneffervescent throughout (HCl, 1 normal); slightly alkaline; gradual wavy boundary.
- 2Btb—38 to 54 inches; light brownish gray (2.5Y 6/2) (interior) silty clay loam, dark grayish brown (2.5Y 4/2) (interior) moist; common fine and medium prominent strong brown (7.5YR 4/6 moist) irregular mottles throughout; moderate coarse prismatic structure parting to strong medium subangular blocky and strong medium angular blocky; extremely hard, extremely firm, very sticky and very plastic; few very fine roots between peds; 38 percent clay; many faint continuous dark grayish brown (2.5Y 4/2 moist) clay films on vertical and horizontal faces of peds, few distinct continuous dark grayish brown (10YR 4/2 moist) organic coatings on vertical faces of peds, few distinct discontinuous dark brown (10YR 3/3 moist) skeletalans on vertical faces of peds, and few faint discontinuous pressure faces on vertical and horizontal faces of peds; few fine rounded very dark brown (10YR 2/2) masses of iron-manganese accumulation (pedogenic) throughout; noneffervescent throughout (HCl, 1 normal); trace of fine gravel; vertical cracks about 5 millimeters wide extend from a depth of 38 to 60 inches;

- skeletons are material from Bt3 horizon lining cracks; slightly alkaline; gradual wavy boundary.
- 2Btkb1—54 to 66 inches; light brownish gray (2.5Y 6/2) (interior) silty clay loam, grayish brown (2.5Y 5/2) (interior) moist; common medium and coarse prominent yellowish brown (10YR 5/6 moist) irregular mottles between peds; moderate coarse prismatic structure parting to moderate medium and coarse subangular blocky; extremely hard, extremely firm, very sticky and very plastic; 36 percent clay; few distinct discontinuous dark grayish brown (2.5Y 4/2 moist) clay films on vertical and horizontal faces of peds and few faint discontinuous pressure faces on vertical faces of peds; few fine and medium irregular white (10YR 8/1) hard carbonate nodules (pedogenic) throughout; noneffervescent throughout (HCl, 1 normal); trace of fine gravel; slightly alkaline; gradual wavy boundary.
- 2Btkb2—66 to 80 inches; light gray (5Y 7/2) (interior) silty clay loam, light olive gray (5Y 6/2) (interior) moist; common coarse prominent strong brown (7.5YR 5/6 moist) irregular mottles throughout; moderate medium and coarse subangular blocky structure; hard, firm, moderately sticky and moderately plastic; 38 percent clay; common faint discontinuous light olive gray (5Y 6/2 moist) clay films on vertical and horizontal faces of peds and few distinct continuous very dark brown (10YR 2/2 moist) manganese or iron-manganese stains in root channels and/or pores; few medium and coarse irregular white (10YR 8/1) hard carbonate nodules (pedogenic) throughout and common fine and medium cylindrical brown (7.5YR 4/4) masses of iron accumulation (pedogenic) between peds; noneffervescent throughout (HCl, 1 normal); slightly alkaline.

Range in Characteristics

- Soil moisture regime:* Ustic (bordering on udic)
Soil temperature regime: Mesic
Mean annual soil temperature: 56 to 58 degrees F
Particle-size control section: 22 to 34 percent clay
Depth to bedrock: Greater than 80 inches
Depth to secondary calcium carbonate: Greater than 60 inches
Thickness of the mollic epipedon: 20 to 37 inches
Depth to buried soil material: 20 to 40 inches
Other features: Some pedons have a 2BCK, 2C, or 3Btkb horizon.

A horizon:

- Hue—10YR
 Value—4 or 5 dry, 3 moist
 Chroma—1 to 3

- Texture—loam or fine sandy loam
 Reaction—slightly acid or neutral

Bt horizon:

- Hue—10YR or 7.5YR
 Value—4 to 6 dry, 3 or 5 moist
 Chroma—1 to 4
 Texture—clay loam, sandy clay loam, or loam
 Reaction—neutral or slightly alkaline

2Ab horizon:

- Hue—10YR, 2.5Y, or 5Y
 Value—4 to 6 dry, 3 to 5 moist
 Chroma—1 to 4
 Texture—silt loam or silty clay loam
 Reaction—neutral or slightly alkaline

2Btb horizon:

- Hue—10YR, 2.5Y, or 5Y
 Value—4 to 7 dry, 3 to 6 moist
 Chroma—2 to 4 dry, 1 to 4 moist
 Texture—silty clay, clay loam, silty clay loam, or sandy clay loam
 Calcium carbonate equivalent—0 to 5 percent
 Reaction—neutral or slightly alkaline

Geary Series

The Geary series consists of very deep, well drained, moderately or moderately slowly permeable soils that formed in loess. These soils are on uplands in the Central Loess Plains (MLRA 75). Slopes range from 0 to 31 percent. The mean annual precipitation is 26 inches, and the mean annual temperature is 55 degrees F.

Typical Pedon

Geary silt loam, in a cultivated field in Saline County, Kansas, about 9 miles east and 1/2 mile north of the Salina post office; 240 feet west and 70 feet south of the center of sec. 9, T. 14 S., R. 1 W. (colors are for dry soil unless otherwise stated):

- Ap—0 to 9 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; weak fine granular structure; hard, friable, slightly plastic and slightly sticky; few fine roots; moderately acid; gradual smooth boundary.
- BA—9 to 15 inches; brown (7.5YR 4/4) silty clay loam, dark brown (7.5YR 3/2) moist; moderate fine subangular blocky structure; very hard, firm, slightly plastic and slightly sticky; few fine roots; moderately acid; gradual smooth boundary.
- Bt1—15 to 23 inches; brown (7.5YR 4/4) silty clay loam, dark brown (7.5YR 3/4) moist and brown (7.5YR 4/4) rubbed and moist; moderate fine and

very fine subangular blocky structure; very hard, firm, plastic and sticky; few faint clay films on horizontal and vertical faces of peds; slightly acid; gradual smooth boundary.

Bt2—23 to 32 inches; brown (7.5YR 4/4) silty clay loam, dark brown (7.5YR 3/4) moist and brown (7.5YR 4/4) rubbed and moist; moderate medium subangular blocky structure; very hard, firm, plastic and sticky; few faint clay films on faces of some peds; slightly acid; gradual smooth boundary.

BC—32 to 42 inches; brown (7.5YR 5/4) silty clay loam, brown (7.5YR 4/4) moist; weak coarse subangular blocky structure; very hard, friable, slightly plastic and slightly sticky; neutral; gradual smooth boundary.

C—42 to 60 inches; reddish brown (5YR 5/3) silty clay loam, reddish brown (5YR 4/3) moist; massive; hard, friable, slightly plastic and slightly sticky; few fine tubular pores; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 22 to 34 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 60 inches

Thickness of the mollic epipedon: 10 to 20 inches

A horizon:

Hue—7.5YR or 10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—silt loam, silty clay loam, or clay loam

Reaction—moderately acid or slightly acid

Bt horizon:

Hue—7.5YR or 5YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—3 to 6

Texture—silty clay loam or clay loam; 27 to 35 percent clay

Reaction—moderately acid to slightly alkaline

C horizon:

Hue—10YR, 7.5YR, or 5YR

Value—5 to 7 dry, 4 or 5 moist

Chroma—3 to 6

Texture—silty clay loam, silt loam, loam, or clay loam

Reaction—slightly acid to moderately alkaline

Hayes Series

The Hayes series consists of very deep, well drained soils that formed in moderately coarse eolian deposits over a buried alluvial soil. These soils are on dunes on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Permeability is moderately rapid in the upper part and slow in the lower part. Slopes range from 0 to 5 percent. The mean annual air temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Hayes loamy fine sand, in a cultivated field in Reno County, Kansas, 5 miles north and 2 miles east of Sylvia; 534 feet north and 1,368 feet west of the southeast corner of sec. 24, T. 23 S., R. 10 W.; USGS Alden SE topographic quadrangle; lat. 38 degrees 1 minute 45.8 seconds N. and long. 98 degrees 22 minutes 1.3 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 8 inches; pale brown (10YR 6/3) (interior) loamy fine sand, brown (10YR 4/3) (interior) moist; weak fine subangular blocky structure parting to single grain; soft when dry, loose when moist, nonsticky and nonplastic when wet; common very fine roots throughout; 8.4 percent clay; moderately acid; abrupt smooth boundary.

Bt1—8 to 14 inches; yellowish brown (10YR 5/4) (interior) fine sandy loam, dark yellowish brown (10YR 4/4) (interior) moist; weak medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine roots throughout; 15.2 percent clay; few faint patchy clay bridges between sand grains; neutral; abrupt smooth boundary.

Bt2—14 to 23 inches; brown (10YR 5/3) (interior) fine sandy loam, brown (10YR 4/3) (interior) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very fine roots throughout; 15.9 percent clay; few faint patchy brown (10YR 4/3 moist) clay films on faces of peds and in pores and few faint patchy clay bridges between sand grains; neutral; clear smooth boundary.

Bt3—23 to 34 inches; yellowish brown (10YR 5/4) (interior) fine sandy loam, dark yellowish brown (10YR 4/4) (interior) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; common very

fine roots throughout; 15.7 percent clay; few distinct patchy brown (10YR 4/3 moist) clay films in root channels and/or pores and few faint patchy clay bridges between sand grains; neutral; clear wavy boundary.

Bt4—34 to 42 inches; light yellowish brown (10YR 6/4) (interior) fine sandy loam, dark yellowish brown (10YR 4/4) (interior) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; 13.3 percent clay; few faint patchy clay bridges between sand grains; slightly alkaline; abrupt smooth boundary.

Ab—42 to 47 inches; 80 percent grayish brown (10YR 5/2) (interior) and 20 percent brown (10YR 5/3) (interior) fine sandy loam; 80 percent dark grayish brown (10YR 4/2) (interior) and 20 percent brown (10YR 4/3) (interior) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine roots throughout; 14 percent clay; slightly alkaline; abrupt wavy boundary.

2Btb1—47 to 56 inches; yellowish brown (10YR 5/4) (interior) sandy clay loam, dark yellowish brown (10YR 4/4) (interior) moist; few medium distinct grayish brown (10YR 5/2 moist) cylindrical redoximorphic depletions throughout; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; common very fine and fine constricted tubular pores with moderate continuity; redoximorphic depletions in root channels and pores; trace of fine pebbles; 20.4 percent clay; few distinct discontinuous brown (10YR 4/3 moist) clay films on vertical faces of peds and very few distinct patchy dark grayish brown (10YR 4/2 moist) organic coatings on vertical faces of peds; slightly alkaline; abrupt smooth boundary.

2Btb2—56 to 69 inches; light gray (2.5Y 7/2) (interior) silty clay, dark grayish brown (2.5Y 4/2) (interior) moist; moderate medium prismatic structure parting to moderate medium angular blocky; hard, firm, sticky and plastic; few very fine roots throughout; few very fine constricted tubular pores with low continuity; trace of fine pebbles; 41.8 percent clay; common faint continuous dark grayish brown (2.5Y 4/2 moist) clay films on vertical and horizontal faces of peds, few distinct discontinuous pressure faces on vertical and horizontal faces of peds, and few prominent discontinuous yellowish brown (10YR 5/4 moist) skeletans on vertical faces of peds; few medium

irregular black (10YR 2/1) soft masses of iron-manganese (pedogenic) between peds; slightly alkaline; clear smooth boundary.

2Btb3—69 to 80 inches; light gray (2.5Y 7/2) (interior) clay loam, grayish brown (2.5Y 5/2) (interior) moist; common fine and medium prominent yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; few very fine constricted tubular pores with low continuity; trace of fine pebbles; 29.7 percent clay; few faint discontinuous grayish brown (2.5Y 5/2 moist) clay films on vertical faces of peds, few prominent discontinuous brown (10YR 4/3 moist) skeletans on faces of peds and in pores, and few prominent patchy dark grayish brown (10YR 4/2 moist) organic coatings on vertical faces of peds; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 8 to 17 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 30 to more than 80 inches

Thickness of the ochric epipedon: 4 to 19 inches

A horizon:

Hue—10YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 or 3

Texture—loamy fine sand, fine sandy loam, loamy sand, fine sand, sand, or sandy loam

Reaction—strongly acid to neutral

Bt horizon:

Hue—10YR or 7.5YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 to 4

Texture—fine sandy loam, loamy fine sand, or loamy sand in the lower part; lamellae of fine sandy loam or sandy loam

Reaction—moderately acid to slightly alkaline

Ab horizon:

Hue—10YR or 7.5YR

Value—4 to 6 dry, 3 or 4 moist

Chroma—1 to 3

Texture—fine sandy loam, sandy loam, loamy fine sand, fine sand, or loam

Redoximorphic features—0 to 5 percent

Reaction—slightly acid to slightly alkaline

2Btb horizon:

Hue—typically 2.5Y to 7.5YR, but the range includes 5YR and 5Y

Value—4 to 7 dry, 3 to 6 moist

Chroma—1 to 6

Texture—sandy clay loam, loam, silty clay, silty clay loam, or clay loam

Redoximorphic features—0 to 30 percent

Reaction—neutral or slightly alkaline

Imano Series

The Imano series consists of very deep, somewhat poorly drained soils that formed in loamy sediments over sandy alluvium. These soils are on low stream terraces or flood plains in the Great Bend Sand Plains (MLRA 79). Permeability is moderate in the upper part and rapid in the lower part. Slopes are 0 to 1 percent. The mean annual temperature is 57 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Imano clay loam, in a nearly level area in a cultivated field in Reno County, Kansas, 1 mile west of the city of Hutchinson on old Highway 50; 2,000 feet east and 1,500 feet south of the northwest corner of sec. 15, T. 23 S., R. 6 W.; USGS Hutchinson topographic quadrangle; lat. 38 degrees 3 minutes 10.1 seconds N. and long. 97 degrees 58 minutes 13.3 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 10 inches; dark grayish brown (10YR 4/2)

(interior) clay loam, very dark grayish brown (10YR 3/2) (interior) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; clear smooth boundary.

Bw—10 to 25 inches; pale brown (10YR 6/3) (interior) loam, brown (10YR 5/3) (interior) moist; common medium and coarse distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concretions throughout; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common fine and medium irregular masses of iron-manganese accumulation throughout; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; 1 percent subrounded mixed gravel; abrupt smooth boundary.

2C1—25 to 55 inches; pale brown (10YR 6/3)

(interior), stratified fine sand and sand, brown (10YR 5/3) (interior) moist; common coarse distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concretions throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; noneffervescent throughout (HCl, 1 normal); slightly alkaline; gradual smooth boundary.

2C2—55 to 80 inches; very pale brown (10YR 7/3) (interior) coarse sand, pale brown (10YR 6/3) (interior) moist; common coarse prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concretions throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; noneffervescent throughout (HCl, 1 normal); slightly alkaline; 7 percent subrounded mixed gravel.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 16 to 28 percent clay (18 to 28 percent in the upper part, 0 to 6 percent in the lower part)

Depth to secondary calcium carbonate: 0 to 12 inches

Depth to redoximorphic features: 18 to 32 inches

Depth to sandy material: 20 to 40 inches

Thickness of the mollic epipedon: 7 to 20 inches

Water table: Depth to top—2 to 4 feet; kind—apparent; months—March through June

Other features: A saline phase is recognized. A few pedons have dark buried horizons below a depth of 40 inches. Some pedons have an AC horizon instead of a Bw horizon.

A horizon:

Hue—10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—1 to 3

Texture—loam or clay loam

Content of rock fragments—0 to 2 percent by volume

Calcium carbonate equivalent—1 to 5 percent

Electrical conductivity—0 to 2 mmhos/cm

Sodium adsorption ratio—0 to 2

Reaction—slightly alkaline or moderately alkaline

Bw horizon:

Hue—10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—1 to 3

Texture—clay loam or loam

Content of rock fragments—0 to 2 percent by volume

Calcium carbonate equivalent—1 to 5 percent
 Electrical conductivity—0 to 2 mmhos/cm
 Sodium adsorption ratio—0 to 2
 Reaction—slightly alkaline or moderately alkaline

2C horizon:

Hue—7.5YR to 2.5Y
 Value—5 to 7 dry, 4 to 6 moist
 Chroma—2 to 4
 Texture—loamy fine sand, loamy sand, fine sand, sand, or coarse sand
 Content of rock fragments—0 to 14 percent by volume
 Calcium carbonate equivalent—1 to 5 percent
 Electrical conductivity—0 to 2 mmhos/cm
 Sodium adsorption ratio—0 to 2
 Reaction—slightly alkaline to moderately alkaline

Jamash Series

The Jamash series consists of shallow, well drained soils that formed in residuum derived from Permian shale. These soils are on pediments in river valleys in the Central Rolling Red Prairies (MLRA 80A). Slopes range from 0 to 12 percent. The mean annual precipitation is about 29 inches, and the mean annual temperature is about 59 degrees F.

Typical Pedon

Jamash clay loam (fig. 22), on a west-facing, planar slope of 1 percent, in an area of cropland at an elevation of 1,490 feet in Reno County, Kansas, about 5 miles south of Yoder; about 1,630 feet north and 120 feet west of the southeast corner of sec. 28, T. 25 N., R. 5 W.; USGS Haven SE quadrangle; lat. 37 degrees 50 minutes 38.0 seconds N. and long. 97 degrees 52 minutes 0.6 second W. (colors are for dry soil unless otherwise stated):

Ap—0 to 4 inches; brown (7.5YR 4/3) (interior) clay loam, dark brown (7.5YR 3/3) (interior) moist; weak fine subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine roots throughout; 32 percent clay; noneffervescent throughout (HCl, 1 normal); slightly alkaline; abrupt smooth boundary.

Bw—4 to 11 inches; reddish brown (5YR 4/3) (interior) clay loam, dark reddish brown (5YR 3/3) (interior) moist; moderate medium subangular blocky structure parting to weak medium angular blocky; very hard, very firm, very sticky and very plastic; common very fine roots throughout; 37 percent clay; common distinct continuous reddish brown (5YR 4/3 moist) clay films on vertical and horizontal faces of peds and few distinct

discontinuous dark brown (7.5YR 3/2 moist) organic coatings on faces of peds and in pores; very slightly effervescent throughout (HCl, 1 normal); 2 percent well rounded shale channers; moderately alkaline; clear wavy boundary.

BC—11 to 15 inches; reddish brown (5YR 5/4) (interior) silty clay loam, dark reddish brown (5YR 3/4) (interior) moist; weak medium subangular blocky structure; 30 percent platy rock structure; extremely hard, extremely firm, moderately sticky and moderately plastic; few very fine roots throughout; 30 percent clay; slightly effervescent throughout (HCl, 1 normal); moderately alkaline; abrupt wavy boundary.

Cr1—15 to 28 inches; reddish brown (2.5YR 5/3), weathered shale, dark reddish brown (2.5YR 3/3) moist; noneffervescent throughout (HCl, 1 normal); clear smooth boundary.

Cr2—28 to 80 inches; 50 percent reddish brown (2.5YR 4/4) and 50 percent light greenish gray (5GY 7/1), weathered shale; 50 percent dark reddish brown (2.5YR 3/4) and 50 percent greenish gray (5GY 6/1) moist; noneffervescent throughout (HCl, 1 normal).

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Thermic

Mean annual soil temperature: 58 to 60 degrees F

Particle-size control section: 35 to 45 percent clay

Depth to nonparalithic contact: 10 to 19 inches

Depth to secondary calcium carbonate: Greater than 4 inches

Thickness of the mollic epipedon: 7 to 14 inches

Ap horizon:

Hue—2.5YR to 7.5YR

Value—4 or 5 dry, 3 moist

Chroma—2 or 3 dry or moist

Texture—silty clay loam or clay loam

Reaction—slightly acid to slightly alkaline

Bw horizon:

Hue—2.5YR to 7.5YR

Value—3 or 4 dry or moist

Chroma—2 to 4 dry or moist

Texture—silty clay loam, clay loam, or silty clay

Reaction—neutral to moderately alkaline

BC horizon:

Hue—2.5YR or 5YR

Value—3 to 5 dry, 3 or 4 moist

Chroma—3 or 4 dry or moist

Texture—silty clay loam or clay loam

Content of rock fragments—0 to 35 percent by volume

Reaction—slightly alkaline or moderately alkaline

Cr horizon:

Hue—2.5YR or 5GY

Value—3 to 7 dry or moist

Chroma—1 to 4 dry or moist

Texture—weathered beds of Permian shale

Kanza Series

The Kanza series consists of very deep, poorly drained and somewhat poorly drained soils on flood plains in the Great Bend Sand Plains (MLRA 79). These soils formed in alluvium. Permeability is rapid above the water table. Slopes range from 0 to 2 percent. The mean annual precipitation is 28 inches, and the mean annual temperature is 57 degrees F.

Typical Pedon

Kanza loamy fine sand, in an area of native grass in Harper County, Kansas, about 6 miles north and 7¹/₄ miles east of Harper; 1,320 feet east and 50 feet south of the northwest corner of sec. 8, T. 31 S., R. 5 W. (colors are for dry soil unless otherwise stated):

A—0 to 8 inches; very dark gray (10YR 3/1) loamy fine sand, black (10YR 2/1) moist; weak fine granular structure; slightly hard, friable, nonplastic and nonsticky; slightly acid; clear smooth boundary.

AC—8 to 15 inches; gray (10YR 5/1) loamy fine sand, dark gray (10YR 4/1) moist; common fine prominent yellowish brown (10YR 5/6) redoximorphic concentrations; single grain; soft, very friable, nonplastic and nonsticky; slightly acid; gradual smooth boundary.

C—15 to 80 inches; light gray (10YR 7/2) loamy fine sand, light brownish gray (10YR 6/2) moist; common coarse prominent brownish yellow (10YR 6/6) redoximorphic concentrations; single grain; loose when moist, soft when dry; neutral.

Range in Characteristics

Soil moisture regime: Aquic

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 1 to 12 percent clay

Depth to redox concentrations: 8 to 15 inches

Thickness of the ochric epipedon: 6 to 9 inches

Water table: Depth to top—0 to 3 feet; kind—apparent; months—December through March

A horizon:

Hue—7.5YR to 2.5Y

Value—3 to 5 dry, 2 or 3 moist

Chroma—1 or 2

Texture—loamy fine sand or clay loam

Reaction—moderately acid or slightly acid

AC horizon:

Hue—10YR or 2.5Y

Value—5 or 6 dry, 4 or 5 moist

Chroma—1 or 2

Texture—loamy sand or loamy fine sand

Reaction—slightly acid to moderately alkaline

C horizon:

Hue—10YR or 2.5Y

Value—7 or 8 dry, 6 or 7 moist

Chroma—1 to 3

Texture—fine sand, sand, or loamy fine sand

Calcium carbonate equivalent—0 to 5 percent

Reaction—slightly acid to moderately alkaline

Kaskan Series

The Kaskan series consists of very deep, well drained soils that formed in stratified loamy alluvium. These soils are on flood plains in river valleys of the Great Bend Sand Plains (MLRA 79). Permeability is moderately slow or moderate. Slopes are 0 to 1 percent. The mean annual air temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Kaskan loam, in a cultivated field in Reno County, Kansas, 2 miles north and 2 miles west of Hutchinson; 2,561 feet south and 1,739 feet east of the northwest corner of sec. 28, T. 22 S., R. 6 W.; USGS Hutchinson topographic quadrangle; lat. 38 degrees 6 minutes 28.7 seconds N. and long. 97 degrees 59 minutes 23.3 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) (interior) loam, very dark grayish brown (10YR 3/2) (interior) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 22 percent clay; noneffervescent throughout (HCl, 1 normal); neutral; abrupt smooth boundary.

A—7 to 17 inches; dark gray (10YR 4/1) (interior) silty clay loam, very dark gray (10YR 3/1) (interior) moist; moderate fine and medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine roots throughout; 32 percent clay; noneffervescent throughout (HCl, 1 normal); trace of fine pebbles throughout; neutral; clear smooth boundary.

Bw1—17 to 24 inches; dark grayish brown (10YR 4/2) (interior) loam, very dark grayish brown (10YR

3/2) (interior) moist; weak medium prismatic structure parting to weak fine and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 20 percent clay; few distinct continuous very dark gray (10YR 3/1 moist) organic coatings on faces of peds and in pores; noneffervescent throughout (HCl, 1 normal); trace of fine pebbles throughout; neutral; clear wavy boundary.

Bw2—24 to 35 inches; brown (10YR 5/3) (interior) fine sandy loam, brown (10YR 4/3) (interior) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; 13 percent clay; noneffervescent throughout (HCl, 1 normal); neutral; clear wavy boundary.

BC—35 to 41 inches; pale brown (10YR 6/3) (interior) loamy fine sand, brown (10YR 5/3) (interior) moist; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; 8 percent clay; noneffervescent throughout (HCl, 1 normal); neutral; clear smooth boundary.

C1—41 to 47 inches; very pale brown (10YR 7/3) (interior) fine sand, pale brown (10YR 6/3) (exterior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 1 percent clay; noneffervescent throughout (HCl, 1 normal); neutral; clear smooth boundary.

