

United States Department of Agriculture



United States
Department
of the Interior



Natural Resources Conservation Service



National Park Service Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan



How To Use This Soil Survey

This publication consists of text, tables, and maps. The text includes descriptions of detailed soil map units and provides an explanation of the information presented in the tables. It also includes a glossary of terms used in the text and tables and a list of references.

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 map sheet. Note the map unit symbols that are in that area. Go to the Contents, which lists the map units by symbol and name and shows 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.

National Cooperative Soil Survey

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 has leadership for the Federal part of the National Cooperative Soil Survey.

The 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, the maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Literature Citation

The correct citation for this survey is as follows:

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Cover Caption

North Bar Lake (center of photo) lies to the north of the Empire Bluffs (in the distance). Image was taken from the Pierce Stocking Scenic Drive. North Bar Lake is surrounded by Deer Park soils that formed in dunes.

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Preface

This soil survey was developed in conjunction with the National Park Service's Soil Inventory and Monitoring Program and is intended to serve as the official source document for soils occurring within Sleeping Bear Dunes National Lakeshore, Michigan.

This soil survey contains information that affects current and future land use planning in the park. It contains predictions of soil behavior for selected land uses. The survey highlights soil limitations, actions needed to overcome the limitations, and the impact of selected land uses on the environment. It is designed to meet the needs of the National Park Service and its partners to better understand the properties of the soils in the park and the effects of these properties on various natural ecological characteristics. This knowledge can help the National Park Service and its partners to 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 on 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. The location of each map unit is shown on the detailed soil maps. Each soil in the survey area is described, and information on specific uses is given. Help in using this publication and additional information are available at the local office of the Natural Resources Conservation Service or the park office for Sleeping Bear Dunes National Lakeshore.

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

United States Department of Agriculture, Natural Resources Conservation Service, and United States Department of the Interior, National Park Service

How This Survey Was Made

This survey was made in conjunction with the National Park Service's Soil Inventory and Monitoring Program to provide information about the soils and miscellaneous areas within Sleeping Bear Dunes National Lakeshore.

The soil survey data was clipped from two county-based soil surveys: the soil survey of Benzie and Manistee Counties, Michigan (USDA-NRCS, 2008) and the soil survey of Leelanau County, Michigan (USDA-SCS, 1973). The soil survey of Benzie and Manistee Counties was mapped at a scale of 1:12,000 and was correlated in August 2005. Its data was updated in March 2010. The soil survey of