C2—47 to 66 inches; very pale brown (10YR 7/3) (interior) sand, pale brown (10YR 6/3) (exterior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 1 percent clay; noneffervescent throughout (HCl, 1 normal); 3 percent subrounded mixed gravel; slightly alkaline; abrupt smooth boundary.

C3—66 to 80 inches; very pale brown (10YR 7/3) (interior), stratified sand and gravelly coarse sand, pale brown (10YR 6/3) (interior) moist; common medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; noneffervescent throughout (HCl, 1 normal); 10 percent subrounded mixed gravel; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 10 to 18 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 40 inches

Thickness of the mollic epipedon: 20 to 40 inches

Water table: Depth to top—5.0 to 6.7 feet; kind—

apparent; months—February through June

Other features: Some pedons have an Ab, Bwb, or Btb

horizon.

A horizon:

Hue—10YR

Value—3 or 4 dry, 2 or 3 moist

Chroma—1 or 2

Texture—loam, silty clay loam, or silt loam

Reaction—slightly acid to slightly alkaline

Bw horizon:

Hue—10YR

Value—4 or 5 dry, 3 or 4 moist

Chroma—1 to 3

Texture—loam, fine sandy loam, very fine sandy loam, or silt loam

Reaction—slightly acid to slightly alkaline

C horizon:

Hue—10YR

Value—4 to 7 dry, 3 to 6 moist

Chroma—2 or 3

Texture—fine sand, sand, loamy fine sand, coarse sand, or fine sandy loam or stratified with these textures

Content of rock fragments—0 to 20 percent

Redoximorphic features—0 to 5 percent

Reaction—slightly acid to slightly alkaline

Kisiwa Series

The Kisiwa series consists of very deep, poorly drained, very slowly permeable soils that formed in clayey or loamy, calcareous alluvium. These soils are in slight depressions on terraces and on flood plains in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes are 0 to 1 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Kisiwa loam (fig. 23), in a cultivated field in Reno County, Kansas, about 4 miles south and 7 miles east of Hutchinson; 578 feet north and 2,344 feet west of the southeast corner of sec. 33, T. 23 S., R. 4 W.; USGS Hutchinson SE topographic quadrangle; lat. 38 degrees 0 minutes 3 seconds N. and long. 97 degrees 45 minutes 54 seconds W. (colors are for moist soil unless otherwise stated):

Ap1—0 to 4 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; weak medium subangular blocky structure; hard, friable, slightly

sticky and slightly plastic; common medium roots throughout and common very fine and fine roots throughout; 20.1 percent clay; slightly effervescent throughout; strongly alkaline; clear smooth boundary.

Ap2—4 to 7 inches; very dark gray (10YR 3/1) loam, dark gray (10YR 4/1) dry; few fine distinct dark yellowish brown (10YR 4/4 moist) and few fine faint dark grayish brown (10YR 4/2 moist) irregular mottles throughout; moderate medium angular blocky structure parting to moderate fine subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 21.5 percent clay; slightly effervescent throughout; moderately alkaline; abrupt wavy boundary.

Btkn—7 to 14 inches; very dark grayish brown (10YR 3/2) clay loam, grayish brown (10YR 5/2) dry; common fine faint dark grayish brown (10YR 4/2 moist) irregular mottles throughout; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, very sticky and very plastic; common very fine and fine roots between peds; 31.4 percent clay; very few faint patchy very dark gray (10YR 3/1 moist) clay films on vertical faces of peds and very few distinct discontinuous brown (10YR 5/3 moist) skeletans on vertical and horizontal faces of peds; few fine irregular masses of carbonate throughout; slightly effervescent throughout; 1 percent subrounded mixed gravel; moderately alkaline; clear wavy boundary.

Btknssg1—14 to 23 inches; dark grayish brown (2.5Y 4/2) clay loam, grayish brown (2.5Y 5/2) dry; common fine prominent yellowish brown (10YR 5/4 moist) irregular redoximorphic concentrations throughout; moderate medium prismatic structure parting to moderate medium angular blocky; extremely hard, very firm, very sticky and very plastic; common very fine and fine roots between peds; 36.9 percent clay; very few faint patchy very dark gray (10YR 3/1 moist) clay films on vertical and horizontal faces of peds, very few faint continuous black (10YR 2/1 moist) nonintersecting slickensides on vertical faces of peds, and very few distinct discontinuous brown (10YR 5/3 moist) skeletans on vertical and horizontal faces of peds; common medium irregular masses of carbonate throughout; slightly effervescent throughout; 1 percent subrounded mixed gravel; strongly alkaline; gradual smooth boundary.

Btknssg2—23 to 31 inches; very dark grayish brown (2.5Y 3/2) clay, dark grayish brown (2.5Y 4/2) dry; common fine prominent dark yellowish brown

(10YR 4/4 moist) irregular mottles throughout and common medium prominent light olive brown (2.5Y 5/6 moist) irregular redoximorphic depletions throughout; weak medium prismatic structure parting to moderate fine and medium angular blocky; extremely hard, very firm, very sticky and very plastic; common very fine and fine roots between peds; 41.6 percent clay; very few distinct discontinuous very dark gray (10YR 3/1 moist) clay films on vertical and horizontal faces of peds, very few faint continuous very dark gray (10YR 3/1 moist) nonintersecting slickensides on vertical faces of peds, and very few faint discontinuous skeletans on vertical faces of peds; common fine irregular carbonate concretions throughout; slightly effervescent throughout; 1 percent subrounded mixed gravel; strongly alkaline; clear wavy boundary.

Btknssg3—31 to 40 inches; dark grayish brown (2.5Y 4/2) clay, grayish brown (2.5Y 5/2) dry; common medium prominent light olive brown (2.5Y 5/6 moist) irregular redoximorphic concentrations throughout; moderate medium prismatic structure parting to moderate medium angular blocky; extremely hard, very firm, very sticky and very plastic; few very fine roots between peds; 44.1 percent clay; very few faint patchy clay films on vertical and horizontal faces of peds, very few faint continuous very dark grayish brown (10YR 3/2 moist) nonintersecting slickensides on vertical faces of peds, and very few faint patchy skeletans on vertical faces of peds; common fine irregular carbonate concretions throughout; slightly effervescent throughout; 1 percent subrounded mixed gravel; strongly alkaline; clear wavy boundary.

Btknssg4—40 to 46 inches; dark grayish brown (2.5Y 4/2) loam, grayish brown (2.5Y 5/2) dry; few medium prominent light olive brown (2.5Y 5/6 moist) irregular redoximorphic concentrations throughout and common medium distinct light olive brown (2.5Y 5/4 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, moderately sticky and moderately plastic; few very fine roots between peds; 26.9 percent clay; very few distinct discontinuous very dark gray (10YR 3/1 moist) clay films on vertical faces of peds and very few faint continuous very dark gray (10YR 3/1 moist) nonintersecting slickensides on vertical faces of peds; common fine irregular carbonate concretions throughout and common medium irregular carbonate concretions

throughout; slightly effervescent throughout; 1 percent subrounded mixed gravel; strongly alkaline; gradual smooth boundary.

Btkg—46 to 52 inches; grayish brown (2.5Y 5/2) fine sandy loam, light brownish gray (2.5Y 6/2) dry; few medium prominent light olive brown (2.5Y 5/6 moist) irregular redoximorphic concentrations throughout and common medium distinct light olive brown (2.5Y 5/4 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few very fine roots between peds; 13.1 percent clay; very few faint patchy dark gray (10YR 4/1 moist) clay films on vertical faces of peds; common medium irregular masses of carbonate throughout, common medium rounded carbonate concretions throughout, and common fine irregular carbonate concretions throughout; slightly effervescent throughout; 1 percent subrounded mixed gravel; moderately alkaline; clear wavy boundary.

BCg—52 to 58 inches; light olive brown (2.5Y 5/4) fine sandy loam, light yellowish brown (2.5Y 6/4) dry; common medium distinct light olive brown (2.5Y 5/6 moist) irregular redoximorphic concentrations throughout and common medium distinct grayish brown (2.5Y 5/2 moist) irregular redoximorphic depletions throughout; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; few very fine roots throughout; 8.5 percent clay; common medium irregular masses of carbonate throughout and few fine irregular carbonate concretions throughout; slightly effervescent throughout; 1 percent subrounded mixed gravel; moderately alkaline; clear wavy boundary.

Cg1—58 to 65 inches; 50 percent yellowish brown (10YR 5/4) and 50 percent grayish brown (2.5Y 5/2), stratified fine sandy loam and coarse sand; 50 percent light yellowish brown (10YR 6/4) and 50 percent light brownish gray (2.5Y 6/2) dry; common medium and coarse prominent strong brown (7.5YR 4/6 moist) irregular redoximorphic concentrations throughout; massive; slightly hard, very friable, nonsticky and nonplastic; 8.9 percent clay; moderately alkaline; abrupt wavy boundary.

2Cg2—65 to 80 inches; 50 percent grayish brown (2.5Y 5/2) and 50 percent yellowish brown (10YR 5/4) coarse sand; 50 percent light brownish gray (2.5Y 6/2) and 50 percent light yellowish brown (10YR 6/4) dry; common coarse prominent strong brown (7.5YR 4/6 moist) irregular redoximorphic

concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 0 percent clay; 5 percent subrounded mixed gravel; moderately alkaline.

Range in Characteristics

Soil moisture regime: Aquic

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 27 to 35 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 0 to 10 inches

Depth to salt accumulations: 6 to 12 inches

Thickness of the ochric epipedon: 6 to 14 inches

Water table: Depth to top—1.5 to 2.0 feet; kind—perched; months—December through October

A horizon:

Hue—10YR

Value—3 or 4 dry, 2 or 3 moist

Chroma—1 or 2

Texture—loam, clay loam, or fine sandy loam

Calcium carbonate equivalent—5 to 10 percent

Sodium adsorption ratio—2 to 8

Reaction—moderately alkaline or strongly alkaline

Btkn horizon:

Hue—10YR or 2.5Y

Value—4 to 6 dry, 3 to 5 moist

Chroma—1 or 2

Texture—clay, silty clay, silty clay loam, clay loam, or loam

Content of rock fragments—0 to 3 percent

Calcium carbonate equivalent—15 to 30 percent

Sodium adsorption ratio—15 to 30

Redoximorphic features—5 to 20 percent

Reaction—moderately alkaline or strongly alkaline

Btk horizon:

Hue—10YR or 2.5Y

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—fine sandy loam, clay loam, or loam

Content of rock fragments—0 to 3 percent

Calcium carbonate equivalent—5 to 10 percent

Sodium adsorption ratio—2 to 15

Redoximorphic features—5 to 20 percent

Reaction—moderately alkaline or strongly alkaline

BC horizon:

Hue—2.5Y or 10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—fine sandy loam, sandy loam, or loamy fine sand

Content of rock fragments—0 to 3 percent

Calcium carbonate equivalent—5 to 10 percent
 Sodium adsorption ratio—2 to 4
 Redoximorphic features—5 to 20 percent
 Reaction—moderately alkaline or strongly alkaline

Cg horizon:

Hue—2.5Y or 10YR
 Value—5 to 7 dry, 4 to 6 moist
 Chroma—2 to 4
 Texture—fine sandy loam, loamy fine sand, loamy sand, sand, or coarse sand
 Content of rock fragments—0 to 3 percent
 Calcium carbonate equivalent—5 to 10 percent
 Sodium adsorption ratio—2 to 4
 Redoximorphic features—5 to 20 percent
 Reaction—moderately alkaline or strongly alkaline

Ladysmith Series

The Ladysmith series consists of very deep, somewhat poorly drained, very slowly permeable soils that formed in fine textured sediments. These soils are on uplands in the Central Loess Plains (MLRA 75) and in the Central Bluestem Hills (MLRA 76). Slopes range from 0 to 3 percent. The mean annual air temperature is 57 degrees F, and the mean annual precipitation is 32 inches.

Typical Pedon

Ladysmith silty clay loam, in a cultivated field in Morris County, Kansas, about 1 mile west of Delavan and 175 feet north of U.S. Highway 56; 1,640 feet west and 2,340 feet north of the southeast corner of sec. 13, T. 16 S., R. 5 E. (colors are for dry soil unless otherwise stated):

Ap—0 to 9 inches; dark gray (10YR 4/1) silty clay loam, black (10YR 2/1) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; moderately acid; clear smooth boundary.

Bt1—9 to 22 inches; very dark gray (10YR 3/1) clay, black (10YR 2/1) moist; moderate medium angular blocky structure parting to weak very fine angular blocky; very hard, very firm, very sticky and very plastic; few lighter colored thin silty coatings on some vertical faces of peds; slightly acid; gradual smooth boundary.

Bt2—22 to 36 inches; dark gray (10YR 4/1) clay, very dark gray (10YR 3/1) moist; few very dark gray (10YR 3/1) vertical streaks in the upper 6 inches and few fine brown (7.5YR 5/4) mottles in the lower 4 inches; weak medium angular blocky structure; very hard, very firm, very sticky and very plastic; neutral; gradual smooth boundary.

BC—36 to 50 inches; grayish brown (2.5Y 5/2) silty clay, dark grayish brown (2.5Y 4/2) moist; many coarse distinct brown (7.5YR 4/4) mottles; weak medium angular blocky structure; very hard, very firm, very sticky and very plastic; few small lime concretions; slightly alkaline; gradual smooth boundary.

C—50 to 80 inches; light gray (10YR 6/1) silty clay loam, gray (10YR 5/1) moist; common medium distinct reddish brown (5YR 5/3) and yellowish brown (10YR 5/4) mottles; massive; very hard, firm, very sticky and very plastic; few small black concretions; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Thickness of the mollic epipedon: 20 to 40 inches

Depth to secondary calcium carbonate: Greater than 30 inches

Other features: The content of clay in the boundary between the A and Bt horizons increases less than 15 percent (absolute) within a vertical distance of 1 inch, but it increases 15 to 19 percent (absolute) within a vertical distance of 3 inches.

A horizon:

Hue—10YR
 Value—3 to 5 dry, 2 or 3 moist
 Chroma—1 or 2
 Texture—silt loam or silty clay loam
 Reaction—moderately acid to neutral

Bt horizon (upper part):

Hue—10YR
 Value—3 to 5 dry, 2 or 3 moist
 Chroma—1 or 2 (the upper 6 inches or more of the Bt horizon has value of less than 2.5 moist if the chroma is more than 1.5)
 Reaction—moderately acid to slightly alkaline

Bt horizon (lower part):

Hue—10YR or 2.5Y
 Value—4 or 5 dry, 3 or 4 moist
 Chroma—1 or 2
 Texture—clay or silty clay (as much as 60 percent clay)
 Reaction—neutral to moderately alkaline
 Redox features—reddish or brownish mottles in most pedons

C horizon:

Hue—10YR, 2.5Y, or 5Y
 Value—5 to 7 dry, 4 to 6 moist
 Chroma—1 to 3

Redox features—reddish or brownish mottles in most pedons

Texture—silty clay, silty clay loam, or clay; more clayey or sandy soil material constituting an unconformity in some pedons below a depth of 40 inches

Reaction—slightly alkaline or moderately alkaline

brown (10YR 4/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; three lamellae 3 to 6 mm thick; 5 percent clay; light yellowish brown (10YR 6/4) (interior) fine sand (E), yellowish brown (10YR 5/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; moderately acid.

Langdon Series

The Langdon series consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in sandy eolian sediments. These soils are on undulating to rolling dunes on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes are complex and range from 1 to 15 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Langdon fine sand, in an area of rangeland in Reno County, Kansas, 1.5 miles northeast of Plevna; 1,460 feet west and 1,900 feet north of the southeast corner of sec. 3, T. 24 S., R. 9 W.; USGS Plevna topographic quadrangle; lat. 37 degrees 53 minutes 5.5 seconds N. and long. 98 degrees 22 minutes 6.1 seconds W. (colors are for dry soil unless otherwise stated):

A—0 to 8 inches; grayish brown (10YR 5/2) (interior) fine sand, dark grayish brown (10YR 4/2) (interior) moist; weak fine subangular blocky structure parting to single grain; loose when moist and dry, nonsticky and nonplastic when wet; 1 percent clay; moderately acid; clear wavy boundary.

E&Bt—8 to 47 inches; brown (7.5YR 5/4) (interior) loamy fine sand (Bt), brown (7.5YR 4/4) (interior) moist; weak medium subangular blocky structure parting to single grain; soft when dry, loose when moist, nonsticky and nonplastic when wet; six convoluted lamellae 3 to 8 mm thick; 6 percent clay; few faint patchy clay bridges between sand grains; light yellowish brown (10YR 6/4) (interior) fine sand (E), yellowish brown (10YR 5/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; moderately acid; gradual wavy boundary.

C—47 to 64 inches; light yellowish brown (10YR 6/4) fine sand, yellowish brown (10YR 5/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 1 percent clay; moderately acid; gradual wavy boundary.

E&Btb—64 to 80 inches; yellowish brown (10YR 5/4) (interior) loamy fine sand (Btb), dark yellowish

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 0 to 12 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 80 inches

Thickness of the ochric epipedon: 3 to 13 inches

A horizon:

Hue—10YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—2 to 4

Texture—fine sand or sand

Reaction—strongly acid to neutral

AE horizon (if it occurs):

Hue—10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—sand or fine sand

Reaction—strongly acid to neutral

E horizon:

Hue—7.5YR or 10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—3 to 6

Texture—sand or fine sand

Reaction—strongly acid to neutral

Bt horizon:

Hue—7.5YR or 10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—3 to 6

Texture—loamy sand, loamy fine sand, fine sandy loam, or sandy loam

Reaction—strongly acid to neutral

C horizon:

Hue—10YR or 7.5YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 6

Texture—sand or fine sand

Redoximorphic features—0 to 10 percent

Reaction—strongly acid to neutral

Longford Series

The Longford series consists of deep and very deep, well drained, slowly permeable soils on high terraces and uplands in the Central Loess Plains (MLRA 75). These soils formed in loess and/or in silt and loamy alluvium. Slopes range from 0 to 12 percent. The mean annual precipitation is 28 inches, and the mean annual temperature is 53 degrees F.

Typical Pedon

Longford silt loam, in an area of rangeland in Cloud County, Kansas, about 2 miles south of Miltonvale; about 2,100 feet west and 300 feet south of the northeast corner of sec. 31, T. 8 S., R. 1 W. (colors are for dry soil unless otherwise stated):

- A—0 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; strong fine granular structure; slightly hard, friable, slightly plastic and slightly sticky; many fine roots; slightly acid; gradual smooth boundary.
- BA—10 to 16 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; strong fine subangular blocky structure; slightly hard, friable, slightly plastic and slightly sticky; many fine roots; slightly acid; gradual smooth boundary.
- Bt1—16 to 22 inches; brown (7.5YR 5/4) silty clay loam, brown (7.5YR 4/4) moist; strong fine subangular blocky structure; hard, friable, plastic and sticky; dark grayish brown (10YR 4/2) stains and clay films on faces of peds; few fine roots; slightly acid; gradual smooth boundary.
- Bt2—22 to 40 inches; yellowish red (5YR 5/6) silty clay loam, yellowish red (5YR 4/6) moist; strong fine and medium angular blocky structure; very hard, firm, plastic and sticky; clay films on faces of peds; few coarse roots, slightly acid; gradual smooth boundary.
- Bt3—40 to 46 inches; reddish yellow (5YR 6/6) silty clay loam, yellowish red (5YR 5/6) moist; moderate fine and medium subangular blocky structure; hard, friable, plastic and sticky; thin discontinuous clay films on faces of peds; few very fine and fine black concretions and sandstone pebbles; slightly acid; gradual smooth boundary.
- 2BC—46 to 60 inches; reddish yellow (5YR 6/6) clay loam, yellowish red (5YR 5/6) moist; weak fine and medium granular structure; hard, friable, slightly plastic and slightly sticky; few fine and medium black concretions and fine sandstone pebbles; neutral.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 36 to more than 60 inches

Thickness of the mollic epipedon: 10 to 20 inches

Other features: A few small pebbles are in some pedons. Some pedons do not have a lithologic discontinuity. A bedrock substratum phase and an eroded phase are recognized. Some pedons have a BA horizon, which has colors and textures similar to those of the Bt horizon. Some pedons have a C or 2C horizon, which has colors and textures similar to those of the 2BC horizon. Also, some pedons have grayish brown or reddish mottles below a depth of 48 inches.

A horizon:

Hue—10YR

Value—4 or 5 dry, 2 or 3 moist

Chroma—1 or 2

Texture—silt loam, loam, or silty clay loam

Reaction—moderately acid to neutral

Bt horizon:

Hue—7.5YR or 5YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 to 6

Texture—silty clay loam, silty clay, or clay loam

Content of clay—average of 35 to 45 percent

Reaction—slightly acid or neutral

2BC or BC horizon:

Hue—5YR to 10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—3 to 6

Texture—clay loam, silt loam, silty clay loam, or loam

Reaction—slightly acid to slightly alkaline

Lucien Series

The Lucien series consists of shallow, well drained, moderately rapidly permeable soils that formed in material weathered from sandstone interbedded with clay, siltstone, or sandy shale of Permian age. These soils are on convex ridges and the upper side slopes on uplands in the Central Rolling Red Prairies (MLRA 80A). Slopes range from 1 to 30 percent. The mean annual precipitation is 33 inches, and the mean annual temperature is 61 degrees F.

Typical Pedon

Lucien very fine sandy loam, in an area of rangeland in Noble County, Oklahoma, about 6 miles east and 8 miles north of Perry; 3,000 feet east and 2,450 feet south of the northwest corner of sec. 2, T. 22 N., R. 1 E. (colors are for dry soil unless otherwise stated):

A—0 to 4 inches; brown (7.5YR 4/2) very fine sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium granular structure; slightly hard, very friable; many very fine and fine roots throughout; common irregular wormcasts; few very fine and common fine and medium constricted tubular pores; slightly acid; clear smooth boundary.

BA—4 to 8 inches; brown (7.5YR 4/2) very fine sandy loam, dark brown (7.5YR 3/2) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable; common very fine and fine roots throughout; common irregular wormcasts; many very fine and few fine constricted tubular pores; neutral; clear smooth boundary.

Bw—8 to 14 inches; brown (7.5YR 4/4) very fine sandy loam, dark brown (7.5YR 3/4) moist; moderate fine and medium subangular blocky structure; slightly hard, very friable; common very fine and fine roots throughout; common irregular wormcasts; common very fine constricted tubular pores; 10 percent pebbles of noncalcareous sandstone that has a yellowish red (5YR 5/6) weathering rind $\frac{1}{4}$ to $\frac{1}{2}$ inch thick and a strong brown (7.5YR 5/6) interior; neutral; abrupt wavy boundary.

Cr—14 to 20 inches; weathered bedrock, 75 percent strong brown (7.5YR 5/6) and 25 percent yellowish red (5YR 5/6); 75 percent strong brown (7.5YR 4/6) and 25 percent yellowish red (5YR 4/6) moist; few very fine and fine roots in cracks; neutral.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Thermic

Mean annual soil temperature: 58 to 60 degrees F

Depth to bedrock: Less than 20 inches

Content of coarse fragments of sandstone: Ranges from 0 to 30 percent by volume; about 0 to 10 percent (by volume) less than 76 mm in diameter and 0 to 20 percent (by volume) more than 76 mm in diameter

Other features: The Cr horizon is rippable sandstone interbedded with clay, siltstone, or sandy shale. This material is paralithic, and the difficulty of excavation is high. Fractures are more than 10 cm apart. The material is dense enough to be root

restrictive. Most of the material slakes in water within 15 hours. In some pedons the Cr horizon is divided into a Cr1 horizon that is nonparalithic and is low or moderate in difficulty of excavation and a paralithic Cr2 horizon as described above.

A and AB horizons:

Hue—2.5YR to 7.5YR

Value—4 or 5

Chroma—2 or 3

Texture—loam, silt loam, very fine sandy loam, or fine sandy loam or the stony analogs of these textures

Reaction—moderately acid to slightly alkaline

Bw horizon:

Hue—2.5YR to 7.5YR

Value—4 to 6

Chroma—2 to 6

Texture—loam, silt loam, very fine sandy loam, or fine sandy loam or the stony analogs of these textures

Reaction—moderately acid to slightly alkaline

Cr horizon:

Hue—2.5YR or 5YR

Value—4 to 6

Chroma—4 to 8

Texture—loam, silt loam, very fine sandy loam, or fine sandy loam or the stony analogs of these textures

Reaction—moderately acid to moderately alkaline (horizon is noncalcareous)

Mahone Series

The Mahone series consists of very deep, well drained, moderately permeable soils that formed in stratified loamy alluvium. These soils are on high flood plains in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 2 percent. The mean annual air temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Mahone loamy fine sand, in a cultivated field in Reno County, Kansas, 0.5 mile west of Hutchinson; 800 feet north and 1,550 feet east of the southwest corner of sec. 10, T. 23 S., R. 6 W.; USGS Hutchinson topographic quadrangle; lat. 38 degrees 3 minutes 34.1 seconds N. and long. 97 degrees 58 minutes 18.3 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 8 inches; brown (10YR 5/3) (interior) loamy

- fine sand, brown (10YR 4/3) (interior) moist; weak fine subangular blocky structure parting to single grain; soft, loose, nonsticky and nonplastic; common very fine and fine roots throughout; 4 percent clay; noneffervescent throughout (HCl, 1 normal); moderately acid; clear smooth boundary.
- A—8 to 14 inches; grayish brown (10YR 5/2) (interior) loamy fine sand, very dark grayish brown (10YR 3/2) (interior) moist; weak fine and medium subangular blocky structure parting to single grain; soft, loose, nonsticky and nonplastic; common very fine and fine roots throughout; 8 percent clay; noneffervescent throughout (HCl, 1 normal); moderately acid; clear smooth boundary.
- Bw1—14 to 20 inches; brown (10YR 5/3) (interior) fine sandy loam, brown (10YR 4/3) (interior) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; 9 percent clay; noneffervescent throughout (HCl, 1 normal); slightly acid; clear smooth boundary.
- Bw2—20 to 25 inches; pale brown (10YR 6/3) (interior) very fine sandy loam, brown (10YR 4/3) (interior) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; 11 percent clay; 20 percent fine sand and coarser (0.1 to 75 mm); noneffervescent throughout (HCl, 1 normal); slightly acid; clear smooth boundary.
- Bw3—25 to 33 inches; light yellowish brown (10YR 6/4) (interior) silt loam, yellowish brown (10YR 5/4) (interior) moist; weak medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; 11 percent clay; 8 percent fine sand and coarser (0.1 to 75 mm); noneffervescent throughout (HCl, 1 normal); slightly acid; abrupt smooth boundary.
- 2C—33 to 39 inches; 70 percent yellowish brown (10YR 5/4) (interior) and 30 percent light yellowish brown (10YR 6/4) (interior), stratified silt loam and very fine sandy loam; 70 percent dark yellowish brown (10YR 4/4) (interior) and 30 percent yellowish brown (10YR 5/4) (interior) moist; massive; slightly hard, very friable, slightly sticky and nonplastic; few very fine roots throughout; 15 percent clay; 5 percent fine sand and coarser (0.1 to 75 mm); noneffervescent throughout (HCl, 1 normal); slightly acid; abrupt smooth boundary.
- 2Ab1—39 to 42 inches; dark grayish brown (10YR 4/2) (interior) clay loam, very dark grayish brown (10YR 3/2) (interior) moist; weak medium subangular blocky structure parting to weak fine angular blocky; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 27 percent clay; few fine dendritic carbonate threads throughout and few fine and medium irregular masses of lime throughout; horizon is somewhat turbated by worm channels; strongly effervescent throughout (HCl, 1 normal); slightly alkaline; clear smooth boundary.
- 2Ab2—42 to 48 inches; dark grayish brown (10YR 4/2) (interior) fine sandy loam, very dark grayish brown (10YR 3/2) (interior) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; 14 percent clay; few fine dendritic carbonate threads throughout and few fine irregular masses of lime throughout; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; gradual smooth boundary.
- 2Bwb1—48 to 54 inches; brown (10YR 5/3) (interior) fine sandy loam, brown (10YR 4/3) (interior) moist; weak medium and coarse subangular blocky structure; hard, very friable, slightly sticky and nonplastic; 15 percent clay; 16 percent fine sand and coarser (0.1 to 75 mm); few fine dendritic carbonate threads throughout and few fine irregular masses of lime throughout; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; clear smooth boundary.
- 2Bwb2—54 to 61 inches; light yellowish brown (2.5Y 6/3) (interior) fine sandy loam, light olive brown (2.5Y 5/4) (interior) moist; weak medium subangular blocky structure; hard, very friable, slightly sticky and nonplastic; 16 percent clay; 16 percent fine sand and coarser (0.1 to 75 mm); few fine dendritic carbonate threads throughout and few fine irregular masses of lime throughout; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; clear smooth boundary.
- 2A' b—61 to 66 inches; grayish brown (2.5Y 5/2) (interior) sandy loam, very dark grayish brown (2.5Y 3/2) (interior) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; 12 percent clay; few fine dendritic carbonate threads throughout and few fine irregular masses of lime throughout; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; gradual wavy boundary.
- 2B' wb—66 to 71 inches; light brownish gray (2.5Y 6/2) (interior) fine sandy loam, light olive brown (2.5Y 5/3) (interior) moist; common fine and medium prominent dark yellowish brown (10YR 4/6 moist) irregular mottles throughout; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; 13 percent clay; few fine and medium irregular masses of lime



Figure 17.—Representative profile of Albion sandy loam. Depth is marked in centimeters.



Figure 18.—Representative profile of Blazefork silty clay loam. The highest clay content is in the layers between depths of 17 and 102 centimeters (14 and 41 inches).



Figure 19.—Representative profile of Buhler silty clay loam. Gypsum, salts, and sodium are throughout the profile. Depth is marked in centimeters.



Figure 20.—Representative profile of Darlow loam. The horizons between depths of 50 and 85 centimeters (20 and 34 inches) contain the highest concentrations of salts, gypsum, and sodium.



Figure 21.—Representative profile of Elmer fine sandy loam. The horizons below a depth of 48 centimeters (19 inches) contain concentrations of sodium.

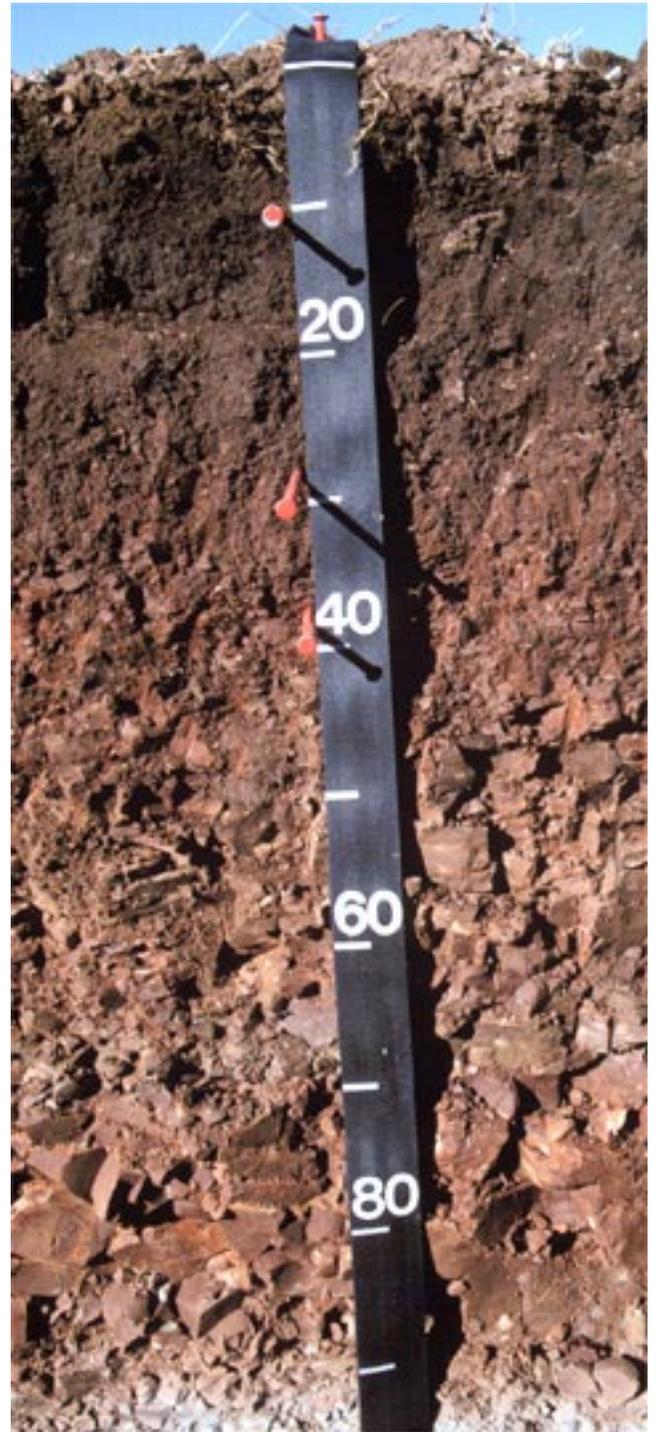


Figure 22.—Representative profile of Jamash clay loam. Shale bedrock is at a depth of 38 centimeters (15 inches).



Figure 23.—Representative profile of Kisiwa loam. This soil has a high content of clay, sodium, and calcium carbonate and a fluctuating seasonal high water table.



Figure 24.—Representative profile of Nalim loam. Depth is marked in centimeters.



Figure 25.—Representative profile of Nickerson loamy fine sand. The horizons below a depth of 74 centimeters (29 inches) contain calcium carbonate.

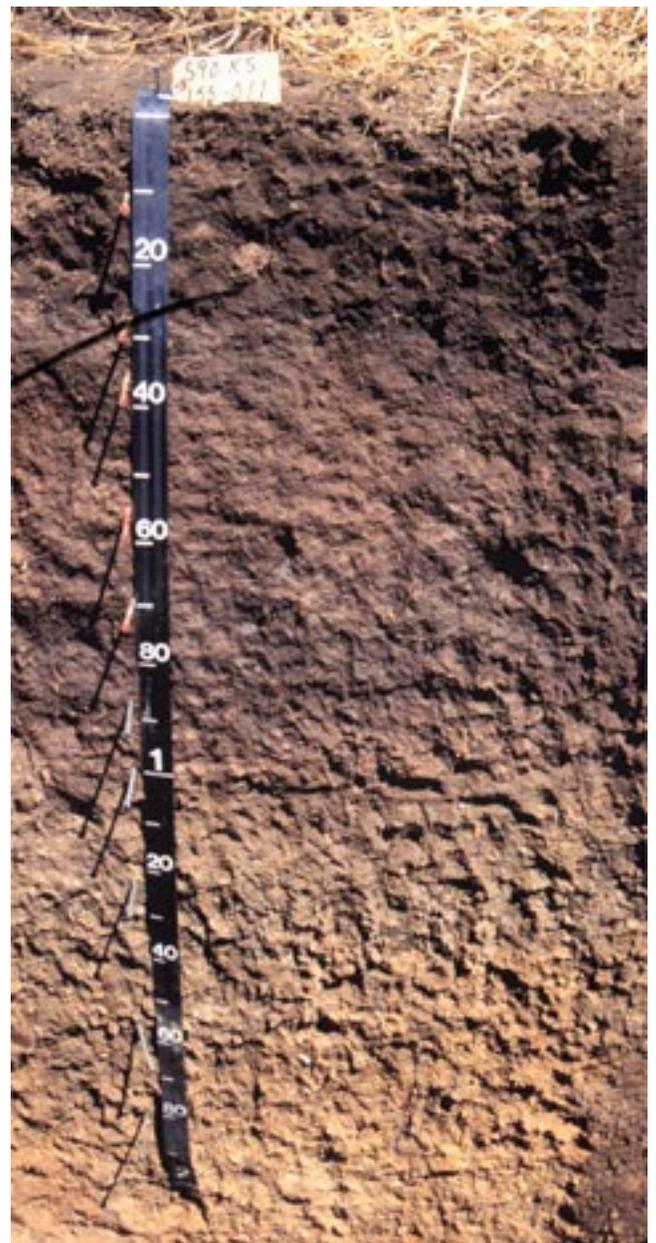


Figure 26.—Representative profile of Penalosa silt loam. A buried soil, which has a high content of clay, is at a depth of 122 centimeters (48 inches).



Figure 27.—Representative profile of Punkin silt loam. The content of sodium and salt is high in the horizons below a depth of 20 centimeters (8 inches).



Figure 28.—Representative profile of Saxman loamy sand. Sand is at a depth of 56 centimeters (22 inches).



Figure 29.—Representative profile of Shellabarger fine sandy loam. Depth is marked in centimeters.



Figure 30.—Representative profile of Solvay fine sandy loam. Depth is marked in centimeters.



Figure 31.—Representative profile of Willowbrook fine sandy loam. The horizons below a depth of 43 centimeters (17 inches) contain calcium carbonate. The soil has a fluctuating seasonal high water table.



Figure 32.—Representative profile of Yaggy fine sandy loam. Flooding events have placed recent alluvial deposits above a buried soil, which is at a depth of 35 to 130 centimeters (14 to 54 inches).

- throughout; strongly effervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately alkaline; clear smooth boundary.
- 3BC—71 to 78 inches; very pale brown (10YR 7/3) (interior) loamy fine sand, brown (10YR 5/3) (interior) moist; common medium prominent strong brown (7.5YR 4/6 moist) irregular mottles throughout; weak medium and coarse subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; 8 percent clay; few fine irregular masses of lime throughout and common medium irregular very dark grayish brown (10YR 3/2) masses of iron-manganese accumulation throughout; slightly effervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; slightly alkaline; clear wavy boundary.
- 3C—78 to 80 inches; very pale brown (10YR 7/3) (interior) sand, pale brown (10YR 6/3) (interior) moist; common coarse prominent strong brown (7.5YR 5/6 moist) irregular mottles throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 1 percent clay; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; neutral.

Range in Characteristics

- Soil moisture regime:* Ustic (bordering on udic)
Soil temperature regime: Mesic
Mean annual soil temperature: 56 to 58 degrees F
Particle-size control section: 5 to 17 percent clay
Depth to bedrock: Greater than 80 inches
Depth to secondary calcium carbonate: 20 to 50 inches
Depth to lithologic discontinuity: 22 to 50 inches
Thickness of the ochric epipedon: 8 to 21 inches
Water table: Depth—greater than 5 feet; kind—apparent; months—February through June

A horizon:

- Hue—10YR
 Value—4 to 6 dry, 3 or 4 moist
 Chroma—2 or 3
 Texture—loamy fine sand or fine sandy loam
 Reaction—strongly acid to neutral

Bw horizon:

- Hue—10YR
 Value—5 or 6 dry, 4 or 5 moist
 Chroma—2 to 4
 Texture—fine sandy loam, very fine sandy loam, or silt loam
 Content of rock fragments—0 to 1 percent
 Calcium carbonate equivalent—0 to 1 percent
 Reaction—slightly acid or neutral

2Ab horizon:

- Hue—10YR
 Value—4 or 5 dry, 3 or 4 moist
 Chroma—1 or 2
 Texture—silty clay loam, silt loam, loam, clay loam, or fine sandy loam
 Calcium carbonate equivalent—0 to 1 percent
 Reaction—slightly alkaline or moderately alkaline

2Bwb horizon:

- Hue—10YR or 2.5Y
 Value—5 to 7 dry, 4 or 5 moist
 Chroma—2 to 4
 Texture—fine sandy loam, sandy clay loam, or silty clay loam
 Content of rock fragments—0 to 2 percent
 Calcium carbonate equivalent—0 to 1 percent
 Redoximorphic features—0 to 10 percent below a depth of 40 inches
 Reaction—slightly alkaline or moderately alkaline

3C horizon:

- Hue—10YR
 Value—5 to 7 dry, 4 to 6 moist
 Chroma—2 to 4
 Texture—coarse sand, sand, fine sand, loamy fine sand, stratified coarse sand and sand, or stratified sand and gravelly coarse sand
 Content of rock fragments—0 to 10 percent
 Redoximorphic features—0 to 25 percent
 Reaction—neutral to moderately alkaline

Nalim Series

The Nalim series consists of deep, well drained, moderately slowly permeable soils that formed in loamy alluvium. These soils are on paleoterraces in river valleys in the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 6 percent. The mean annual precipitation is 32 inches, and the mean annual air temperature is 58 degrees F.

Typical Pedon

Nalim loam (fig. 24), in a cultivated field in Reno County, Kansas, about 1 mile north of Pretty Prairie; 2,475 feet north and 1,050 feet west of the southeast corner of sec. 12, T. 26 S., R. 7 W.; USGS Pretty Prairie topographic quadrangle; lat. 37 degrees 47 minutes 55.8 seconds N. and long. 98 degrees 1 minute 50.3 seconds W. (colors are for dry soil unless otherwise stated):

- Ap—0 to 6 inches; grayish brown (10YR 5/2) (interior) loam, very dark grayish brown (10YR 3/2)

- (interior) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; few very fine and fine roots throughout; 23 percent clay; noneffervescent throughout (HCl, 1 normal); slightly acid; trace fine gravel; abrupt smooth boundary.
- Bt1**—6 to 9 inches; dark grayish brown (10YR 4/2) (interior) loam, very dark grayish brown (10YR 3/2) (interior) and very dark grayish brown (10YR 3/2) crushed and moist; moderate fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 25 percent clay; very few faint patchy dark brown (10YR 3/3 moist) clay films on faces of peds and in pores and common distinct continuous very dark grayish brown (10YR 3/2 moist) organic coatings on vertical and horizontal faces of peds; noneffervescent throughout (HCl, 1 normal); slightly acid; 1 percent subrounded mixed gravel; clear wavy boundary.
- Bt2**—9 to 13 inches; brown (7.5YR 4/3) (interior) clay loam, dark brown (7.5YR 3/3) (interior) and dark brown (7.5YR 3/3) crushed and moist; weak fine and medium prismatic structure parting to weak fine and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 32 percent clay; common distinct continuous brown (7.5YR 4/3 moist) clay films on vertical and horizontal faces of peds and few faint patchy dark brown (7.5YR 3/2 moist) organic coatings on faces of peds and in pores; noneffervescent throughout (HCl, 1 normal); neutral; 3 percent subrounded mixed gravel; gradual wavy boundary.
- Bt3**—13 to 21 inches; brown (7.5YR 5/4) (interior) clay loam, brown (7.5YR 4/4) (interior) moist; weak medium and coarse prismatic structure parting to moderate fine and medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 30 percent clay; few distinct continuous brown (7.5YR 4/3 moist) clay films on vertical and horizontal faces of peds and very few faint patchy dark brown (7.5YR 3/2 moist) organic coatings in root channels and/or pores; noneffervescent throughout (HCl, 1 normal); neutral; 5 percent subrounded mixed gravel; clear smooth boundary.
- Bt4**—21 to 31 inches; brown (7.5YR 4/3) (interior) clay loam, dark brown (7.5YR 3/3) (interior) moist; moderate medium and coarse prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky and moderately plastic; few very fine roots throughout; 34 percent clay; common distinct continuous brown (7.5YR 4/3 moist) clay films on vertical and horizontal faces of peds and few distinct patchy dark brown (7.5YR 3/2 moist) organic coatings on faces of peds and in pores; few fine irregular very dark brown (10YR 2/2) soft masses of iron-manganese accumulation (pedogenic) throughout; noneffervescent throughout (HCl, 1 normal); neutral; 1 percent subrounded mixed gravel; gradual wavy boundary.
- Bt5**—31 to 39 inches; reddish brown (5YR 5/4) (interior) sandy clay loam, reddish brown (5YR 4/4) (interior) moist; weak fine and medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; 26 percent clay; few distinct discontinuous reddish brown (5YR 4/3 moist) clay films on vertical and horizontal faces of peds and common distinct patchy clay bridges between sand grains; noneffervescent throughout (HCl, 1 normal); neutral; 4 percent subrounded mixed gravel; gradual wavy boundary.
- Bt6**—39 to 44 inches; reddish brown (5YR 5/4) (interior) gravelly sandy clay loam, reddish brown (5YR 4/4) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; 26 percent clay; few distinct discontinuous reddish brown (5YR 4/3 moist) clay films on vertical faces of peds and few distinct patchy clay bridges between sand grains; noneffervescent throughout (HCl, 1 normal); neutral; 20 percent subrounded mixed gravel; clear smooth boundary.
- Bt7**—44 to 52 inches; light reddish brown (5YR 6/4) (interior) sandy clay loam, reddish brown (5YR 5/4) (interior) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; 25 percent clay; few distinct discontinuous reddish brown (5YR 4/3 moist) clay films on faces of peds and in pores and few distinct patchy clay bridges between sand grains; few fine irregular very dark brown (10YR 2/2) soft masses of iron-manganese accumulation (pedogenic) throughout; noneffervescent throughout (HCl, 1 normal); neutral; 4 percent subrounded mixed gravel; clear wavy boundary.
- BC**—52 to 62 inches; yellowish red (5YR 5/6) (interior) loamy coarse sand, yellowish red (5YR 4/6) (interior) moist; weak medium and coarse subangular blocky structure parting to single grain; soft, loose, nonsticky and nonplastic; 8 percent clay; few prominent continuous brown (10YR 5/3

moist) skeletons in root channels and/or pores; few fine and medium irregular very dark brown (10YR 2/2) soft masses of iron-manganese accumulation (pedogenic) throughout; noneffervescent throughout (HCl, 1 normal); neutral; 2 percent subrounded mixed gravel; clear wavy boundary.

C1—62 to 72 inches; light brown (7.5YR 6/4) (interior) gravelly loamy coarse sand, brown (7.5YR 5/4) (interior) moist; massive; loose when moist and dry, nonsticky and nonplastic when wet; 6 percent clay; noneffervescent throughout (HCl, 1 normal); neutral; 30 percent subrounded mixed gravel; clear smooth boundary.

C2—72 to 80 inches; 95 percent very pale brown (10YR 7/4) (interior) and 5 percent reddish brown (2.5YR 5/4) (interior), stratified sand and loamy coarse sand; 95 percent light yellowish brown (10YR 6/4) (interior) and 5 percent reddish brown (2.5YR 4/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 1 percent clay; noneffervescent throughout (HCl, 1 normal); neutral.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 55 to 57 degrees F

Surface rock fragments: 0 to 10 percent, by volume, coarse sand and gravel up to 1 inch in diameter

Particle-size control section: 25 to 35 percent clay

Thickness of the mollic epipedon: 10 to 19 inches

Ap horizon:

Hue—5YR, 7.5YR, or 10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—typically loam; less commonly sandy loam, clay loam, or fine sandy loam

Content of rock fragments—0 to 10 percent by volume

Reaction—strongly acid to neutral

Bt horizon:

Hue—2.5YR, 5YR, 7.5YR, or 10YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 to 7

Texture—clay loam, loam, or sandy clay loam or the gravelly analogs of these textures

Content of rock fragments—0 to 20 percent by volume

Reaction—moderately acid to neutral

BC horizon:

Hue—2.5YR or 5YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—3 to 7

Texture—loamy sand, loamy coarse sand, or sandy loam

Content of rock fragments—0 to 10 percent by volume

Reaction—moderately acid to neutral

C horizon:

Hue—2.5YR to 10YR

Value—4 to 7 dry, 3 to 6 moist

Chroma—4 to 8

Texture—loamy sand, loamy coarse sand, or sand or the gravelly analogs of these textures

Content of rock fragments—5 to 20 percent by volume (typically contains more coarse sand and gravel than the Bt horizon and is less clayey)

Reaction—moderately acid to moderately alkaline

Naron Series

The Naron series consists of very deep, well drained, moderately permeable soils that formed in loamy eolian sediments. These soils are on dunes on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 8 percent. The mean annual temperature is 57 degrees F, and the mean annual precipitation is 27 inches.

Typical Pedon

Naron fine sandy loam, on a slope of 2 percent, in a cultivated field in Reno County, Kansas, 17 miles west and 2 miles north of Hutchinson; 775 feet east and 100 feet south of the northwest corner of sec. 28, T. 22 S., R. 8 W.; USGS Sterling SW topographic quadrangle; lat. 38 degrees 6 minutes 53.3 seconds N. and long. 98 degrees 12 minutes 46.7 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 8 inches; brown (10YR 4/3) (interior) fine sandy loam, dark brown (10YR 3/3) (interior) moist; weak fine and medium subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; 11 percent clay; noneffervescent throughout (HCl, 1 normal); moderately acid; abrupt smooth boundary.

A—8 to 14 inches; dark grayish brown (10YR 4/2) (interior) fine sandy loam, very dark grayish brown (10YR 3/2) (interior) moist; weak fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine roots throughout; 15 percent clay; moderately acid; clear smooth boundary.

Bt1—14 to 28 inches; yellowish brown (10YR 5/4)

(interior) sandy clay loam, dark yellowish brown (10YR 4/4) (interior) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 25 percent clay; few distinct discontinuous clay films on vertical faces of peds; slightly acid; gradual wavy boundary.

Bt2—28 to 39 inches; brown (10YR 5/3) (interior) sandy clay loam, brown (10YR 4/3) (interior) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 23 percent clay; few distinct discontinuous clay films on vertical faces of peds; slightly acid; gradual wavy boundary.

Bt3—39 to 55 inches; yellowish brown (10YR 5/4) (interior) sandy clay loam, dark yellowish brown (10YR 4/4) (interior) moist; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 20 percent clay; few distinct discontinuous clay films on vertical faces of peds; moderately acid; gradual smooth boundary.

BC—55 to 66 inches; brown (10YR 5/3) (interior) fine sandy loam, brown (10YR 4/3) (interior) moist; weak fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; 17 percent clay; slightly acid; clear smooth boundary.

C—66 to 80 inches; pale brown (10YR 6/3) (interior) loamy fine sand, brown (10YR 5/3) (interior) moist; massive; soft, very friable, nonsticky and nonplastic; 7 percent clay; slightly acid.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 18 to 27 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Typically more than 60 inches; a few pedons are calcareous below the Bt horizon (the organic carbon is less than 0.6 percent below a depth of 20 inches)

Thickness of the mollic epipedon: 10 to 19 inches

A horizon:

Hue—10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—fine sandy loam, sandy loam, or loam

Reaction—moderately acid to neutral

Bt horizon:

Hue—10YR or 7.5YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 to 4

Texture—fine sandy loam, loam, or sandy clay loam

Reaction—moderately acid to slightly alkaline

BC horizon:

Hue—10YR or 7.5YR

Value—4 to 6 dry, 5 to 7 moist

Chroma—2 to 4

Texture—fine sandy loam, sandy clay loam, or loamy fine sand

Reaction—slightly acid to moderately alkaline

C horizon:

Hue—10YR or 7.5YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—3 or 4

Texture—fine sandy loam, loamy fine sand, or fine sand

Reaction—slightly acid to moderately alkaline

Nash Series

The Nash series consists of moderately deep, well drained, moderately permeable soils that formed in material weathered from sandstone of Permian age. These soils are on convex ridges and side slopes of uplands in the Central Rolling Red Prairies (MLRA 80A). Slopes range from 0 to 20 percent. The mean annual precipitation is 32 inches, and the mean annual temperature is 61 degrees F.

Typical Pedon

Nash silt loam, in Garfield County, Oklahoma, about 1 mile south and 3½ miles east of Hillsdale; 1,000 feet east and 500 feet south of the northwest corner of sec. 23, T. 24 N., R. 7 W. (colors are for dry soil unless otherwise stated):

Ap—0 to 6 inches; reddish brown (5YR 5/3) silt loam, dark reddish brown (5YR 3/3) moist; weak fine granular structure; slightly hard, friable; common fine roots; slightly acid; clear smooth boundary.

A—6 to 10 inches; reddish brown (5YR 4/3) silt loam, dark reddish brown (5YR 3/3) moist; moderate fine granular structure; slightly hard, friable; common fine roots; slightly acid; gradual smooth boundary.

Bw—10 to 22 inches; yellowish red (5YR 5/6) silt loam, yellowish red (5YR 4/6) moist; weak coarse prismatic structure parting to moderate fine granular; slightly hard, friable; few fine roots; neutral; gradual smooth boundary.

BC—22 to 30 inches; red (2.5YR 5/6) silt loam, red (2.5YR 4/6) moist; weak coarse prismatic structure; slightly hard, friable; few fine roots; about 5 percent, by volume, coarse sandstone

fragments less than 3 inches in diameter; slightly alkaline; clear smooth boundary.

Cr—30 to 40 inches; red (2.5YR 5/6), weakly consolidated, calcareous sandstone, red (2.5YR 4/6) moist.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Thermic

Mean annual soil temperature: 58 to 60 degrees F

Particle-size control section: 18 to 27 percent clay

Depth to bedrock: 20 to 40 inches

Ap or A horizon:

Hue—5YR or 7.5YR

Value—4 or 5

Chroma—2 or 3

Texture—silt loam, loam, very fine sandy loam, or fine sandy loam

Reaction—slightly acid to moderately alkaline

Bw horizon:

Hue—2.5YR or 7.5YR

Value—4 or 5

Chroma—3 to 6

Texture—silt loam, loam, very fine sandy loam, or fine sandy loam

Reaction—slightly acid to moderately alkaline

BC horizon:

Hue—2.5YR or 5YR

Value—4 to 6

Chroma—6 to 8

Texture—silt loam, loam, very fine sandy loam, or fine sandy loam

Reaction—slightly acid to moderately alkaline

Cr horizon:

Texture—weakly consolidated, reddish sandstone

Reaction—slightly alkaline or moderately alkaline; calcareous or noncalcareous

Nickerson Series

The Nickerson series consists of very deep, moderately well drained, moderately permeable soils that formed in old alluvium. These soils are on wind-modified terraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 2 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 57 degrees F.

Typical Pedon

Nickerson loamy fine sand (fig. 25), in a cultivated field in Reno County, Kansas, about 2 miles east and 1 mile north of Nickerson; 2,500 feet north and 803 feet

east of the southwest corner of sec. 1, T. 22 S., R. 7 W. (colors are for dry soil unless otherwise stated):

Ap—0 to 6 inches; brown (10YR 5/3) loamy fine sand, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to single grain; soft, loose, nonsticky and nonplastic; common very fine roots throughout; 3.5 percent clay; neutral; abrupt smooth boundary.

A—6 to 12 inches; grayish brown (10YR 5/2) loamy fine sand, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; 5.8 percent clay; strongly acid; clear wavy boundary.

BA—12 to 18 inches; brown (10YR 5/3) fine sandy loam, dark brown (10YR 3/3) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; 12.7 percent clay; common faint continuous very dark grayish brown (10YR 3/2 moist) organic coatings on faces of peds and in pores; moderately acid; clear wavy boundary.

Bt—18 to 29 inches; brown (10YR 5/3) sandy clay loam, brown (10YR 4/3) moist; common medium faint dark yellowish brown (10YR 4/4 moist) irregular mottles throughout; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; many medium vesicular pores with moderate continuity; 21.4 percent clay; few distinct continuous very dark grayish brown (10YR 3/2 moist) clay films on faces of peds and in pores; slightly alkaline; abrupt wavy boundary.

Btk1—29 to 34 inches; pale brown (10YR 6/3) loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; many medium vesicular pores; 16 percent clay; very few distinct discontinuous very dark grayish brown (10YR 3/2 moist) clay films on faces of peds and in pores; common medium irregular masses of carbonate throughout and few medium rounded carbonate concretions throughout; strongly effervescent throughout; moderately alkaline; clear wavy boundary.

Btk2—34 to 38 inches; pale brown (10YR 6/3) very fine sandy loam, brown (10YR 4/3) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very

fine and fine roots throughout; 11.2 percent clay; very few distinct continuous very dark grayish brown (10YR 3/2 moist) clay films in root channels and/or pores; common medium irregular masses of carbonate and common medium rounded carbonate concretions; violently effervescent throughout; moderately alkaline; gradual wavy boundary.

BC—38 to 45 inches; light yellowish brown (10YR 6/4) loamy fine sand, dark yellowish brown (10YR 4/6) moist; weak medium prismatic structure parting to weak medium subangular blocky; soft, loose, nonsticky and nonplastic; few very fine roots throughout; common fine vesicular pores with low continuity; 6.4 percent clay; strongly effervescent throughout; 2 percent rounded mixed gravel; moderately alkaline; gradual wavy boundary.

C1—45 to 53 inches; brownish yellow (10YR 6/6) fine sand, dark yellowish brown (10YR 4/6) moist; common fine distinct yellowish brown (10YR 5/8 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; common fine vesicular pores with low continuity; 0 percent clay; very few distinct continuous brown (10YR 5/3 moist) manganese or iron-manganese stains in root channels and/or pores; slightly effervescent throughout; 2 percent rounded mixed gravel; moderately alkaline; gradual wavy boundary.

C2—53 to 57 inches; light yellowish brown (10YR 6/4) fine sand, brown (10YR 5/3) moist; many coarse distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; 0 percent clay; very slightly effervescent throughout; 5 percent rounded mixed gravel; moderately alkaline; clear smooth boundary.

C3—57 to 80 inches; pale brown (10YR 6/3) sand, brown (10YR 5/3) moist; common medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic depletions throughout and common coarse faint grayish brown (10YR 5/2 moist) irregular mottles throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 0 percent clay; noneffervescent throughout; 5 percent rounded mixed gravel; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 15 to 26 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 20 to 36 inches

Thickness of the ochric epipedon: 5 to 14 inches

Water table: Depth to top—2 to 4 feet; kind—apparent; months—December through April

A horizon:

Hue—10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—fine sand or loamy fine sand

Reaction—moderately acid to neutral

BA horizon:

Hue—10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—fine sandy loam, loam, or sandy clay loam

Reaction—moderately acid to neutral

Bt horizon:

Hue—10YR or 7.5YR

Value—4 or 5 dry, 2 to 4 moist

Chroma—2 or 3

Texture—loam, sandy clay loam, or clay loam

Reaction—slightly acid to slightly alkaline

Btk horizon:

Hue—10YR or 7.5YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—3 to 6

Texture—fine sandy loam, loam, very fine sandy loam, or loamy fine sand

Calcium carbonate equivalent—0 to 5 percent

Reaction—slightly alkaline or moderately alkaline

BC and C horizons:

Hue—10YR or 7.5YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—3 to 6

Texture—fine sand, loamy fine sand, or loamy sand in the upper part; fine sand or sand common below a depth of 40 inches

Calcium carbonate equivalent—1 to 5 percent

Reaction—neutral to moderately alkaline

Ninnescah Series

The Ninnescah series consists of very deep, poorly drained, moderately rapidly permeable soils that formed in loamy alluvium. These soils are on flood plains in river valleys of the Great Bend Sand Plains

(MLRA 79). The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Ninnescah fine sandy loam, in an area of native grass in Reno County, Kansas, 2 miles north of Arlington; 205 feet north and 100 feet east of the southwest corner of sec. 34, T. 24 S., R. 8 W.; USGS Arlington topographic quadrangle; lat. 37 degrees 54 minutes 45.5 seconds N. and long. 98 degrees 11 minutes 47.1 seconds W. (colors are for moist soil unless otherwise stated):

Ak1—0 to 6 inches; very dark gray (10YR 3/1) fine sandy loam, dark gray (10YR 4/1) dry; moderate fine granular structure; slightly hard, very friable, slightly sticky and slightly plastic; many very fine and fine roots throughout; 17 percent clay; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; gradual smooth boundary.

Ak2—6 to 14 inches; very dark gray (10YR 3/1) sandy loam, gray (10YR 5/1) dry; moderate medium granular structure; slightly hard, very friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 16 percent clay; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; gradual smooth boundary.

Ak3—14 to 19 inches; very dark gray (10YR 3/1) sandy loam, gray (10YR 5/1) dry; few fine distinct dark yellowish brown (10YR 4/4 moist) dendritic redoximorphic concentrations in root channels; moderate medium granular structure; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine roots throughout; 12 percent clay; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; clear smooth boundary.

Bgk1—19 to 30 inches; dark gray (10YR 4/1) sandy loam, gray (10YR 6/1) dry; common medium prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; few very fine and fine roots throughout; 10 percent clay; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; gradual smooth boundary.

Bgk2—30 to 37 inches; dark grayish brown (10YR 4/2) sandy loam, light brownish gray (10YR 6/2) dry; common medium prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; 10 percent clay; common fine and

medium irregular black (N 2/0) soft masses of iron-manganese (pedogenic) throughout; strongly effervescent throughout (HCl, 1 normal); moderately alkaline; gradual smooth boundary.

Cg1—37 to 52 inches; dark grayish brown (10YR 4/2) sandy loam, grayish brown (10YR 5/2) dry; common medium prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; massive; slightly hard, very friable, nonsticky and nonplastic; 10 percent clay; common fine and medium irregular black (N 2/0) soft masses of iron-manganese (pedogenic) throughout; slightly effervescent throughout (HCl, 1 normal); moderately alkaline; irregular decrease in organic matter content; gradual smooth boundary.

Cg2—52 to 80 inches; grayish brown (10YR 5/2) loamy sand, light brownish gray (10YR 6/2) dry; many medium prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; massive; soft, loose, nonsticky and nonplastic; 7 percent clay; common fine and medium irregular black (N 2/0) soft masses of iron-manganese (pedogenic) throughout; very slightly effervescent throughout (HCl, 1 normal); slightly alkaline.

Range in Characteristics

Soil moisture regime: Aquic

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 10 to 17 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 0 to 10 inches

Thickness of the mollic epipedon: 10 to 20 inches

Water table: Depth to top—0 to 2 feet; kind—apparent; months—February through June

Other features: Some pedons have an Akb, ABk, BCgk, or C horizon. A saline phase is recognized. The depth to loamy sand or coarser textures is greater than 40 inches.

Ak horizon:

Hue—10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—1

Texture—mainly fine sandy loam, but the range includes sandy loam or loam

Calcium carbonate equivalent—5 to 14 percent

Sodium adsorption ratio—0 to 1

Redoximorphic features—0 to 5 percent

Reaction—slightly alkaline or moderately alkaline

Bgk horizon:

Hue—10YR to 2.5YR

Value—5 or 6 dry, 4 or 5 moist
 Chroma—1 or 2
 Texture—fine sandy loam or sandy loam
 Calcium carbonate equivalent—5 to 14 percent
 Sodium adsorption ratio—0 to 1
 Reaction—slightly alkaline or moderately alkaline

Cg horizon:

Hue—10YR to 2.5YR
 Value—5 or 6 dry, 4 or 5 moist
 Chroma—dominantly 2; chroma of 3 below a depth of 40 inches in some pedons
 Texture—loamy sand, sandy loam, sand, or fine sandy loam
 Content of rock fragments—0 to 5 percent
 Calcium carbonate equivalent—0 to 10 percent
 Sodium adsorption ratio—0 to 1
 Redoximorphic features—2 to 25 percent
 Reaction—neutral to moderately alkaline

Ost Series

The Ost series consists of very deep, well drained, slowly permeable soils that formed in alluvium. These soils are on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 8 percent. The mean annual precipitation is about 26 inches, and the mean annual temperature is about 58 degrees F.

Typical Pedon

Ost loam, on an east-facing, convex slope of 1 percent, in an area of cropland at an elevation of 1,634 feet in Reno County, Kansas, about 1 mile south of Arlington; about 320 feet north and 1,650 feet west of the southeast corner of sec. 16, T. 25 S., R. 8 W.; USGS Pretty Prairie SW quadrangle; lat. 37 degrees 52 minutes 11 seconds N. and long. 98 degrees 12 minutes 6 seconds W. (colors are for dry soil unless otherwise stated):

- Ap—0 to 8 inches; dark grayish brown (10YR 4/2) (interior) loam, very dark grayish brown (10YR 3/2) (interior) moist; weak fine granular structure; hard, friable, slightly sticky and slightly plastic; common fine roots throughout; 21 percent clay; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately alkaline; abrupt smooth boundary.
- Bt1—8 to 12 inches; brown (7.5YR 4/2) (interior) loam, dark brown (7.5YR 3/2) (interior) moist; weak coarse prismatic structure parting to moderate fine or very fine subangular blocky; hard, firm, sticky and plastic; common fine roots throughout; 26

percent clay; few distinct continuous clay films on vertical and horizontal faces of peds; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; slightly alkaline; clear wavy boundary.

- Bt2—12 to 18 inches; reddish brown (5YR 5/3) (interior) loam, reddish brown (5YR 4/4) (interior) moist; weak coarse prismatic structure parting to moderate fine subangular blocky parting to moderate very fine subangular blocky; hard, firm, sticky and plastic; common fine roots throughout; 26 percent clay; few distinct continuous clay films on vertical and horizontal faces of peds and very few faint patchy skeletons on faces of peds and in pores; slightly effervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately alkaline; clear wavy boundary.
- Bk1—18 to 23 inches; light brown (7.5YR 6/4) (interior) clay loam, reddish brown (5YR 4/4) (interior) moist; weak coarse prismatic structure parting to moderate fine subangular blocky parting to moderate very fine subangular blocky; hard, firm, sticky and plastic; common fine roots throughout; 29 percent clay; common coarse irregular soft masses of lime and common coarse irregular carbonate concretions; violently effervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately alkaline; gradual wavy boundary.
- Bk2—23 to 38 inches; light brown (7.5YR 6/4) (interior) clay loam, light brown (7.5YR 6/4) (interior) moist; weak coarse prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; common fine roots throughout; 27 percent clay; many coarse irregular soft masses of lime throughout and many coarse irregular carbonate concretions throughout; violently effervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately alkaline; gradual wavy boundary.
- BcK—38 to 54 inches; 50 percent pink (7.5YR 7/4) (interior) and 50 percent light reddish brown (5YR 6/4) (interior) loam, 50 percent light brown (7.5YR 6/4) (interior) and 50 percent reddish brown (5YR 5/4) (interior) moist; few fine prominent yellowish brown (10YR 5/6 moist) irregular mottles throughout; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, slightly sticky and slightly plastic; 23 percent clay; many coarse irregular soft masses of lime throughout; violently effervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately alkaline; gradual wavy boundary.

C—54 to 80 inches; light gray (2.5Y 7/2) (interior) loam, light brownish gray (2.5Y 6/2) (interior) moist; few fine prominent yellowish brown (10YR 5/6 moist) irregular mottles throughout; massive; hard, friable, slightly sticky and slightly plastic; 21 percent clay; many coarse irregular soft masses of lime throughout and many coarse irregular carbonate concretions throughout; violently effervescent throughout (HCl, 1 normal); 2 percent subrounded mixed gravel; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 18 to 34 percent clay

Depth to calcic horizon: 18 to more than 80 inches

Depth to secondary calcium carbonate: 12 to 28 inches

Thickness of the mollic epipedon: 10 to 16 inches

Thickness of the argillic horizon: 8 to 34 inches

Thickness of the calcic horizon: 0 to 30 inches

Ap horizon:

Hue—5YR to 10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—1 or 2

Texture—loam or clay loam

Content of rock fragments—0 to 3 percent

Calcium carbonate equivalent—0 to 1 percent

Reaction—slightly acid to moderately alkaline

Bt horizon:

Hue—5YR to 10YR

Value—4 or 5 dry, 3 or 4 moist

Chroma—2 to 4

Texture—loam or clay loam

Content of rock fragments—0 to 3 percent

Calcium carbonate equivalent—0 to 5 percent

Reaction—neutral to moderately alkaline

Bk and B_{ck} horizons:

Hue—5YR to 10YR

Value—6 to 8 dry, 4 to 6 moist

Chroma—4 to 6

Texture—loam, clay loam, sandy clay loam, or sandy loam

Content of rock fragments—0 to 3 percent

Calcium carbonate equivalent—15 to 40 percent

Reaction—slightly alkaline or moderately alkaline

Ck horizon:

Hue—10YR or 2.5Y

Value—4 to 8 dry or moist

Chroma—2 to 6

Texture—loam, sandy clay loam, or fine sandy loam

Content of rock fragments—0 to 3 percent

Calcium carbonate equivalent—2 to 14 percent

Reaction—slightly alkaline or moderately alkaline

Penalosa Series

The Penalosa series consists of very deep, well drained soils that formed in old alluvium. These soils are on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 6 percent. The mean annual precipitation is about 29 inches, and the mean annual temperature is about 58 degrees F.

Typical Pedon

Penalosa silt loam (fig. 26), in an area of cropland at an elevation of 1,572 feet in Reno County, Kansas, about 6 miles south of Yoder; about 55 feet south and 2,243 feet west of the northeast corner of sec. 23, T. 25 S., R. 5 W.; USGS Haven SE topographic quadrangle; lat. 37 degrees 52 minutes 5.7 seconds N. and long. 97 degrees 50 minutes 14.6 seconds W. (colors are for dry soil unless otherwise stated):

Ap1—0 to 5 inches; brown (10YR 4/3) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine granular structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 20.9 percent clay; noneffervescent throughout (HCl, 1 normal); slightly acid; abrupt smooth boundary.

Ap2—5 to 10 inches; dark grayish brown (10YR 4/2) silt loam, very dark grayish brown (10YR 3/2) moist; weak fine and medium subangular blocky structure parting to weak fine granular; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 21.4 percent clay; noneffervescent throughout (HCl, 1 normal); slightly acid; abrupt smooth boundary.

Bt1—10 to 14 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine and medium subangular blocky structure parting to weak fine granular; hard, firm, moderately sticky and moderately plastic; common very fine and fine roots throughout; 39.6 percent clay; few faint patchy very dark grayish brown (10YR 3/2 moist) clay films on vertical faces of peds and few distinct continuous very dark grayish brown (10YR 3/2 moist) organic coatings on vertical and horizontal faces of peds; noneffervescent throughout (HCl, 1 normal); moderately acid; clear wavy boundary.

Bt2—14 to 22 inches; brown (7.5YR 4/3) silty clay loam, dark brown (7.5YR 3/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky and moderate medium subangular blocky; hard, firm, moderately sticky and moderately plastic; common very fine and fine roots throughout; 36.8 percent clay; common distinct discontinuous dark brown (7.5YR 3/2 moist) clay films on vertical and horizontal faces of peds; common fine rounded iron-manganese concretions throughout; noneffervescent throughout (HCl, 1 normal); slightly acid; abrupt smooth boundary.

Btss1—22 to 28 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; strong fine and medium prismatic structure parting to strong fine angular blocky and strong fine subangular blocky; very hard, firm, moderately sticky and moderately plastic; common very fine and fine roots throughout; 36.5 percent clay; few distinct continuous very dark grayish brown (10YR 3/2 moist) clay films on vertical and horizontal faces of peds and very few prominent very dark grayish brown (10YR 3/2 moist) nonintersecting slickensides on horizontal faces of peds; noneffervescent throughout (HCl, 1 normal); neutral; clear wavy boundary.

Btss2—28 to 34 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; few fine faint dark brown (10YR 3/3 moist) irregular mottles throughout; moderate medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, moderately sticky and moderately plastic; common very fine and fine roots throughout; 35.6 percent clay; few distinct continuous very dark brown (10YR 2/2 moist) clay films on vertical and horizontal faces of peds and few distinct patchy very dark brown (10YR 2/2 moist) nonintersecting slickensides on horizontal faces of peds; noneffervescent throughout (HCl, 1 normal); neutral; clear wavy boundary.

Btss3—34 to 39 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; common fine and medium faint dark brown (10YR 3/3 moist) irregular mottles throughout; weak medium prismatic structure parting to strong fine and medium subangular blocky; very hard, firm, moderately sticky and moderately plastic; common very fine roots throughout; 32 percent clay; common distinct discontinuous very dark grayish brown (10YR 3/2 moist) clay films on vertical and horizontal faces of

peds and common distinct discontinuous very dark grayish brown (10YR 3/2 moist) nonintersecting slickensides on horizontal faces of peds; noneffervescent throughout (HCl, 1 normal); neutral; clear smooth boundary.

BC—39 to 48 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; common fine and medium prominent brown (7.5YR 4/4 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; few very fine roots throughout; many very fine tubular pores; 26.6 percent clay; few fine rounded masses of carbonate throughout; noneffervescent throughout (HCl, 1 normal); slightly alkaline; abrupt smooth boundary.

2Btkssb1—48 to 61 inches; light brownish gray (10YR 6/2) silty clay loam, grayish brown (10YR 5/2) moist; common fine and medium faint dark gray (10YR 4/1 moist) irregular mottles throughout and common fine and medium prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; strong fine and medium prismatic structure parting to strong medium subangular blocky; very hard, firm, very sticky and very plastic; few very fine roots between peds; 38.6 percent clay; common distinct continuous dark grayish brown (10YR 4/2 moist) clay films on vertical and horizontal faces of peds and few distinct discontinuous dark grayish brown (10YR 4/2 moist) nonintersecting slickensides on horizontal faces of peds; common fine irregular masses of iron-manganese accumulation throughout, common medium irregular iron concretions throughout, and common fine and medium irregular carbonate concretions throughout; slightly effervescent throughout (HCl, 1 normal); moderately alkaline; gradual wavy boundary.

2Btkssb2—61 to 71 inches; brown (10YR 5/3) silty clay loam, brown (10YR 4/3) moist; common medium prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; moderate fine and medium prismatic structure parting to moderate fine and medium subangular blocky; very hard, firm, very sticky and very plastic; few very fine roots between peds; 36.4 percent clay; common distinct continuous dark grayish brown (10YR 4/2 moist) clay films on vertical and horizontal faces of peds and few prominent discontinuous very dark gray (N 3/0 moist) manganese or iron-manganese stains in

root channels and/or pores; many fine and medium irregular carbonate concretions throughout and common fine and medium rounded iron-manganese concretions throughout; slightly effervescent throughout (HCl, 1 normal); moderately alkaline; gradual wavy boundary.

2Btkssb3—71 to 80 inches; light yellowish brown (10YR 6/4) clay loam, dark yellowish brown (10YR 4/4) moist; common coarse distinct grayish brown (10YR 5/2 moist) irregular redoximorphic depletions throughout and many coarse prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, moderately sticky and moderately plastic; 30 percent clay; common distinct continuous clay films on vertical faces of peds, common distinct patchy clay films on horizontal faces of peds, very few distinct patchy nonintersecting slickensides on horizontal faces of peds, very few distinct patchy manganese or iron-manganese stains on vertical and horizontal faces of peds, and few distinct discontinuous carbonate coatings in root channels and/or pores; common fine and medium rounded carbonate concretions throughout and few fine and medium rounded iron-manganese concretions throughout; noneffervescent throughout (HCl, 1 normal); neutral.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 35 to 48 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 30 inches

Depth to redox concentrations: Greater than 30 inches

Depth to redox depletions: Greater than 40 inches

Thickness of the mollic horizon: 14 to 40 inches

Depth to vertic features: 20 to 40 inches

Ap horizon:

Hue—7.5YR or 10YR

Value—3 to 5 dry, 2 to 4 moist

Chroma—2 or 3

Texture—silt loam or silty clay loam

Reaction—strongly acid to neutral

Bt horizon:

Hue—7.5YR or 10YR

Value—3 to 5 dry, 2 to 4 moist

Chroma—2 or 3

Texture—silty clay loam or silty clay

Reaction—moderately acid to neutral

Btss horizon:

Hue—7.5YR or 10YR

Value—3 to 5 dry, 2 to 4 moist

Chroma—2 to 4

Texture—silty clay loam, clay loam, or silty clay

Reaction—neutral to moderately alkaline

BC horizon:

Hue—7.5YR or 10YR

Value—3 to 6 moist or dry

Chroma—2 to 4

Texture—silt loam, loam, clay loam, or silty clay loam

Reaction—neutral to moderately alkaline

2Btkssb horizon:

Hue—7.5YR or 10YR

Value—4 to 6

Chroma—2 to 4

Texture—silty clay loam, clay loam, or silty clay

Calcium carbonate equivalent—0 to 5 percent

Reaction—neutral to moderately alkaline

Piedmont Series

The Piedmont series consists of moderately deep, well drained, very slowly permeable soils that formed in material weathered from clayey and silty shale of Permian age. These soils are on convex ridges, side slopes, and footslopes of prairie uplands in the Central Rolling Red Prairies (MLRA 80A). Slopes range from 1 to 5 percent. The mean annual precipitation is 32 inches, and the mean annual temperature is 61 degrees F.

Typical Pedon

Piedmont silt loam, in an area of bermudagrass pasture in Oklahoma County, Oklahoma, about 8 miles west and 3.75 miles north of Edmond; about 1,300 feet south and 2,000 feet west of the northeast corner of sec. 9, T. 14 N., R. 4 W. (colors are for dry soil unless otherwise stated):

Ap—0 to 4 inches; brown (7.5YR 5/3) silt loam, dark brown (7.5YR 3/3) moist; moderate thin and medium platy structure parting to weak very fine granular; hard, friable; many very fine and fine roots; common very fine and fine pores; moderately acid; clear smooth boundary.

BA—4 to 8 inches; dark reddish gray (5YR 4/2) silty clay loam, dark reddish brown (5YR 3/2) moist; weak medium platy structure parting to weak fine

subangular blocky; hard, friable; many very fine and fine roots; many very fine and fine pores; light brown (7.5YR 6/3) silt coatings on ped surfaces; slightly acid; clear smooth boundary.

Btss—8 to 16 inches; reddish brown (5YR 4/3) silty clay, dark reddish brown (5YR 3/3) moist; moderate medium prismatic structure parting to moderate medium angular blocky; extremely hard, extremely firm; common very fine and fine roots; many very fine and common fine pores; common nonintersecting slickensides; continuous clay films on vertical and horizontal faces of peds; common pressure faces; neutral; gradual wavy boundary.

Btkss1—16 to 21 inches; reddish brown (5YR 5/3) silty clay, reddish brown (5YR 4/3) moist; weak medium prismatic structure parting to moderate medium angular blocky; extremely hard, extremely firm; common very fine and fine roots; common very fine and fine pores; common slickensides; continuous clay films on vertical and horizontal faces of peds; common pressure faces; few fine and medium calcium carbonate concretions; moderately alkaline; gradual wavy boundary.

Btkss2—21 to 30 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) moist; weak medium prismatic structure parting to weak medium angular blocky; extremely hard, extremely firm; common very fine and few fine roots; common very fine and fine pores; few slickensides; patchy clay films on faces of peds; common coarse soft masses of calcium carbonate; few fine and medium calcium carbonate concretions; violently effervescent; moderately alkaline; gradual wavy boundary.

Bck—30 to 35 inches; yellowish red (5YR 5/6) silty clay loam, yellowish red (5YR 4/6) moist; weak medium subangular blocky structure; very hard, very firm; few very fine and fine roots; common very fine and fine pores; common fine threads and medium soft masses of calcium carbonate; few black stains on faces of peds; red (2.5YR 5/6 and 5/8) soft shale fragments (10 to 14 percent by volume); violently effervescent; moderately alkaline; clear wavy boundary.

Cr1—35 to 52 inches; red (2.5YR 5/6), clayey and silty, soft shale, red (2.5YR 4/6) moist; few very fine and fine roots in fractures; strongly effervescent; moderately alkaline; gradual wavy boundary.

Cr2—52 to 59 inches; red (2.5YR 5/6), laminated siltstone, red (2.5YR 4/6) moist; strongly effervescent; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Thermic

Mean annual soil temperature: 58 to 60 degrees F

Particle-size control section: 35 to 48 percent clay

Depth to bedrock: 20 to 40 inches

Depth to secondary calcium carbonate: 10 to 30 inches

Thickness of the mollic horizon: 10 to 16 inches

Depth to vertic features: 20 to 40 inches

Other features: In most cultivated areas, moderate erosion has removed much of the original A horizon and the BA horizon has been mixed with the surface layer. Pedons in these areas have an Ap horizon and do not have a BA horizon. Dark soil materials in vertical streaks occur in some pedons as a result of cracking. Most pedons have slickensides. The shale in the Cr horizon is calcareous in most pedons, but in some pedons it is calcareous only in seams or fractures. The material in the Cr horizon is nonparalithic, and the difficulty of excavation is low or moderate. The fractures are more than 10 cm apart. Most of the material slakes in water within 15 hours.

A or Ap horizon:

Hue—2.5YR, 5YR, or 7.5YR

Value—4 or 5

Chroma—2 or 3

Texture—silt loam, silty clay loam, or clay loam

Reaction—moderately acid to neutral

Electrical conductivity—0 to 1 mmho/cm

BA horizon:

Hue—2.5YR or 5YR

Value—4 or 5

Chroma—2 to 4

Texture—silty clay loam or clay loam

Content of clay—27 to 40 percent

Reaction—moderately acid to slightly alkaline

Electrical conductivity—0 to 1 mmho/cm

Btss horizon:

Hue—2.5YR or 5YR

Value—4 or 5

Chroma—3 to 6

Texture—silty clay loam, silty clay, or clay; content of clay ranges from 35 to 55 percent (noncalcareous in most pedons)

Reaction—neutral to moderately alkaline

Electrical conductivity—0 to 1 mmho/cm

Btkss1 horizon:

Hue—2.5YR or 5YR
 Value—4 or 5
 Chroma—4 to 6
 Texture—silty clay loam, silty clay, or clay
 Content of clay—35 to 55 percent
 Reaction—moderately alkaline
 Electrical conductivity—0 to 1 mmho/cm
 Sodium adsorption ratio—0 to 8
 Calcium carbonate—occurs as masses or mycelia and concretions

Btkss2 horizon:

Hue—2.5YR or 5YR
 Value—4 or 5
 Chroma—4 to 8
 Texture—silty clay loam, silty clay, or clay
 Content of clay—35 to 55 percent
 Reaction—moderately alkaline
 Content of soft shale fragments—0 to 15 percent by volume (2 mm to 76 mm in diameter)
 Electrical conductivity—0 to 4 mmhos/cm
 Sodium adsorption ratio—0 to 12

BCK horizon:

Hue—2.5YR or 5YR
 Value—4 or 5
 Chroma—4 to 8
 Texture—silty clay loam, silty clay, or clay
 Content of clay—35 to 55 percent
 Content of soft shale fragments—0 to 35 percent by volume (2 mm to 76 mm in diameter)
 Content of clay—27 to 55 percent
 Calcium carbonate—occurs as masses or mycelia and concretions
 Reaction—moderately alkaline
 Electrical conductivity—0 to 8 mmhos/cm
 Sodium adsorption ratio—0 to 12

Cr horizon:

Hue—2.5YR
 Value—4 to 6
 Chroma—6 to 8
 Electrical conductivity—0 to 8 mmhos/cm
 Sodium adsorption ratio—0 to 16
 Other characteristics—streaks or rounded splotches with hue of 10YR or 2.5Y, value of 5 to 7, and chroma of 2 to 4 in some pedons

Plev Series

The Plev series consists of very deep, poorly drained soils that formed in sandy eolian deposits over a buried alluvial soil. These soils are in interdunal depressions on paleoterraces in river valleys of the

Great Bend Sand Plains (MLRA 79). Permeability is rapid in the upper part and moderate in the lower part. Slopes are concave and are 0 to 1 percent. The mean annual temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Plev loamy fine sand, in an area of rangeland in Reno County, Kansas, 5 miles north of Hutchinson; 2,550 feet north and 594 feet east of the southwest corner of sec. 11, T. 22 S., R. 6 W.; USGS Hutchinson NW topographic quadrangle; lat. 38 degrees 9 minutes 5 seconds N. and long. 97 degrees 57 minutes 24.3 seconds W. (colors are for moist soil unless otherwise stated):

A1—0 to 4 inches; very dark grayish brown (10YR 3/2) loamy fine sand, dark grayish brown (10YR 4/2) dry; few fine distinct yellowish brown (10YR 5/4 moist) irregular redoximorphic concentrations throughout; weak fine granular structure parting to single grain; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; 4 percent clay; slightly acid; clear smooth boundary.

A2—4 to 12 inches; dark gray (10YR 4/1) and gray (10YR 5/1) fine sand; common fine prominent brown (7.5YR 4/4 moist) irregular redoximorphic concentrations throughout; weak fine subangular blocky structure parting to single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine roots throughout; 2 percent clay; moderately acid; clear wavy boundary.

Cg1—12 to 35 inches; grayish brown (10YR 5/2) and light brownish gray (10YR 6/2) fine sand; common coarse distinct dark yellowish brown (10YR 4/4 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; moderately acid; clear wavy boundary.

Cg2—35 to 46 inches; light brownish gray (10YR 6/2) and light gray (10YR 7/2) fine sand; many coarse distinct yellowish brown (10YR 5/4 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; moderately acid; abrupt smooth boundary.

2Btgb1—46 to 57 inches; light brownish gray (2.5Y 6/2) and light gray (2.5Y 7/2) fine sandy loam; many coarse prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium and coarse prismatic structure parting to weak medium subangular

blocky; slightly hard, friable, slightly sticky and slightly plastic; 19 percent clay; few faint patchy clay films on vertical and horizontal faces of peds, few faint patchy clay bridges between sand grains, and few distinct continuous light gray (2.5Y 7/2 moist) redoximorphic depletions on vertical faces of peds; slightly acid; clear smooth boundary.

2Btgb2—57 to 75 inches; light brownish gray (2.5Y 6/2) and light gray (2.5Y 7/2) fine sandy loam; many coarse prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and slightly plastic; 16 percent clay; few faint patchy clay bridges between sand grains and few distinct continuous light gray (2.5Y 7/2 moist) redoximorphic depletions on vertical faces of peds; slightly acid; gradual wavy boundary.

2BCb—75 to 80 inches; 50 percent light brownish gray (10YR 6/2) and 50 percent pale brown (10YR 6/3) loamy fine sand, very pale brown (10YR 7/3) dry; common coarse prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak fine and medium subangular blocky structure parting to single grain; soft, loose, nonsticky and nonplastic; 5 percent clay; slightly acid.

Range in Characteristics

Soil moisture regime: Aquic

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 1 to 5 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 60 to more than 80 inches

Depth to lithologic discontinuity: 40 to 70 inches

Thickness of the ochric epipedon: 3 to 12 inches

Water table: Depth to top—0.5 foot to 4.0 feet; kind—perched; months—February through May

Other features: Some pedons have an AC, Ab, or 2Ab horizon.

A1 horizon:

Hue—10YR

Value—4 or 5 dry, 3 moist

Chroma—1 or 2

Texture—loamy fine sand

Redoximorphic features—1 to 10 percent

Reaction—strongly acid to slightly acid

A2 horizon:

Hue—10YR

Value—5 dry, 4 moist

Chroma—1

Texture—fine sand

Redoximorphic features—1 to 25 percent

Reaction—strongly acid to slightly acid

C horizon:

Hue—10YR to 2.5Y

Value—6 or 7 dry, 5 or 6 moist

Chroma—1 or 2

Texture—fine sand

Redoximorphic features—5 to 40 percent

Reaction—moderately acid or slightly acid

2Btb horizon:

Hue—10YR to 5Y

Value—6 or 7 dry, 5 or 6 moist

Chroma—1 to 3

Texture—fine sandy loam or sandy clay loam

Redoximorphic features—1 to 40 percent

Reaction—slightly acid or neutral

2BCb horizon:

Hue—10YR or 2.5Y

Value—7 dry, 6 moist

Chroma—2 or 3

Texture—loamy fine sand

Redoximorphic features—20 to 40 percent

Reaction—slightly acid or neutral

Poxmash Series

The Poxmash series consists of deep, well drained, moderately rapidly permeable soils that formed in alluvium over residuum derived from Permian shale. These soils are on strath terraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 6 percent. The mean annual precipitation is about 29 inches, and the mean annual temperature is about 58 degrees F.

Typical Pedon

Poxmash sandy loam, on a northwest-facing, planar slope of 1 percent, in an area of cropland at an elevation of 1,500 feet in Reno County, Kansas, about 3 miles west of Castleton; about 240 feet south and 700 feet west of the northeast corner of sec. 24, T. 25 N., R. 7 W.; USGS Pretty Prairie quadrangle; lat. 37 degrees 52 minutes 2 seconds N. and long. 98 degrees 2 minutes 0.8 second W. (colors are for dry soil unless otherwise stated):

Ap—0 to 5 inches; brown (10YR 5/3) (interior) sandy loam, brown (10YR 4/3) (interior) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine roots

throughout; 13 percent clay; noneffervescent throughout (HCl, 1 normal); moderately acid; abrupt smooth boundary.

A—5 to 9 inches; brown (10YR 4/3) (interior) sandy loam, dark brown (10YR 3/3) (interior) moist; weak fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine and fine roots throughout; 14 percent clay; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately acid; clear smooth boundary.

Bt1—9 to 15 inches; yellowish brown (10YR 5/4) (interior) sandy loam, dark yellowish brown (10YR 4/4) (interior) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; common very fine roots throughout; 17 percent clay; very few faint patchy dark yellowish brown (10YR 4/4) clay films on vertical faces of peds; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; slightly acid; gradual wavy boundary.

Bt2—15 to 20 inches; light yellowish brown (10YR 6/4) (interior) sandy loam, yellowish brown (10YR 5/4) (interior) moist; weak fine and medium subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine roots throughout; 10 percent clay; few faint patchy clay bridges between sand grains; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; slightly acid; gradual smooth boundary.

C1—20 to 32 inches; very pale brown (10YR 7/4) (interior) loamy sand, light yellowish brown (10YR 6/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 5 percent clay; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately acid; gradual wavy boundary.

C2—32 to 48 inches; very pale brown (10YR 8/3) (interior) sand, very pale brown (10YR 7/3) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 1 percent clay; noneffervescent throughout (HCl, 1 normal); moderately acid; abrupt smooth boundary.

2Cr—48 to 80 inches; weathered Permian shale bedrock; noneffervescent throughout (HCl, 1 normal).

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Surface rock fragments: 0 to 2 percent

Particle-size control section: 10 to 17 percent clay

Depth to nonparalithic contact: 40 to 59 inches

Thickness of the ochric epipedon: 5 to 9 inches

Thickness of the argillic horizon: 7 to 20 inches

Other features: Some pedons have a BC horizon.

A horizon:

Hue—10YR or 7.5YR

Value—3 to 5 moist, 4 to 6 dry

Chroma—3 or 4

Texture—sandy loam

Content of rock fragments—0 to 2 percent

Reaction—moderately acid or slightly acid

Bt horizon:

Hue—10YR or 7.5YR

Value—4 to 6 moist, 5 to 7 dry

Chroma—4

Texture—sandy loam or fine sandy loam

Content of rock fragments—0 to 10 percent

Reaction—moderately acid or slightly acid

BC horizon (if it occurs):

Hue—10YR or 7.5YR

Value—6 or 7 moist, 7 or 8 dry

Chroma—3 or 4

Texture—sandy loam, loamy sand, or sand

Content of rock fragments—0 to 10 percent

Reaction—slightly acid to slightly alkaline

C horizon:

Hue—10YR or 7.5YR

Value—6 to 8 (moist and dry)

Chroma—3 or 4

Texture—loamy sand or sand

Content of rock fragments—0 to 10 percent

Reaction—moderately acid to moderately alkaline

2Cr horizon:

Hue—5G or 2.5YR

Value—3 to 6

Chroma—2 to 4

Texture—weathered beds, Permian shale, or siltstone

Pratt Series

The Pratt series consists of very deep, well drained, rapidly permeable soils that formed in sandy eolian deposits. These soils are on dunes on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 15 percent. The mean annual temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Pratt fine sand, in a cultivated field in Reno County, Kansas, 7 miles west of Langdon; 2,240 feet east and

400 feet north of the southwest corner of sec. 20, T. 25 S., R. 10 W.; USGS Turon topographic quadrangle; lat. 37 degrees 51 minutes 16 seconds N. and long. 98 degrees 26 minutes 44.5 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 8 inches; light yellowish brown (10YR 6/4) (interior) fine sand, yellowish brown (10YR 5/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 5 percent clay; moderately acid; clear smooth boundary.

Bt—8 to 24 inches; brownish yellow (10YR 6/6) (interior) loamy fine sand, yellowish brown (10YR 5/6) (interior) moist; weak fine and medium subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; 11 lamellae of brown (7.5YR 4/4) fine sandy loam 3 mm to 12 mm thick; 9 percent clay; few distinct patchy clay bridges between sand grains in the matrix, common distinct discontinuous clay bridges between sand grains in the lamellae; strongly acid; clear wavy boundary.

E&Bt—24 to 64 inches; fine sand (E), yellowish brown (10YR 5/6) (interior) and brownish yellow (10YR 6/6) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 3 percent clay; three lamellae of yellowish brown (10YR 5/4) (interior) loamy fine sand (Bt) 4 mm thick, dark yellowish brown (10YR 4/4) (interior) moist; weak fine and medium subangular blocky structure parting to single grain; loose when moist and dry, nonsticky and nonplastic when wet; few distinct discontinuous clay bridges between sand grains; moderately acid; gradual wavy boundary.

C—64 to 80 inches; light yellowish brown (10YR 6/4) (interior) fine sand, yellowish brown (10YR 5/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 5 percent clay; moderately acid.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 4 to 11 percent clay

Depth to secondary calcium carbonate: Greater than 80 inches

Thickness of the ochric epipedon: 7 to 20 inches

A horizon:

Hue—7.5YR or 10YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—typically 2 to 4, but the range includes 1

Texture—sand, fine sand, loamy sand, or loamy fine sand

Reaction—strongly acid to neutral

Bt horizon:

Hue—typically 10YR or 7.5YR, but the range includes 5YR

Value—4 to 6 dry, 4 or 5 moist

Chroma—2 to 6

Texture—loamy sand or loamy fine sand

Reaction—strongly acid to neutral

Other features—in some pedons this horizon consists of a bridged sandy matrix alternating with lamellae of fine sandy loam, loamy fine sand, sandy loam, or loamy sand.

E part of E&Bt horizon:

Hue—7.5YR or 10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—4 to 6

Texture—sand, fine sand, or loamy fine sand

Reaction—strongly acid to neutral

Bt part of E&Bt horizon:

Hue—7.5YR

Value—4 or 5 dry, 3 to 6 moist

Chroma—3 to 6

Texture—loamy sand, fine sandy loam, or loamy fine sand

Reaction—strongly acid to neutral

C horizon:

Hue—10YR or 7.5YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—3 to 6

Texture—loamy fine sand or fine sand

Calcium carbonate equivalent—0 to 2 percent

Reaction—slightly acid or neutral

Punkin Series

The Punkin series consists of very deep, moderately well drained, very slowly permeable soils that formed in calcareous, clayey alluvium. These soils are on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 3 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Punkin silt loam (fig. 27), in a cultivated field in Reno County, Kansas, about 11 miles east and 1 mile south of Hutchinson; 550 feet south and 1,975 feet east of the northwest corner of sec. 35, T. 23 S., R. 4 W., bearing 260; USGS Burrton topographic quadrangle; lat. 38 degrees 0 minutes 45 seconds N. and long. 97

degrees 43 minutes 53.3 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) (interior) silt loam, very dark grayish brown (10YR 3/2) (interior) moist; weak fine and medium subangular blocky structure; soft, friable, slightly sticky and slightly plastic; 15.3 percent clay; neutral; abrupt smooth boundary.

Btn—4 to 8 inches; grayish brown (10YR 5/2) (interior) silty clay, dark brown (10YR 3/3) (interior) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 44.2 percent clay; few distinct continuous clay films on vertical and horizontal faces of peds; few prominent discontinuous very dark gray (10YR 3/1 moist) organic coatings on vertical faces of peds; neutral; clear smooth boundary.

Btnz1—8 to 15 inches; dark grayish brown (10YR 4/2) (interior) silty clay, very dark grayish brown (10YR 3/2) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, firm, very sticky and very plastic; 41.4 percent clay; few distinct continuous clay films on vertical and horizontal faces of peds and few distinct discontinuous organic coatings on vertical and horizontal faces of peds; few medium irregular halite crystals throughout; slightly alkaline; clear smooth boundary.

Btnz2—15 to 21 inches; brown (10YR 4/3) (interior) silty clay, dark brown (10YR 3/3) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; 44.6 percent clay; few prominent continuous clay films on vertical and horizontal faces of peds and few distinct continuous pressure faces on vertical and horizontal faces of peds; common fine irregular salt masses throughout; slightly alkaline; clear smooth boundary.

Btnkz1—21 to 39 inches; grayish brown (10YR 5/2) (interior) silty clay, dark grayish brown (10YR 4/2) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; 43.3 percent clay; few distinct discontinuous clay films on vertical and horizontal faces of peds and few distinct discontinuous pressure faces on vertical and horizontal faces of peds; common medium irregular carbonate concretions throughout and common fine and medium irregular salt masses throughout; slightly alkaline; gradual smooth boundary.

Btnkz2—39 to 47 inches; light brownish gray (10YR

6/2) (interior) silty clay, grayish brown (10YR 5/2) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky and very plastic; 44.5 percent clay; few distinct discontinuous clay films on vertical and horizontal faces of peds; common fine irregular carbonate concretions throughout and few fine irregular halite crystals throughout; slightly alkaline; gradual smooth boundary.

Btnkz3—47 to 64 inches; light brownish gray (10YR 6/2) (interior) silty clay, grayish brown (10YR 5/2) (interior) moist; common fine prominent yellowish brown (10YR 5/6 moist) irregular mottles throughout; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; 40.4 percent clay; few distinct discontinuous clay films on vertical and horizontal faces of peds; common fine irregular carbonate concretions throughout, few fine irregular salt masses throughout, and common fine and medium irregular iron-manganese concretions throughout; slightly alkaline; gradual smooth boundary.

BC1—64 to 78 inches; light gray (2.5Y 7/2) (interior) clay loam, light brownish gray (2.5Y 6/2) (interior) moist; common fine prominent yellowish brown (10YR 5/6 moist) irregular mottles throughout; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 32.1 percent clay; common fine and medium irregular iron-manganese concretions throughout; neutral; gradual smooth boundary.

BC2—78 to 80 inches; light gray (2.5Y 7/2) (interior) loam, light brownish gray (2.5Y 6/2) (interior) moist; common fine and medium prominent yellowish brown (10YR 5/6 moist) irregular mottles throughout; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 27 percent clay; 3 percent subrounded mixed gravel; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 35 to 60 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 5 to 20 inches

Depth to salt accumulations: Greater than 16 inches

Depth to redoximorphic concentrations: 20 to 40 inches

Thickness of the mollic epipedon: 10 to 40 inches

A horizon:

Hue—10YR

Value—3 or 4 dry, 2 or 3 moist

Chroma—1 or 2
 Texture—loam, fine sandy loam, or silt loam
 Sodium adsorption ratio—2 to 8
 Reaction—neutral or slightly alkaline

Bt horizon:

Hue—10YR to 2.5YR
 Value—4 to 6 dry, 3 or 4 moist
 Chroma—1 to 3
 Texture—clay, silty clay, silty clay loam, or clay loam
 Sodium adsorption ratio—13 to 25
 Reaction—neutral to moderately alkaline

BC horizon:

Hue—10YR to 2.5Y
 Value—5 to 7 dry, 4 to 6 moist
 Chroma—2 or 3
 Texture—clay loam or silty clay loam
 Calcium carbonate equivalent—1 to 5 percent
 Sodium adsorption ratio—20 to 40
 Reaction—neutral to moderately alkaline

Saltcreek Series

The Saltcreek series consists of very deep, well drained soils that formed in loamy eolian sediments over a buried alluvial soil. These soils are on dunes on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Permeability is moderate in the upper part and slow in the lower part. Slopes range from 0 to 6 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Saltcreek fine sandy loam, on a convex slope of 3 percent, in a cultivated field in Reno County, Kansas, 4 miles north and 14 miles west of Hutchinson; USGS Sterling SW topographic quadrangle; lat. 38 degrees 6 minutes 49 seconds N. and long. 98 degrees 12 minutes 38.1 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 5 inches; brown (10YR 5/3) (interior) fine sandy loam, dark brown (10YR 3/3) (interior) moist; weak fine and medium subangular blocky structure; soft, very friable, slightly sticky and nonplastic; common very fine, fine, and medium roots throughout; 13 percent clay; very strongly acid; clear smooth boundary.

Bt1—5 to 10 inches; grayish brown (10YR 5/2) (interior) sandy clay loam, very dark grayish brown (10YR 3/2) (interior) moist; weak medium subangular blocky structure; slightly hard, very

friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 20 percent clay; few faint patchy clay films on vertical faces of peds and few faint patchy clay bridges between sand grains; slightly acid; gradual smooth boundary.

Bt2—10 to 26 inches; brown (10YR 5/3) (interior) sandy clay loam, brown (10YR 4/3) (interior) moist; weak medium prismatic structure parting to weak medium subangular blocky; hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 21 percent clay; few faint patchy clay films on vertical faces of peds and few faint patchy clay bridges between sand grains; neutral; gradual smooth boundary.

Bt3—26 to 39 inches; brown (10YR 5/3) (interior) fine sandy loam, brown (10YR 4/3) (interior) moist; weak medium subangular blocky structure; hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 19 percent clay; few faint patchy clay films on faces of peds and in pores and few faint patchy clay bridges between sand grains; neutral; clear smooth boundary.

2Btb—39 to 56 inches; light brownish gray (2.5Y 6/2) (interior) silty clay, grayish brown (2.5Y 5/2) (interior) moist; few fine prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; 40 percent clay; few prominent continuous clay films on vertical and horizontal faces of peds; neutral; gradual wavy boundary.

2Btkb1—56 to 66 inches; olive gray (5Y 5/2) (interior) silty clay loam, olive gray (5Y 4/2) (interior) moist; common fine prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; 37 percent clay; few prominent continuous clay films on vertical and horizontal faces of peds; common fine irregular soft masses of lime throughout; slightly alkaline; gradual wavy boundary.

2Btkb2—66 to 80 inches; light olive gray (5Y 6/2) (interior) silty clay loam, olive gray (5Y 5/2) (interior) moist; few fine prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; 32 percent clay; few faint

patchy clay films on vertical and horizontal faces of peds; few fine and medium irregular soft masses of lime between peds; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 18 to 28 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 40 to more than 80 inches

Depth to loamy or clayey buried soil: 25 to 60 inches

Thickness of the mollic epipedon: 10 to 19 inches

Other features: Some pedons do not have redoximorphic features. Some pedons have an Ab, BA, 2Ab, BC, Btb, or 3Btb horizon.

A horizon:

Hue—10YR

Value—4 or 5 dry, 3 or 4 moist

Chroma—2 or 3

Texture—fine sandy loam, sandy loam, or loamy fine sand

Reaction—extremely acid to slightly acid

Bt horizon:

Hue—10YR or 7.5YR

Value—4 or 5 dry, 3 or 4 moist

Chroma—2 to 4

Texture—sandy clay loam, fine sandy loam, or clay loam

Reaction—slightly acid or neutral

2Btb horizon:

Hue—10YR, 7.5YR, 2.5Y, or 5Y

Value—4 to 7 dry, 3 to 6 moist

Chroma—1 to 3

Texture—silty clay loam, clay loam, or silty clay

Calcium carbonate equivalent—0 to 5 percent

Redoximorphic features—0 to 25 percent

Reaction—neutral to moderately alkaline

Saxman Series

The Saxman series consists of very deep, moderately well drained, rapidly permeable soils that formed in sandy alluvium. These soils are on high flood plains in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 2 percent. The mean annual temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Saxman loamy sand (fig. 28), in a cultivated field in Reno County, Kansas, 1 mile east of South Hutchinson; 462 feet west and 1,518 feet north of the southeast corner of sec. 29, T. 23 S., R. 5 W.; USGS Hutchinson topographic quadrangle; lat. 38 degrees 1 minute 5 seconds N. and long. 97 degrees 53 minutes 12 seconds W. (colors are for dry soil unless otherwise stated):

Ap1—0 to 4 inches; brown (10YR 5/3) loamy sand, brown (10YR 4/3) moist; weak fine subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; common very fine, fine, and medium roots throughout; 6 percent clay; noneffervescent throughout; 1 percent rounded mixed gravel; very strongly acid; abrupt smooth boundary.

Ap2—4 to 8 inches; brown (10YR 5/3) loamy sand, dark brown (10YR 3/3) moist; weak fine subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; 5 percent clay; noneffervescent throughout; 1 percent rounded mixed gravel; very strongly acid; abrupt wavy boundary.

A—8 to 13 inches; grayish brown (10YR 5/2) loamy sand, very dark grayish brown (10YR 3/2) moist; weak fine subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; 7 percent clay; noneffervescent throughout; 2 percent rounded mixed gravel; very strongly acid; clear wavy boundary.

AC—13 to 22 inches; brown (10YR 5/3) loamy sand, brown (10YR 4/3) moist; weak medium subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; common very fine and fine roots throughout; 6 percent clay; noneffervescent throughout; 1 percent rounded mixed gravel; slightly alkaline; clear wavy boundary.

C1—22 to 30 inches; brown (10YR 5/3) sand, brown (10YR 4/3) moist; few medium faint dark yellowish brown (10YR 4/4 moist) irregular redoximorphic concentrations throughout; weak medium subangular blocky structure parting to single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine and fine roots throughout; 3 percent clay; slightly effervescent throughout; 3 percent rounded mixed gravel; slightly alkaline; clear wavy boundary.

- C2—30 to 37 inches; pale brown (10YR 6/3) sand, brown (10YR 5/3) moist; few medium faint dark yellowish brown (10YR 4/4 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine and fine roots throughout; few medium irregular brown (7.5YR 4/4) soft masses of iron (pedogenic) throughout; slightly effervescent throughout; 5 percent rounded mixed gravel; moderately alkaline; clear wavy boundary.
- C3—37 to 48 inches; very pale brown (10YR 7/4) sand, light yellowish brown (10YR 6/4) moist; common medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; noneffervescent throughout; 2 percent rounded mixed gravel; moderately alkaline; clear wavy boundary.
- C4—48 to 54 inches; very pale brown (10YR 7/4) fine sand, yellowish brown (10YR 5/4) and light yellowish brown (10YR 6/4) moist; few coarse distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; noneffervescent throughout; 10 percent rounded mixed gravel; moderately alkaline; clear wavy boundary.
- C5—54 to 80 inches; very pale brown (10YR 7/3) gravelly coarse sand, pale brown (10YR 6/3) and light yellowish brown (10YR 6/4) moist; common coarse distinct dark yellowish brown (10YR 4/4 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; noneffervescent throughout; 21 percent rounded mixed gravel; moderately alkaline.

Range in Characteristics

- Soil moisture regime:* Ustic (bordering on udic)
Soil temperature regime: Mesic
Mean annual soil temperature: 56 to 58 degrees F
Particle-size control section: 0 to 7 percent clay
Depth to bedrock: Greater than 80 inches
Thickness of the ochric epipedon: 3 to 17 inches
Water table: Depth to top—2 to 3 feet; kind—apparent; months—February through June
Other features: Some pedons have an AC or Ab horizon. Pedons with mollic colors have less than 0.6 percent organic carbon. Some pedons have slight or very slight effervescence in the BC, AC, or C1 horizons between depths of 17 and 35 inches.

A horizon:

- Hue—10YR
 Value—4 to 6 dry, 3 or 4 moist
 Chroma—2 to 4
 Texture—loamy sand, loamy fine sand, or sand
 Content of rock fragments—0 to 5 percent
 Reaction—very strongly acid to moderately acid

AC horizon:

- Hue—10YR
 Value—5 dry, 3 or 4 moist
 Chroma—2 to 4
 Texture—loamy sand or sand
 Content of rock fragments—0 to 5 percent
 Redoximorphic features—0 to 5 percent
 Reaction—neutral to moderately alkaline

C horizon:

- Hue—10YR
 Value—5 to 7 dry, 4 to 6 moist
 Chroma—2 to 4
 Texture—sand, fine sand, gravelly coarse sand, coarse sand, stratified coarse sand and sand, stratified sand and gravelly coarse sand, or loamy sand; loamy or clayey sediments below a depth of 40 inches in some pedons
 Content of rock fragments—0 to 25 percent
 Redoximorphic features—1 to 25 percent
 Reaction—neutral to moderately alkaline

Shellabarger Series

The Shellabarger series consists of deep, well drained, moderately permeable soils that formed in alluvium on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 15 percent. The mean annual temperature is 58 degrees F, and the mean annual precipitation is 28 inches.

Typical Pedon

Shellabarger fine sandy loam (fig. 29), on a slope of 2 percent, in an area of range in Harper County, Kansas, about 6 miles north and 2 miles east of Attica; 2,000 feet south and 40 feet west of the northeast corner of sec. 21, T. 31 S., R. 8 W. (colors are for dry soil unless otherwise stated):

- A—0 to 13 inches; brown (7.5YR 4/3) fine sandy loam, dark brown (7.5YR 3/3) moist; weak very fine granular structure; soft, very friable; moderately acid; gradual smooth boundary.
 BA—13 to 19 inches; brown (7.5YR 4/3) sandy clay loam, dark brown (7.5YR 3/3) moist; weak medium subangular blocky and fine granular

structure; slightly hard, friable; slightly acid; clear smooth boundary.

Bt—19 to 38 inches; reddish brown (5YR 5/4) sandy clay loam, reddish brown (5YR 4/4) moist; weak medium subangular blocky structure; hard, firm; thin patchy clay films on faces of peds; slightly acid; gradual smooth boundary.

C—38 to 80 inches; yellowish red (5YR 5/6) coarse sandy loam, yellowish red (5YR 4/6) moist; single grain; soft, very friable; slightly acid.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 18 to 37 percent clay

Depth to secondary calcium carbonate: Greater than 34 inches

Thickness of the mollic epipedon: 10 to 20 inches

Other features: Some pedons have a few mottles of yellow or brown in the lower part of the Bt horizon. Some pedons have a BC horizon.

A horizon:

Hue—10YR to 5YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—2 or 3

Texture—commonly sandy loam or fine sandy loam; less commonly loamy sand, loamy fine sand, or loam

Reaction—strongly acid to neutral

Bt horizon:

Hue—2.5YR to 7.5YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—3 to 6

Texture—sandy clay loam, loam, or sandy loam; 18 to 27 percent clay and more than 20 percent sand coarser than fine sand

Content of rock fragments—0 to 10 percent by volume

Reaction—slightly acid to moderately alkaline

C horizon:

Hue—7.5YR to 2.5YR

Value—4 to 7 dry, 3 to 6 moist

Chroma—4 to 6

Texture—typically coarse sandy loam, sandy loam, loam, or fine sandy loam; loamy sand, sand, or coarse sand below a depth of 40 inches in some pedons

Content of rock fragments—0 to 20 percent by volume

Calcium carbonate equivalent—0 to 5 percent

Reaction—slightly acid to moderately alkaline

Smolan Series

The Smolan series consists of deep, well drained and moderately well drained, slowly permeable soils in the uplands in the Central Loess Plains (MLRA 75). These soils formed in loess. Slopes range from 0 to 12 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 55 degrees F.

Typical Pedon

Smolan silt loam, in a cultivated field in Saline County, Kansas, about 1 mile west and 1/2 mile south of Gypsum; 1,100 feet north and 100 feet east of the southwest corner of sec. 33, T. 15 S., R. 1 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; weak fine granular structure; slightly hard, friable; moderately acid; clear smooth boundary.

A—6 to 12 inches; dark grayish brown (10YR 4/2) silty clay loam, very dark brown (10YR 2/2) moist; moderate fine and very fine granular structure; slightly hard, friable; moderately acid; clear smooth boundary.

BA—12 to 18 inches; grayish brown (10YR 5/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; moderate fine subangular blocky structure; hard, firm; slightly acid; gradual smooth boundary.

Bt1—18 to 24 inches; grayish brown (10YR 5/2) silty clay, very dark grayish brown (10YR 3/2) moist; moderate medium subangular blocky structure; very hard, very firm; common distinct clay films on faces of peds; slightly acid; gradual smooth boundary.

Bt2—24 to 30 inches; brown (7.5YR 5/4) silty clay, dark brown (7.5YR 4/3) moist; moderate medium angular blocky structure; very hard, firm; common distinct clay films on faces of peds; neutral; gradual smooth boundary.

BC—30 to 46 inches; reddish brown (5YR 5/3) silty clay loam, reddish brown (5YR 4/3) moist; weak medium and coarse subangular blocky structure; very hard, friable; common faint clay films on faces of some peds; slightly alkaline; few small carbonate concretions; diffuse smooth boundary.

C—46 to 80 inches; reddish brown (5YR 5/4) silty clay loam, reddish brown (5YR 4/4) dry; massive; hard, friable; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 55 to 58 degrees F

Particle-size control section: 18 to 37 percent clay
Depth to secondary calcium carbonate: Greater than 28 inches

Thickness of the mollic epipedon: 20 inches

A horizon:

Hue—10YR or 7.5YR
 Value—4 or 5 dry, 2 or 3 moist
 Chroma—1 to 3
 Texture—silt loam or silty clay loam
 Reaction—moderately acid to neutral

Bt1 horizon:

Hue—10YR, 7.5YR, or 5YR
 Value—4 or 5 dry, 2 or 3 moist
 Chroma—2 or 3
 Texture—silty clay or silty clay loam
 Reaction—moderately acid to slightly alkaline

Bt2 horizon:

Hue—7.5YR or 5YR
 Value—4 or 5 dry, 3 or 4 moist
 Chroma—3 or 4
 Texture—silty clay or silty clay loam; between 35 and 50 percent clay and less than 15 percent fine sand and coarser sand (horizons containing more than 40 percent clay are not within 14 inches of the soil surface)
 Reaction—moderately acid to slightly alkaline

BC and C horizons:

Hue—7.5YR or 5YR; some pedons have mottles with yellower hue
 Value—5 or 6 dry, 3 or 4 moist
 Chroma—3 to 6; some pedons have mottles with lower chroma
 Reaction—neutral or slightly alkaline

Solvay Series

The Solvay series consists of very deep, somewhat poorly drained soils that formed in eolian material over alluvium. These soils are in interdune areas on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Permeability is moderate or moderately slow. Slopes range from 0 to 2 percent. The mean annual air temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Solvay fine sandy loam (fig. 30), in an area of pasture in Reno County, Kansas, 6 miles east of Hutchinson; 2,325 feet south and 1,170 feet west of the northeast corner of sec. 8, T. 23 S., R. 4 S.; USGS Hutchinson SE topographic quadrangle; lat. 38 degrees 3 minutes 56.5 seconds N. and long. 97 degrees 46 minutes 44.2

seconds W. (colors are for moist soil unless otherwise stated):

A—0 to 5 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak fine and medium granular structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; 9.2 percent clay; slightly acid; clear wavy boundary.

2Bt1—5 to 14 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 19 percent clay; few distinct discontinuous dark brown (7.5YR 3/4 moist) clay films on vertical faces of pedes and very few faint patchy clay bridges between sand grains; few fine irregular masses of iron-manganese accumulation throughout; slightly acid; gradual wavy boundary.

2Bt2—14 to 23 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; few medium distinct strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 17.3 percent clay; few distinct discontinuous dark brown (7.5YR 3/4 moist) clay films on vertical faces of pedes, very few faint patchy clay bridges between sand grains, and few distinct continuous pinkish gray (7.5YR 6/2 moist) skeletal on vertical faces of pedes; common fine irregular masses of iron-manganese accumulation throughout; slightly acid; gradual wavy boundary.

2Bt3—23 to 37 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; common medium faint strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; common very fine and fine roots throughout; 13.6 percent clay; very few distinct discontinuous dark brown (7.5YR 3/4 moist) clay films on vertical faces of pedes, very few faint patchy clay bridges between sand grains, and few distinct continuous pinkish gray (7.5YR 6/2 moist) redoximorphic depletions on faces of pedes and in pores; common fine and medium irregular masses of iron-manganese accumulation throughout; slightly acid; gradual wavy boundary.

2BC1—37 to 58 inches; brown (7.5YR 5/4) fine sandy loam, brown (7.5YR 4/4) moist; common medium distinct dark reddish brown (5YR 3/4 moist) irregular redoximorphic concentrations throughout;

weak medium prismatic structure parting to weak fine and medium subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; common very fine roots throughout; 11.1 percent clay; few distinct continuous pinkish gray (7.5YR 6/2 moist) redoximorphic depletions on faces of peds and in pores; few fine and medium irregular masses of iron-manganese accumulation throughout; slightly acid; gradual wavy boundary.

2BC2—58 to 76 inches; brown (7.5YR 5/4) loamy fine sand, brown (7.5YR 4/4) moist; few medium faint strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium and coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; few very fine roots throughout; 10.6 percent clay; few distinct continuous light brownish gray (10YR 6/2 moist) redoximorphic depletions on faces of peds and in pores; slightly acid; gradual wavy boundary.

2BC3—76 to 80 inches; light brown (7.5YR 6/3) loamy fine sand, brown (7.5YR 5/3) moist; few medium faint strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium and coarse prismatic structure parting to weak medium subangular blocky; soft, very friable, nonsticky and nonplastic; few very fine roots throughout; 9.3 percent clay; few distinct continuous light gray (10YR 7/2 moist) redoximorphic depletions on vertical faces of peds; slightly acid.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 18 to 34 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 30 inches

Thickness of the ochric epipedon: 5 to 18 inches

Water table: Depth to top—2 to 4 feet; kind—apparent; months—February through May

Other features: Some pedons have an Ap, BA, 2A, 2AB, 2BA, 2BC, or 2Cg horizon.

A horizon:

Hue—10YR

Value—4 to 6 dry, 3 or 4 moist

Chroma—2 or 3

Texture—loamy fine sand, loamy sand, fine sandy loam, or sandy loam

Reaction—slightly acid

2Bt horizon:

Hue—10YR or 7.5YR; 2.5Y in the lower part in some pedons

Value—4 to 7 dry, 3 to 6 moist

Chroma—2 to 4

Texture—mainly sandy clay loam, fine sandy loam, or loam; clay loam in some pedons

Redoximorphic features—5 to 50 percent

Reaction—slightly acid or neutral

2BC horizon:

Hue—10YR or 7.5YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—fine sandy loam, sandy loam, loamy fine sand, or sandy clay loam

Redoximorphic features—5 to 20 percent

Reaction—slightly acid to neutral

Spelvin Series

The Spelvin series consists of very deep, well drained, moderately permeable soils that formed in eolian material over alluvium. These soils are in interdune areas on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes are 0 to 1 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Spelvin loamy sand, in a cultivated field in Reno County, Kansas, 4 miles north of Langdon; 700 feet north and 100 feet east of the southwest corner of sec. 5, T. 25 S., R. 9 W.; USGS Plevna topographic quadrangle; lat. 37 degrees 53 minutes 55.6 seconds N. and long. 98 degrees 20 minutes 35.3 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 5 inches; pale brown (10YR 6/3) (interior) loamy sand, brown (10YR 4/3) (interior) moist; weak fine subangular blocky structure parting to single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine roots throughout; 1 percent subrounded mixed gravel; moderately acid; clear smooth boundary.

2Bt1—5 to 23 inches; reddish brown (5YR 5/4) (interior) sandy clay loam, reddish brown (5YR 4/4) (interior) moist; moderate medium and coarse prismatic structure parting to moderate fine and medium subangular blocky; hard, firm, slightly sticky and slightly plastic; common very fine roots throughout; 25 percent clay; common distinct continuous brown (7.5YR 4/4 moist) clay films on

vertical and horizontal faces of ped; 1 percent subrounded mixed gravel; slightly acid; clear smooth boundary.

2Bt2—23 to 34 inches; light brown (7.5YR 6/4) (interior) sandy loam, brown (7.5YR 5/4) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, firm, slightly sticky and slightly plastic; few very fine roots throughout; 15 percent clay; few distinct discontinuous brown (7.5YR 4/4 moist) clay films on vertical faces of ped; 1 percent subrounded mixed gravel; slightly acid; gradual smooth boundary.

2Bt3—34 to 50 inches; strong brown (7.5YR 5/6) (interior) sandy loam, strong brown (7.5YR 4/6) (interior) moist; moderate medium subangular blocky structure; slightly hard, friable, slightly sticky and nonplastic; few very fine roots throughout; 15 percent clay; very few distinct patchy brown (7.5YR 5/4 moist) clay films on vertical faces of ped and few distinct discontinuous clay bridges between sand grains; slightly acid; gradual smooth boundary.

2BC—50 to 58 inches; strong brown (7.5YR 5/6) (interior) loamy sand, strong brown (7.5YR 4/6) (interior) moist; weak medium subangular blocky structure parting to single grain; soft, very friable, nonsticky and nonplastic; 5 percent clay; neutral; gradual smooth boundary.

2C—58 to 80 inches; yellow (10YR 7/6) (interior) sand, brownish yellow (10YR 6/6) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 1 percent clay; 1 percent subrounded mixed gravel; neutral.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 20 to 30 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 80 inches

Depth to loamy sand or coarser textures: 40 to 60 inches

Thickness of the ochric epipedon: 3 to 13 inches

A horizon:

Hue—10YR or 7.5YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—2 to 4

Texture—loamy sand, fine sand, sand, or loamy fine sand

Content of rock fragments—0 to 1 percent

Reaction—strongly acid to neutral

2Bt1 and 2Bt2 horizons:

Hue—10YR to 5YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—3 to 6

Texture—sandy clay loam, clay loam, sandy loam, or loam

Content of rock fragments—0 to 10 percent

Reaction—strongly acid to neutral

2Bt3 horizon:

Hue—10YR or 7.5YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—4 to 6

Texture—sandy loam

Content of rock fragments—0 to 10 percent

Relict mottles—0 to 10 percent

Reaction—strongly acid to neutral

2BC horizon:

Hue—10YR or 7.5YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—4 to 6

Texture—loamy sand, sandy loam, stratified sandy loam and loamy sand, loamy coarse sand, or coarse sandy loam

Content of rock fragments—0 to 10 percent

Relict mottles—0 to 5 percent

Reaction—strongly acid to neutral

2C horizon:

Hue—10YR or 7.5YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—3 to 8

Texture—sand, coarse sand, loamy sand, stratified sand and coarse sand, or loamy coarse sand

Content of rock fragments—0 to 14 percent

Relict mottles—0 to 5 percent

Reaction—strongly acid to neutral

Taver Series

The Taver series consists of very deep, moderately well drained, very slowly permeable soils that formed in alluvium. These soils are on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes are 0 to 1 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Taver loam, in a cultivated field in Reno County, Kansas, 8 miles west and 2 miles south of Nickerson; 2,376 feet south and 300 feet east of the northwest corner of sec. 20, T. 22 S., R. 8 W.; USGS Sterling SW

topographic quadrangle; lat. 38 degrees 7 minutes 22.7 seconds N. and long. 98 degrees 14 minutes 58.8 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 7 inches; dark grayish brown (10YR 4/2) (interior) loam, very dark grayish brown (10YR 3/2) (interior) moist; weak fine subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 24 percent clay; neutral; clear smooth boundary.

2Bt1—7 to 17 inches; dark gray (10YR 4/1) (interior) silty clay loam, very dark gray (10YR 3/1) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, sticky and plastic; common very fine and fine roots throughout; 35 percent clay; few prominent continuous clay films on vertical and horizontal faces of peds and few distinct discontinuous pressure faces on vertical and horizontal faces of peds; neutral; clear wavy boundary.

2Bt2—17 to 33 inches; dark grayish brown (10YR 4/2) (interior) silty clay, dark grayish brown (2.5Y 4/2) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; very hard, very firm, very sticky and very plastic; common very fine and fine roots throughout; 41 percent clay; common prominent continuous clay films on vertical and horizontal faces of peds and few distinct discontinuous pressure faces on vertical faces of peds; neutral; clear wavy boundary.

2Btk1—33 to 53 inches; light brownish gray (2.5Y 6/2) (interior) silty clay loam, grayish brown (2.5Y 5/2) (interior) moist; common fine prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, very sticky and very plastic; few very fine roots throughout; 35 percent clay; few prominent continuous clay films on vertical and horizontal faces of peds, few prominent continuous manganese or iron-manganese stains on vertical faces of peds, and very few distinct discontinuous pressure faces on vertical faces of peds; common fine irregular carbonate threads throughout; moderately alkaline; gradual wavy boundary.

2Btk2—53 to 64 inches; light olive gray (5Y 6/2) (interior) clay loam, olive gray (5Y 5/2) (interior) moist; common fine prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium

prismatic structure parting to weak medium subangular blocky; hard, firm, sticky and plastic; 30 percent clay; few prominent continuous clay films on vertical and horizontal faces of peds and few distinct discontinuous manganese or iron-manganese stains on vertical faces of peds; common fine irregular carbonate threads throughout; slightly alkaline; clear smooth boundary.

3Bt—64 to 80 inches; pale brown (10YR 6/3) (interior) sandy clay loam, brown (10YR 5/3) (interior) moist; common fine prominent strong brown (7.5YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; 20 percent clay; few distinct discontinuous clay films on vertical faces of peds and few distinct discontinuous manganese or iron-manganese stains on vertical faces of peds; common fine irregular soft masses of iron-manganese throughout; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 35 to 45 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 10 to 80 inches

Depth to redoximorphic features: 30 to 40 inches

Thickness of the mollic epipedon: 10 to 25 inches

A or Ap horizon:

Hue—10YR

Value—4 to 7 dry, 3 to 5 moist

Chroma—1 to 3

Texture—silt loam, loam, clay loam, silty clay loam, or fine sandy loam

Reaction—moderately acid to moderately alkaline

2Bt horizon:

Hue—10YR to 5Y

Value—4 to 7 dry, 3 to 6 moist

Chroma—1 or 2

Texture—silty clay, clay, clay loam, or silty clay loam

Calcium carbonate equivalent—0 to 5 percent

Redoximorphic features—0 to 15 percent in the lower part

Reaction—slightly acid to moderately alkaline

3Bt horizon:

Hue—7.5YR or 10YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—2 to 4

Texture—clay loam or sandy clay loam
 Calcium carbonate equivalent—0 to 5 percent
 Redoximorphic features—5 to 30 percent
 Reaction—slightly alkaline or moderately alkaline

Tivin Series

The Tivin series consists of very deep, somewhat excessively drained, rapidly permeable soils that formed in sandy eolian sediments. These soils are on dunes on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 1 to 35 percent. The mean annual precipitation is 26 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Tivin fine sand, in an area of rangeland in Reno County, Kansas, 4 miles north of Hutchinson; 2,399 feet west and 812 feet north of the southeast corner of sec. 16, T. 22 S., R. 5 W.; USGS Buhler topographic quadrangle; lat. 38 degrees 7 minutes 57.1 seconds N. and long. 97 degrees 52 minutes 30.2 seconds W. (colors are for dry soil unless otherwise stated):

A—0 to 8 inches; yellowish brown (10YR 5/4) (interior) fine sand, dark yellowish brown (10YR 4/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine and fine roots throughout; 1 percent clay; moderately acid; clear smooth boundary.

AC—8 to 18 inches; light yellowish brown (10YR 6/4) (interior) fine sand, yellowish brown (10YR 5/4) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine roots throughout; 1 percent clay; slightly acid; gradual wavy boundary.

C—18 to 80 inches; brownish yellow (10YR 6/6) (interior) sand, yellowish brown (10YR 5/6) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; 1 percent clay; neutral.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 0 to 2 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 80 inches

Thickness of the ochric epipedon: 3 to 16 inches

Other features: Some pedons have a 2C or 2Ab

horizon within a depth of 40 to 60 inches. This horizon is very fine sandy loam, loam, fine sandy loam, or silt loam, and the content of clay ranges from 10 to 20 percent. Some pedons have a 3C horizon. This horizon is sand, fine sand, or coarse sand, and the content of clay ranges from 0 to 3 percent. Some pedons contain carbonates and gravel.

A horizon:

Hue—10YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—2 to 4

Texture—fine sand

Reaction—moderately acid or slightly acid

AC horizon:

Hue—10YR or 7.5YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—2 to 4

Texture—fine sand or sand

Reaction—slightly acid or neutral

C horizon:

Hue—10YR or 7.5YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—3 to 6

Texture—fine sand or sand

Reaction—slightly acid or neutral

Tobin Series

The Tobin series consists of very deep, well drained, moderately permeable soils on flood plains in the Central Loess Plains (MLRA 75). These soils formed in stratified silty alluvium. Slopes range from 0 to 2 percent. The mean annual precipitation is 28 inches, and the mean annual temperature is 55 degrees F.

Typical Pedon

Tobin silt loam, in Ellsworth County, Kansas, about 4 miles west and 7 miles north of Ellsworth; about 2,310 feet west and 60 feet south of the northeast corner of sec. 15, T. 14 S., R. 9 W. (colors are for dry soil unless otherwise stated):

A1—0 to 20 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard, friable, slightly sticky and slightly plastic; many fine roots; slightly acid; gradual smooth boundary.

A2—20 to 32 inches; dark grayish brown (10YR 4/2) silt loam, very dark brown (10YR 2/2) moist; moderate medium granular structure; slightly hard,

friable, slightly sticky and slightly plastic; common fine roots; slightly alkaline; diffuse smooth boundary.

C—32 to 60 inches; grayish brown (10YR 5/2) silt loam, dark grayish brown (10YR 4/2) moist; few thin strata of dark grayish brown (10YR 4/2) silty clay loam, very dark grayish brown (10YR 3/2) moist; massive; slightly hard, very friable, slightly sticky and slightly plastic; few fine roots; strong effervescence; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Thickness of the mollic epipedon: 20 to 40 inches

Depth to secondary calcium carbonate: 15 to 40 inches

Depth to bedrock: Greater than 80 inches

Other features: Some pedons have an AC horizon.

Some pedons have more sandy or clayey strata below a depth of 40 inches. Pedons with a buried A horizon are common. Faint mottling occurs in some pedons below a depth of 40 inches.

A horizon:

Hue—10YR

Value—3 to 5 dry, 2 or 3 moist

Chroma—1 to 3

Texture—silt loam or silty clay loam

Reaction—moderately acid to slightly alkaline in the upper part, slightly acid to moderately alkaline in the lower part

C horizon:

Hue—10YR

Value—5 to 7 dry, 4 or 5 moist

Chroma—2 or 3

Texture—silt loam, loam, or silty clay loam

Reaction—slightly alkaline or moderately alkaline

Turon Series

The Turon series consists of very deep, well drained soils that formed in sandy eolian deposits over a buried alluvial soil. These soils are on dunes on paleoterraces in river valleys of the Great Bend Sand Plains (MLRA 79). Permeability is moderately rapid in the upper part and moderately slow in the lower part. Slopes range from 0 to 10 percent. The mean annual air temperature is 56 degrees F (13 degrees C), and the mean annual precipitation is 29 inches.

Typical Pedon

Turon fine sand, in a cultivated field in Reno County,

Kansas, 5 miles north and 1 mile east of Turon; 660 feet west and 2,320 feet north of the southeast corner of sec. 10, T. 25 S., R. 10 W.; USGS Sylvia topographic quadrangle; lat. 37 degrees 53 minutes 21.4 seconds N. and long. 98 degrees 24 minutes 3.4 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 8 inches; pale brown (10YR 6/3) (interior) fine sand, brown (10YR 5/3) (interior) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine and fine roots throughout; 2 percent clay; strongly acid; clear smooth boundary.

Bt—8 to 28 inches; brown (10YR 5/3) (interior) loamy fine sand, brown (10YR 4/3) (interior) moist; weak fine subangular blocky structure; loose when moist and dry, nonsticky and nonplastic when wet; common very fine and fine roots throughout; three dark yellowish brown (10YR 4/4) lamellae 10 cm, 18 cm, and 17 cm thick; 8 percent clay; few distinct continuous clay bridges on vertical and horizontal faces of peds; moderately acid; clear wavy boundary.

E&Bt—28 to 40 inches; loamy fine sand (E), dark yellowish brown (10YR 4/4) (interior) and yellowish brown (10YR 5/4) (interior) moist; weak fine subangular blocky structure; soft, loose, nonsticky and nonplastic; common very fine roots throughout; two horizontal lamellae of brown (7.5YR 4/4) sandy loam 4 cm and 2 cm thick; 8 percent clay; few distinct patchy clay bridges between sand grains; lamellae of very pale brown (10YR 7/3) (interior) loamy fine sand (Bt), pale brown (10YR 6/3) (interior) moist; weak fine subangular blocky structure; soft, loose, nonsticky and nonplastic; 8 percent clay; moderately acid; abrupt wavy boundary.

2Btb1—40 to 58 inches; grayish brown (2.5Y 5/2) (interior) silty clay, dark grayish brown (2.5Y 4/2) (interior) moist; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky and moderately plastic; 40 percent clay; few distinct discontinuous clay bridges between sand grains; neutral; clear smooth boundary.

2Btb2—58 to 75 inches; light olive brown (2.5Y 5/3) (interior) silty clay, olive brown (2.5Y 4/3) (interior) moist; common fine distinct yellowish brown (10YR 5/4) mottles; weak medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky and moderately plastic; 42 percent clay; common distinct continuous clay films on vertical and horizontal faces of peds; common fine irregular masses of iron-manganese accumulation

throughout; slightly alkaline; clear smooth boundary.

2Btb3—75 to 80 inches; light olive brown (2.5Y 5/3) (interior) silty clay, olive brown (2.5Y 4/3) (interior) moist; common fine and medium distinct yellowish brown (10YR 5/6 moist) irregular mottles throughout; moderate medium prismatic structure parting to moderate medium subangular blocky; hard, firm, moderately sticky and moderately plastic; 41 percent clay; common distinct continuous clay films on vertical faces of peds; common fine irregular masses of iron-manganese accumulation throughout; slightly alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 2 to 18 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 40 inches; the carbonates occur only in the buried alluvial soil material.

Depth to lithologic discontinuity: Between 40 and 60 inches

Thickness of the ochric epipedon: 3 to 18 inches

Other features: Some pedons have an AB, BC, C, Ab, Btb, 2Ab, or 2Btkb horizon.

A horizon:

Hue—10YR

Value—5 or 6 dry, 4 or 5 moist

Chroma—2 to 4

Texture—fine sand, loamy fine sand, sand, or loamy sand

Reaction—strongly acid to neutral

Bt horizon:

Hue—10YR or 7.5YR

Value—5 or 6 dry (matrix), 4 or 5 moist; 4 or 5 dry (lamellae), 3 or 4 moist

Chroma—2 to 6 (matrix); 3 or 4 (lamellae)

Texture—loamy sand, loamy fine sand, or fine sand (matrix); sandy loam, fine sandy loam, or loamy sand (lamellae)

Reaction—strongly acid to neutral

E part of E&Bt horizon:

Hue—7.5YR or 10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—4

Texture—sand, fine sand, or loamy fine sand

Reaction—strongly acid to neutral

Bt part of E&Bt horizon:

Hue—7.5YR

Value—4 or 5 dry, 3 or 4 moist

Chroma—3 or 4

Texture—loamy sand, fine sandy loam, or loamy fine sand

Reaction—strongly acid to neutral

2Bt horizon:

Hue—7.5YR to 5Y

Value—5 to 7 dry, 4 to 6 moist

Chroma—1 to 6

Texture—sandy clay loam, silty clay loam, clay loam, loam, or silty clay

Redoximorphic features—0 to 30 percent

Reaction—neutral or slightly alkaline

Warnut Series

The Warnut series consists of very deep, poorly drained, moderately permeable soils that formed in loamy alluvium. These soils are in interdunal depressions on paleoterraces of the Great Bend Sand Plains (MLRA 79). Slopes are 0 to 1 percent. The mean annual air temperature is 56 degrees F, and the mean annual precipitation is 29 inches.

Typical Pedon

Warnut fine sandy loam, in a pasture in Reno County, Kansas, 2 miles north and 1 mile west of Turon; 1,600 feet north and 2,100 feet west of the southeast corner of sec. 28, T. 25 S., R. 10 W.; USGS Turon topographic quadrangle; lat. 37 degrees 50 minutes 36.1 seconds N. and long. 98 degrees 25 minutes 26.6 seconds W. (colors are for moist soil unless otherwise stated):

A—0 to 2 inches; black (10YR 2/1) (interior) fine sandy loam, very dark gray (10YR 3/1) (interior) dry; weak medium subangular blocky structure; slightly hard, friable, nonsticky and slightly plastic; common very fine and fine roots throughout; 19 percent clay; noneffervescent throughout (HCl, 1 normal); moderately acid; clear wavy boundary.

Bt1—2 to 5 inches; dark gray (2.5Y 4/1) (interior) loam, gray (2.5Y 5/1) (interior) dry; weak medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine and fine roots throughout; 24 percent clay; few faint patchy clay films throughout and few distinct discontinuous black (10YR 2/1) organic coatings on vertical faces of peds; many medium irregular yellowish red (5YR 4/6) masses of iron accumulation throughout, common medium irregular gray (2.5Y 6/1) iron depletions throughout, and few fine irregular black (10YR 2/1) masses of iron-manganese accumulation

- throughout; noneffervescent throughout (HCl, 1 normal); moderately acid; clear wavy boundary.
- Bt2**—5 to 11 inches; 50 percent grayish brown (10YR 5/2) (interior) and 50 percent brown (10YR 5/3) (interior) fine sandy loam, light brownish gray (10YR 6/2) (interior) dry; weak medium prismatic structure parting to moderate medium subangular blocky; slightly hard, friable, slightly sticky and slightly plastic; common very fine, fine, coarse, and very coarse roots throughout; 18 percent clay; few faint patchy light brownish gray (10YR 6/2) clay films on vertical faces of peds and common distinct continuous light brownish gray (10YR 6/2) skeletons on vertical faces of peds; many medium and coarse irregular strong brown (7.5YR 5/8) masses of iron accumulation throughout, many medium irregular gray (10YR 6/1) iron depletions throughout, and common fine and medium irregular black (10YR 2/1) masses of iron-manganese accumulation throughout; noneffervescent throughout (HCl, 1 normal); slightly acid; clear smooth boundary.
- Bt3**—11 to 15 inches; brown (10YR 5/3) (interior) fine sandy loam, pale brown (10YR 6/3) (interior) dry; weak medium and coarse prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, slightly sticky and nonplastic; common very fine, fine, coarse, and very coarse roots throughout; 18 percent clay; few distinct discontinuous light brownish gray (10YR 6/2) clay films on faces of peds and in pores; many medium and coarse irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout, common coarse irregular light brownish gray (10YR 6/2) iron depletions throughout, and common fine dendritic black (10YR 2/1) masses of iron-manganese accumulation between peds; noneffervescent throughout (HCl, 1 normal); slightly acid; clear smooth boundary.
- Bt4**—15 to 22 inches; brown (10YR 5/3) (interior) fine sandy loam, pale brown (10YR 6/3) (interior) dry; weak medium and coarse subangular blocky structure; soft, friable, nonsticky and nonplastic; common coarse and very coarse roots throughout; 14 percent clay; many coarse irregular strong brown (7.5YR 5/6) masses of iron accumulation throughout and many medium and coarse irregular light brownish gray (10YR 6/2) iron depletions throughout; noneffervescent throughout (HCl, 1 normal); slightly acid; clear smooth boundary.
- Bt5**—22 to 37 inches; brown (10YR 5/3) (interior) sandy loam, pale brown (10YR 6/3) (interior) dry; weak medium and coarse subangular blocky structure; soft, very friable, nonsticky and nonplastic; common coarse and very coarse roots throughout; 13 percent clay; many coarse irregular strong brown (7.5YR 4/6) masses of iron accumulation throughout and many medium and coarse irregular light brownish gray (10YR 6/2) iron depletions throughout; noneffervescent throughout (HCl, 1 normal); neutral; clear smooth boundary.
- C1**—37 to 60 inches; brown (10YR 5/3) (interior) loamy fine sand, pale brown (10YR 6/3) (interior) dry; single grain; loose when moist and dry, nonsticky and nonplastic when wet; common coarse and very coarse roots throughout; 6 percent clay; common coarse irregular yellowish brown (10YR 5/8) masses of iron accumulation throughout and common medium and coarse irregular light brownish gray (10YR 6/2) iron depletions throughout; noneffervescent throughout (HCl, 1 normal); neutral; clear smooth boundary.
- C2**—60 to 80 inches; yellowish brown (10YR 5/4) (interior) loamy sand, light yellowish brown (10YR 6/4) (interior) dry; single grain; loose when moist and dry, nonsticky and nonplastic when wet; common coarse and few very coarse roots throughout; 4 percent clay; common medium irregular yellowish brown (10YR 5/6) masses of iron accumulation throughout; noneffervescent throughout (HCl, 1 normal); neutral.

Range in Characteristics

Soil moisture regime: Aquic

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 18 to 29 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: Greater than 80 inches

Thickness of the ochric epipedon: 2 to 17 inches

Water table: Depth to top—1.0 to 1.5 feet; kind—apparent; months—April through June

Other features: Some pedons have an Ap, BCb, BCg, Btb, or Cg horizon.

A horizon:

Hue—10YR

Value—4 to 6 dry, 2 to 5 moist

Chroma—1 to 3

Texture—fine sandy loam, loamy sand, sandy loam, or sand

Redoximorphic features—1 to 15 percent

Reaction—moderately acid or slightly acid

Bt horizon:

Hue—7.5YR to 2.5YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—1 to 4

Texture—sandy clay loam, sandy loam, fine sandy loam, loam, or clay loam

Redoximorphic features—10 to 40 percent

Reaction—moderately acid to neutral

BC horizon:

Hue—7.5YR or 10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 4

Texture—sandy loam, loamy sand, sand, fine sandy loam, loamy fine sand, or sandy clay loam

Redoximorphic features—0 to 15 percent

Reaction—slightly acid or neutral

C horizon:

Hue—7.5YR to 2.5Y

Value—6 or 7 dry, 5 or 6 moist

Chroma—2 to 6

Texture—loamy fine sand, fine sandy loam, or sand

Redoximorphic features—0 to 20 percent

Reaction—slightly acid or neutral

Willowbrook Series

The Willowbrook series consists of very deep, somewhat poorly drained, moderately rapidly permeable soils on flood plains in river valleys of the Great Bend Sand Plains (MLRA 79). These soils formed in loamy alluvium over sand. Slopes are 0 to 1 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Willowbrook fine sandy loam (fig. 31), in a cultivated field in Reno County, Kansas, about 1.5 miles southwest of Nickerson; 91 feet north and 972 feet west of the southeast corner of sec. 17, T. 22 S., R. 7 W.; USGS Nickerson topographic quadrangle; lat. 38 degrees 7 minutes 49.5 seconds N. and long. 98 degrees 6 minutes 31.3 seconds W. (colors are for dry soil unless otherwise stated):

Ap1—0 to 4 inches; dark gray (10YR 4/1) fine sandy loam, black (10YR 2/1) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common

very fine roots throughout; 12 percent clay; noneffervescent throughout; 1 percent rounded mixed gravel; slightly acid; abrupt smooth boundary.

Ap2—4 to 10 inches; dark gray (10YR 4/1) fine sandy loam, black (10YR 2/1) moist; weak fine and medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; 10 percent clay; very slightly effervescent throughout; 1 percent rounded mixed gravel; slightly alkaline; abrupt smooth boundary.

AB—10 to 13 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; weak medium subangular blocky structure; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; 9 percent clay; strongly effervescent throughout; 1 percent rounded mixed gravel; moderately alkaline; clear smooth boundary.

Bw—13 to 17 inches; grayish brown (10YR 5/2) fine sandy loam, very dark grayish brown (10YR 3/2) moist; common fine distinct dark yellowish brown (10YR 4/4 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; 7 percent clay; strongly effervescent throughout; 1 percent rounded mixed gravel; moderately alkaline; clear smooth boundary.

Bk1—17 to 20 inches; grayish brown (10YR 5/2) loam, dark grayish brown (10YR 4/2) moist; common medium prominent dark yellowish brown (10YR 4/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; 9 percent clay; common fine and medium irregular soft masses of carbonate throughout; strongly effervescent throughout; 1 percent rounded mixed gravel; moderately alkaline; clear smooth boundary.

Bk2—20 to 26 inches; pale brown (10YR 6/3) sandy loam, brown (10YR 5/3) moist; common medium distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; weak medium prismatic structure parting to weak medium subangular blocky; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; 5 percent clay; common fine irregular soft masses of carbonate throughout;

strongly effervescent throughout; 5 percent rounded mixed gravel; moderately alkaline; abrupt wavy boundary.

- 2C1—26 to 46 inches; pale brown (10YR 6/3) coarse sand, dark yellowish brown (10YR 4/6) and brown (10YR 5/3) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; 1.2 percent clay; very slightly effervescent throughout; 10 percent rounded mixed gravel; moderately alkaline; clear smooth boundary.
- 2C2—46 to 52 inches; very pale brown (10YR 7/3) coarse sand, brown (10YR 5/3) moist; many coarse distinct yellowish brown (10YR 5/6 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; 0.2 percent clay; noneffervescent throughout; 5 percent rounded mixed gravel; slightly alkaline; clear smooth boundary.
- 2C3—52 to 80 inches; very pale brown (10YR 7/3), stratified sand and gravelly coarse sand, brown (10YR 5/3) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 0 percent clay; noneffervescent throughout; 20 percent rounded mixed gravel; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 5 to 15 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 8 to 25 inches

Depth to loamy sand or coarser textures: 14 to 26 inches

Thickness of the mollic epipedon: 7 to 18 inches

Water table: Depth to top—2 to 4 feet; kind—apparent; months—February through June

Other features: Some pedons have an AB, Ab, AC, or BC horizon.

A horizon:

Hue—10YR

Value—3 to 5 dry, 2 to 4 moist

Chroma—1 or 2

Texture—fine sandy loam

Content of rock fragments—0 to 1 percent

Reaction—moderately acid to moderately alkaline

B horizon:

Hue—10YR

Value—4 to 7 dry, 3 to 6 moist

Chroma—2 to 4

Texture—fine sandy loam, sandy loam, loam, or loamy fine sand

Content of rock fragments—0 to 5 percent

Calcium carbonate equivalent—0 to 5 percent

Redoximorphic features—1 to 15 percent

Reaction—slightly alkaline or moderately alkaline

2C horizon:

Hue—10YR

Value—5 to 7 dry, 4 to 6 moist

Chroma—2 to 6

Texture—fine sand, sand, coarse sand, gravelly coarse sand, stratified sand and gravelly coarse sand, stratified gravelly coarse sand and sand, or loamy sand

Redoximorphic concentrations—1 to 25 percent

Content of rock fragments—0 to 25 percent

Reaction—slightly alkaline or moderately alkaline

Yaggy Series

The Yaggy series consists of very deep, somewhat poorly drained soils on flood plains in river valleys of the Great Bend Sand Plains (MLRA 79). These soils formed in stratified loamy alluvium over sand. Permeability is moderate in the upper part and rapid in the lower part. Slopes are 0 to 1 percent. The mean annual precipitation is 29 inches, and the mean annual temperature is 56 degrees F.

Typical Pedon

Yaggy fine sandy loam (fig. 32), in a cultivated field in Reno County, Kansas, 1 mile south of South Hutchinson; 1,879 feet north and 558 feet west of the southeast corner of sec. 31, T. 23 S., R. 5 W.; USGS Hutchinson topographic quadrangle; lat. 38 degrees 0 minutes 18 seconds N. and long. 97 degrees 54 minutes 18.5 seconds W. (colors are for dry soil unless otherwise stated):

Ap1—0 to 5 inches; pale brown (10YR 6/3) fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; common fine tubular pores; trace of fine gravel; 7 percent clay; strongly effervescent throughout (HCl, 1 normal); slightly alkaline; abrupt smooth boundary.

Ap2—5 to 11 inches; brown (10YR 5/3) fine sandy loam, brown (10YR 4/3) moist; weak fine subangular blocky structure; soft, very friable, nonsticky and nonplastic; common very fine roots throughout; many fine tubular pores; 7 percent clay; strongly effervescent throughout (HCl, 1

- normal); 1 percent subrounded mixed gravel; moderately alkaline; abrupt smooth boundary.
- 2C1—11 to 14 inches; light brownish gray (10YR 6/2) and pale brown (10YR 6/3), stratified silt loam and very fine sandy loam, dark grayish brown (10YR 4/2) and brown (10YR 4/3) moist; few coarse prominent reddish yellow (7.5YR 7/8 moist) irregular redoximorphic concentrations throughout and common fine prominent dark brown (7.5YR 3/4 moist) irregular mottles throughout; massive; slightly hard, very friable, nonsticky and nonplastic; common very fine roots throughout; common fine tubular pores; 14 percent clay; strongly effervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately alkaline; abrupt smooth boundary.
- 3C2—14 to 24 inches; very pale brown (10YR 7/4) fine sand, light yellowish brown (10YR 6/4) moist; few fine prominent yellowish brown (10YR 5/8 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; common very fine and fine roots throughout; few thin strata of very dark grayish brown (10YR 3/2) fine sandy loam 1 to 2 mm thick; few thin strata of coarse sand 2 to 4 cm thick; 0 percent clay; noneffervescent throughout (HCl, 1 normal); 5 percent subrounded mixed gravel; slightly alkaline; abrupt smooth boundary.
- 3C3—24 to 31 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; few fine and medium prominent strong brown (7.5YR 5/8 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; 0.2 percent clay; noneffervescent throughout (HCl, 1 normal); moderately alkaline; clear wavy boundary.
- 3C4—31 to 43 inches; very pale brown (10YR 7/3) fine sand, pale brown (10YR 6/3) moist; common medium and coarse prominent strong brown (7.5YR 5/8 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; few thin strata of very dark grayish brown (10YR 3/2) very fine sandy loam 3 to 5 mm thick; 0.2 percent clay; noneffervescent throughout (HCl, 1 normal); 1 percent subrounded mixed gravel; moderately alkaline; abrupt smooth boundary.
- 3C5—43 to 54 inches; very pale brown (10YR 7/3) coarse sand, pale brown (10YR 6/3) moist; few coarse prominent strong brown (7.5YR 5/8 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky

and nonplastic when wet; few very fine roots throughout; 0 percent clay; noneffervescent throughout (HCl, 1 normal); 2 percent subrounded mixed gravel; moderately alkaline; abrupt smooth boundary.

- 3C6—54 to 70 inches; very pale brown (10YR 7/3) and light brownish gray (10YR 6/2), stratified sand and gravelly coarse sand, pale brown (10YR 6/3) and grayish brown (10YR 5/2) moist; many medium and coarse prominent yellowish brown (10YR 5/8 moist) irregular redoximorphic concentrations throughout; single grain; loose when moist and dry, nonsticky and nonplastic when wet; few very fine roots throughout; 0 percent clay; noneffervescent throughout (HCl, 1 normal); 22 percent subrounded mixed gravel; moderately alkaline; clear smooth boundary.

- 3C7—70 to 80 inches; pale brown (10YR 6/3), stratified sand and gravelly coarse sand, brown (10YR 5/3) and yellowish brown (10YR 5/4) moist; single grain; loose when moist and dry, nonsticky and nonplastic when wet; 0 percent clay; noneffervescent throughout (HCl, 1 normal); 14 percent subrounded mixed gravel; moderately alkaline.

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Particle-size control section: 0 to 26 percent clay

Depth to bedrock: Greater than 80 inches

Depth to secondary calcium carbonate: 0 to 21 inches

Water table: Depth to top—2 to 4 feet; kind—apparent; months—December through May

A horizon:

Hue—10YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 or 3

Texture—dominantly fine sandy loam, but the range includes sandy loam, loamy sand, sand, loam, sandy clay loam, and clay loam

Calcium carbonate equivalent—0 to 3 percent

Reaction—slightly alkaline or moderately alkaline

2C horizon:

Hue—10YR

Value—4 to 6 dry, 3 to 5 moist

Chroma—2 or 3

Texture—dominantly stratified silt loam and very fine sandy loam; textures stratified with fine sand to silty clay loam included in range

Content of rock fragments—0 to 2 percent

Calcium carbonate equivalent—0 to 5 percent

Reaction—slightly alkaline or moderately alkaline

3C horizon:

Hue—10YR

Value—6 or 7 dry, 5 or 6 moist

Chroma—2 to 4

Texture—fine sand, sand, coarse sand, or gravelly coarse sand or stratified with some combination of these textures

Content of rock fragments—0 to 25 percent

Redoximorphic concentrations—0 to 30 percent

Reaction—slightly alkaline or moderately alkaline

Zellmont Series

The Zellmont series consists of moderately deep, well drained, moderately slowly permeable soils that formed in alluvium over residuum derived from shale. These soils are on strath terraces in river valleys of the Great Bend Sand Plains (MLRA 79). Slopes range from 0 to 6 percent. The mean annual precipitation is about 29 inches, and the mean annual temperature is about 58 degrees F.

Typical Pedon

Zellmont sandy loam, on a southwest-facing, convex slope of 3 percent, in an area of cropland at an elevation of 1,447 feet in Reno County, Kansas, about 7 miles east of Pretty Prairie; about 175 feet north and 129 feet west of the southeast corner of sec. 20, T. 26 N., R. 5 W.; USGS Castleton quadrangle; lat. 37 degrees 45 minutes 46.3 seconds N. and long. 97 degrees 52 minutes 54.2 seconds W. (colors are for dry soil unless otherwise stated):

Ap—0 to 8 inches; brown (10YR 4/3) (interior) sandy loam, dark brown (10YR 3/3) (interior) moist; weak fine and medium subangular blocky structure; slightly hard, friable, slightly sticky and slightly plastic; common very fine roots throughout; 18 percent clay; noneffervescent throughout (HCl, 1 normal); 2 percent subrounded mixed gravel; moderately acid; abrupt smooth boundary.

Bt1—8 to 18 inches; reddish brown (5YR 5/3) (interior) clay loam, reddish brown (5YR 4/3) (interior) moist; moderate medium subangular blocky structure; hard, firm, moderately sticky and moderately plastic; common very fine roots throughout; 28 percent clay; few distinct continuous clay films on vertical and horizontal faces of peds; noneffervescent throughout (HCl, 1 normal); 3 percent subrounded mixed gravel; slightly acid; clear wavy boundary.

Bt2—18 to 26 inches; reddish brown (5YR 5/4)

(interior) coarse sandy loam, reddish brown (5YR 4/4) (interior) moist; weak fine subangular blocky structure; soft, friable, nonsticky and nonplastic; common very fine roots throughout; 12 percent clay; few distinct continuous clay films on vertical and horizontal faces of peds; noneffervescent throughout (HCl, 1 normal); 3 percent subrounded mixed gravel; slightly acid; clear wavy boundary.

2C—26 to 32 inches; reddish brown (2.5YR 4/3) (interior) clay loam, dark reddish brown (2.5YR 3/3) (interior) moist; massive; hard, firm, moderately sticky and moderately plastic; 27 percent clay; noneffervescent throughout (HCl, 1 normal); 4 percent subrounded mixed gravel and 10 percent subrounded shale gravel; slightly alkaline; abrupt wavy boundary.

2Cr—32 to 80 inches; reddish brown (2.5YR 4/3) (interior), weathered bedrock, dark reddish brown (2.5YR 3/3) (interior) moist; noneffervescent throughout (HCl, 1 normal).

Range in Characteristics

Soil moisture regime: Ustic (bordering on udic)

Soil temperature regime: Mesic

Mean annual soil temperature: 56 to 58 degrees F

Surface rock fragments: 0 to 2 percent

Particle-size control section: 23 to 34 percent clay

Depth to nonparalithic contact: 20 to 39 inches

Thickness of the ochric epipedon: 5 to 12 inches

Other features: Some pedons have a BC horizon.

Ap horizon:

Hue—5YR to 7.5YR

Value—3 to 5 moist or dry

Chroma—2 to 4

Texture—sandy loam, loam, or sandy clay loam

Reaction—moderately acid to neutral

Bt horizon:

Hue—2.5YR to 7.5YR

Value—3 to 6 moist or dry

Chroma—2 to 4

Texture—sandy clay loam, loam, sandy loam, coarse sandy loam, or clay loam

Content of rock fragments—0 to 5 percent

Reaction—slightly acid to slightly alkaline

2C horizon:

Hue—2.5YR or 5YR

Value—3 to 5 moist or dry

Chroma—3 or 4

Texture—silty loam, silty clay loam, clay loam, or loam

Content of rock fragments—0 to 5 percent

Reaction—neutral to moderately alkaline

2Cr horizon:

Hue—2.5YR or 5G

Value—3 to 6

Chroma—2 to 4

Texture—weathered beds, Permian shale, or siltstone

Table 21.--Classification of the Soils

Soil name	Family or higher taxonomic class
Abbyville-----	Fine-loamy, mixed, superactive, mesic Aquic NatrustalFs
Albion-----	Coarse-loamy, mixed, superactive, mesic Udic Argiustolls
Aquents-----	Coarse-loamy, mixed, superactive, mesic Fluvaquentic Endoaquolls
Arents-----	Arents
Avans-----	Fine-silty, mixed, superactive, mesic Udic Argiustolls
Blazefork-----	Fine, smectitic, mesic Pachic Argiustolls
Buhler-----	Fine-silty, mixed, superactive, mesic Leptic Vertic Natrustolls
Carbika-----	Fine, smectitic, mesic Vertic Argiaquolls
Carway-----	Fine-loamy, mixed, superactive, mesic Aeric Epiaqualfs
Clark-----	Fine-loamy, mixed, superactive, mesic Typic Calciustolls
Crete-----	Fine, smectitic, mesic Pachic Argiustolls
Darlow-----	Fine-loamy, mixed, superactive, mesic Vertic NatrustalFs
Dillhut-----	Coarse-loamy, mixed, superactive, mesic Aquic Ustorthents
Dillwyn-----	Mixed, mesic Aquic Ustipsamments
Elmer-----	Fine-loamy, mixed, superactive, mesic Typic Natrustolls
Farnum-----	Fine-loamy, mixed, superactive, mesic Pachic Argiustolls
Funmar-----	Fine-loamy, mixed, superactive, mesic Pachic Argiustolls
Geary-----	Fine-silty, mixed, superactive, mesic Udic Argiustolls
Hayes-----	Coarse-loamy, mixed, superactive, mesic Udic HaplustalFs
Imano-----	Fine-loamy over sandy or sandy-skeletal, mixed, mesic Oxyaquic Haplustolls
Jamash-----	Loamy, mixed, active, thermic, shallow Udorthentic Haplustolls
Kanza-----	Mixed, mesic Mollic Psammaquents
Kaskan-----	Coarse-loamy, mixed, superactive, mesic Cumulic Haplustolls
Kisiwa-----	Fine-loamy, mixed, superactive, mesic Vertic Natraqualfs
Ladysmith-----	Fine, smectitic, mesic Udertic Argiustolls
Langdon-----	Mixed, mesic Lamellic Ustipsamments
Longford-----	Fine, smectitic, mesic Udic Argiustolls
Lucien-----	Loamy, mixed, thermic, shallow Udic Haplustolls
Mahone-----	Coarse-loamy, mixed, superactive, mesic Udifluventic Haplustepts
Nalim-----	Fine-loamy, mixed, superactive, mesic Udic Argiustolls
Naron-----	Fine-loamy, mixed, superactive, mesic Udic Argiustolls
Nash-----	Coarse-silty, mixed, thermic Udic Haplustolls
Nickerson-----	Fine-loamy, mixed, superactive, mesic Udic HaplustalFs
Ninnescah-----	Coarse-loamy, mixed (calcareous), superactive, mesic Fluvaquentic Endoaquolls
Ost-----	Fine-loamy, mixed, superactive, mesic Udic Argiustolls
Penalosa-----	Fine, mixed, superactive, mesic Udertic Argiustolls
Piedmont-----	Fine, mixed, active, thermic Udertic Argiustolls
Plev-----	Mixed, mesic Mollic Psammaquents
Poxmash-----	Coarse-loamy, mixed, superactive, mesic Udic HaplustalFs
Pratt-----	Sandy, mixed, mesic Lamellic HaplustalFs
Punkin-----	Fine, mixed, superactive, mesic Vertic Natrustolls
Saltcreek-----	Fine-loamy, mixed, superactive, mesic Udic Argiustolls
Saxman-----	Mixed, mesic Oxyaquic Ustipsamments
Shellabarger-----	Fine-loamy, mixed, superactive, mesic Udic Argiustolls
Smolan-----	Fine, smectitic, mesic Pachic Argiustolls
Solvay-----	Fine-loamy, mixed, superactive, mesic Aquic HaplustalFs
Spelvin-----	Fine-loamy, mixed, superactive, mesic Udic HaplustalFs
Taver-----	Fine, smectitic, mesic Udertic Argiustolls
Tivin-----	Mixed, mesic Typic Ustipsamments
Tobin-----	Fine-silty, mixed, superactive, mesic Cumulic Haplustolls
Turon-----	Sandy, mixed, mesic Lamellic HaplustalFs
Warnut-----	Fine-loamy, mixed, superactive, mesic Aeric Endoaqualfs
Willowbrook-----	Sandy, mixed, mesic Oxyaquic Haplustolls
Yaggy-----	Sandy, mixed, mesic Oxyaquic Ustifluvents
Zellmont-----	Fine-loamy, mixed, superactive, mesic Udic Argiustolls

Formation of the Soils

Soil forms through processes that act on deposited or accumulated geologic material. The characteristics of the soil at any given point are determined by the interaction of five major factors of soil formation. These factors are parent material, climate, plants and other living organisms, relief, and time. Each of these factors influences the formation of every soil, and each modifies the effects of the other four. The relative effects of the individual factors vary from place to place. The interactions among the factors are more complex for some soils than for others.

Parent Material

Parent material is the unconsolidated material in which soils form. It either is material weathered from rocks through freezing and thawing, abrasion, erosion, or chemical processes or is weathered material deposited by wind or water. The parent material affects texture, structure, color, natural fertility, and many other soil properties. Soils differ partly because of the various kinds of parent material. The texture of the parent material influences the rate of downward movement of water and air and thus greatly affects soil formation. The composition of the parent material largely determines the mineralogical composition of the soil and, hence, its natural fertility.

The kinds of parent material in Reno County include material weathered from shale and sandstone (residuum); loess; alluvium; and eolian sand.

Permian rocks are the oldest rocks that outcrop in the county. They occur as thick beds of shale. These rocks outcrop to the north and east of Cheney Lake. Jamash and Piedmont soils formed in material weathered from Permian shale.

Loess is wind-deposited material made up mainly of silt and clay particles. Some of this material was carried hundreds of miles from its source. Loess deposits of varying thickness occur in the extreme northeast corner of the county. Those on unstable landscapes generally have been removed by geologic erosion. Crete and Longford soils formed in loess deposits.

Alluvium is material deposited by floodwater in stream and river valleys. It is a mixture of silt, clay, and

sand washed from upland areas. Soils that formed in alluvium differ from one another depending on the source of the material and on drainage characteristics. The Arkansas and Ninnescah Rivers were major sources of alluvium. Avans, Funmar, Imano, Saxman, and Yaggy soils formed in alluvium.

Eolian deposits are primarily sand-sized particles that have been deposited by winds. These eolian sands have been blown out of the Arkansas River and its tributaries. The deposits occur in the northeastern, northwestern, and western parts of the county. In many places the eolian deposits overlie alluvium. Tivin, Pratt, Langdon, and Turon soils formed in eolian deposits.

Climate

Climate is an active factor of soil formation. It directly influences soil formation by weathering the parent material. It indirectly affects soil formation through its effect on plants and animals.

The climate of Reno County is typical continental. It is characterized by intermittent dry and moist periods, which can last for less than a year or for several years. The soil dries to varying depths during dry periods. It slowly regains moisture during wet periods and can become so saturated that excess moisture penetrates the substratum. Because of the wetting and drying, some of the basic nutrients (and even clay particles) have been leached from the upper horizons in some soils. Freezing and thawing cycles modify soil structure. In clayey soils they can result in soil aggregates, thus forming a granular structure that favors plant growth.

Plant and Animal Life

Plants and animals have an important effect on soil formation. Plants generally influence the content of nutrients and organic matter in the soil. Ants, earthworms, cicadas, and burrowing animals help to keep the soil open and porous. Bacteria and fungi help to decompose the plants, thus releasing plant nutrients.

Mid and tall grasses have greatly affected soil

formation in Reno County. As a result of the grasses, the upper part of a typical soil in the county is dark and is high in organic matter content. In many areas the next layer is slightly finer textured and somewhat lighter colored than the layer above. The underlying parent material generally is light in color.

Relief

Relief, or lay of the land, influences the formation of soils through its effect on drainage, runoff, plant cover, and soil temperature. Although climate and plants are the most active factors of soil formation, relief also is important, mainly because it controls the movement of water on the surface and into the soil.

Runoff is more rapid on the steeper soils in the uplands than on the less sloping soils. As a result, less water penetrates the surface and erosion is more extensive. Runoff is rapid in these moderately sloping to moderately steep soils, and much of the soil material is removed as soon as a soil forms.

Soils having well expressed horizons generally formed in the less sloping areas where runoff is slow, erosion is less extensive, and more water percolates

throughout the profile. In areas where relief is gentle, the soils generally receive runoff from the higher elevations.

Time

Differences in the length of time that the parent material has been exposed to the processes of soil formation are reflected in the degree of profile development. Soils that do not have well expressed horizons are in the earlier stages of development, whereas those that have well expressed horizons are in the later stages.

Profile development in the soils in Reno County varies. The soils on bottom land, such as Ninnescah soils, are subject to stream overflow. They receive sediments with each period of flooding. They have a thick, dark surface layer but have weakly defined subsoil horizons. These soils are considered to be in the early stages of development. In contrast, the older Farnum soils, which have been exposed to soil-forming processes for thousands of years, have well defined horizons. Much of the clay in these soils has been translocated to the subsoil.

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Glossary

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 of approximately 1,000 pounds weight, with or without a calf, for 1 month.

Aquic conditions. Current soil wetness characterized by saturation, reduction, and redoximorphic features.

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.

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

Backslope. The position that forms the steepest and generally linear, middle portion of a hillslope. In profile, backslopes are commonly bounded by a convex shoulder above and a concave footslope below.

Basal area. The area of a cross section of a tree, generally referring to the section at breast height and measured outside the bark. It is a measure of stand density, commonly expressed in square feet.

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.

Base slope. A geomorphic component of hills consisting of the concave to linear (perpendicular to the contour) slope that, regardless of the lateral shape, forms an apron or wedge at the bottom of a hillside dominated by colluvium and slope-wash sediments (for example, slope alluvium).

Bedding planes. Fine strata, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediment.

Bedding system. A drainage system made by plowing, grading, or otherwise shaping the surface of a flat field. It consists of a series of low ridges separated by shallow, parallel dead furrows.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bedrock-controlled topography. A landscape where the configuration and relief of the landforms are determined or strongly influenced by the underlying bedrock.

- Bench terrace.** A raised, level or nearly level strip of earth constructed on or nearly on a contour, supported by a barrier of rocks or similar material, and designed to make the soil suitable for tillage and to prevent accelerated erosion.
- Bisequum.** Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.
- 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.
- Breast height.** An average height of 4.5 feet above the ground surface; the point on a tree where diameter measurements are ordinarily taken.
- 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.
- 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.
- Catsteps.** Very small, irregular terraces on steep hillsides, especially in pasture, formed by the trampling of cattle or the slippage of saturated soil.
- Cement rock.** Shaly limestone used in the manufacture of cement.
- Channery soil material.** Soil material that has, 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 has 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.
- COLE (coefficient of linear extensibility).** See Linear extensibility.
- 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.

Congeliturbate. Soil material disturbed by frost action.

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. Refers to the degree of cohesion and adhesion of soil material and its resistance to deformation when ruptured. Consistence includes resistance of soil material to rupture and to penetration; plasticity, toughness, and stickiness of puddled soil material; and the manner in which the soil material behaves when subject to compression. Terms describing consistence are defined in the "Soil Survey Manual."

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.

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.

Coprogenous earth (sedimentary peat). Fecal material deposited in water by aquatic organisms.

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.

Cross-slope farming. Deliberately conducting farming operations on sloping farmland in such a way that tillage is across the general slope.

Crown. The upper part of a tree or shrub, including the living branches and their foliage.

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.

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.

Dip slope. A slope of the land surface, roughly determined by and approximately conforming to the dip of the underlying bedrock.

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, somewhat excessively drained, well drained, moderately well drained, somewhat poorly drained, poorly drained, and very poorly drained*. These classes are defined in the “Soil Survey Manual.”

Drainage, surface. Runoff, or surface flow of water, from an area.

Draw. A small stream valley that generally is more open and has broader bottom land than a ravine or gulch.

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.

Duff. A generally firm organic layer on the surface of mineral soils. It consists of fallen plant material that is in the process of decomposition and includes everything from the litter on the surface to underlying pure humus.

Ecological site. An area where climate, soil, and relief are sufficiently uniform to produce a distinct natural plant community. An ecological 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 ecological sites in kind and/or proportion of species or in total production.

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.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

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.

Extrusive rock. Igneous rock derived from deep-seated molten matter (magma) emplaced on the earth's surface.

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.

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 oven-dry

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.

Firebreak. An area cleared of flammable material to stop or help control creeping or running fires. It also serves as a line from which to work and to facilitate the movement of firefighters and equipment. Designated roads also serve as firebreaks.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flaggy soil material. Material that has, 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.

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.

Footslope. The position that forms the inner, gently inclined surface at the base of a hillslope. In profile, footslopes are commonly concave. A footslope is a transition zone between upslope sites of erosion and transport (shoulders and backslopes) and downslope sites of deposition (toeslopes).

Forb. Any herbaceous plant not a grass or a sedge.

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.

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.

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 has 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.

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.

Head out. To form a flower head.

Head slope. A geomorphic component of hills consisting of a laterally concave area of a hillside, especially at the head of a drainageway. The overland waterflow is converging.

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 humified 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.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

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.

Increasesers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasesers 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.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake, in inches per hour, is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate
1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Interfluve. An elevated area between two drainageways that sheds water to those drainageways.

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.

Kame. An irregular, short ridge or hill of stratified glacial drift.

Karst (topography). The relief of an area underlain by limestone that dissolves in differing degrees, thus forming numerous depressions or small basins.

Knoll. A small, low, rounded hill rising above adjacent landforms.

K_{sat}. Saturated hydraulic conductivity. (See Permeability.)

Lacustrine deposit. Material deposited in lake water and exposed when the water level is lowered or the elevation of the land is raised.

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.

Leaching. The removal of soluble material from soil or other material by percolating water.

Linear extensibility. Refers to the change in length of an unconfined clod as moisture content is decreased from a moist to a dry state. Linear extensibility is used to determine the shrink-swell potential of soils. It is an expression of the volume change between the water content of the clod at 1/3- or 1/10-bar tension (33kPa or 10kPa tension) and oven dryness. Volume change is influenced by the amount and type of clay minerals in the soil. The volume change is the percent change for the whole soil. If it is expressed as a fraction, the resulting value is COLE, coefficient of linear extensibility.

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.

Marl. An earthy, unconsolidated deposit consisting chiefly of calcium carbonate mixed with clay in approximately equal amounts.

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).

Muck. Dark, finely divided, well decomposed organic soil material. (See Sapric soil material.)

Mudstone. Sedimentary rock formed by induration of silt and clay in approximately equal amounts.

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.

Nose slope. A geomorphic component of hills consisting of the projecting end (laterally convex area) of a hillside. The overland waterflow is predominantly divergent.

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 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.

Pedisediment. A thin layer of alluvial material that mantles an erosion surface and has been transported to its present position from higher lying areas of the erosion surface.

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 movement of water through the soil.

Permeability. 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. In soil physics, the rate is referred to as “saturated hydraulic conductivity,” which is defined in the “Soil Survey Manual.” In line with conventional usage in the engineering profession and with traditional usage in published soil surveys, this rate of flow continues to be expressed as “permeability.” Terms describing permeability, 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

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.)

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.

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.

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.

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.

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.

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

- 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 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.
- 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.
- Road cut.** A sloping surface produced by mechanical means during road construction. It is commonly on the uphill side of the road.
- Rock fragments.** Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.
- 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 soil.** A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.
- 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.
- Scarification.** The act of abrading, scratching, loosening, crushing, or modifying the surface to increase water absorption or to provide a more tillable soil.
- Second bottom.** The first terrace above the normal flood plain (or first bottom) of a river.
- 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.
- 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.** The position that forms the uppermost inclined surface near the top of a hillslope. It is a transition from backslope to summit. The surface is dominantly convex in profile and erosional in origin.

Side slope. A geomorphic component of hills consisting of a laterally planar area of a hillside. The overland waterflow is predominantly parallel.

Silica. A combination of silicon and oxygen. The mineral form is called quartz.

Silica-sesquioxide ratio. The ratio of the number of molecules of silica to the number of molecules of alumina and iron oxide. The more highly weathered soils or their clay fractions in warm-temperate, humid regions, and especially those in the tropics, generally have a low ratio.

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.

Sinkhole. A depression in the landscape where limestone has been dissolved.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75.

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.

Slickspot. 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.

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.

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 Na^+ to $Ca^{++} + Mg^{++}$. The degrees of sodicity and their respective ratios are:

Slight	less than 13:1
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

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 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.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

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.

Strath terrace. A surface cut formed by the erosion of hard or semiconsolidated bedrock and thinly mantled with stream deposits.

Stream terrace. One of a series of platforms in a stream valley, flanking and more or less parallel to the stream channel. It originally formed near the level of the stream and is the dissected remnants of an abandoned flood plain, streambed, or valley floor that was produced during a former stage of erosion or deposition.

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 grain* (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. Any surface soil horizon (A, E, AB, or EB) below the 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.

Summit. The topographically highest position of a hillslope. It has a nearly level (planar or only slightly convex) surface.

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.

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.”

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 position that forms the gently inclined surface at the base of a hillslope. Toeslopes in profile are commonly gentle and linear and are constructional surfaces forming the lower part of a hillslope continuum that grades to valley or closed-depression floors.

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.

Trace elements. Chemical elements, for example, zinc, cobalt, manganese, copper, and iron, in soils in extremely small amounts. They are essential to plant growth.

Tuff. A compacted deposit that is 50 percent or more volcanic ash and dust.

Upland. Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Valley fill. In glaciated regions, material deposited in stream valleys by glacial meltwater. In nonglaciated regions, alluvium deposited by heavily loaded streams.

Variiegation. 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.

Water bars. Smooth, shallow ditches or depressional areas that are excavated at an angle across a sloping road. They are used to reduce the downward velocity of water and divert it off and away from the road surface. Water bars can easily be driven over if constructed properly.

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 oven-dry basis, at which a plant (specifically a sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Windthrow. The uprooting and tipping over of trees by the wind.

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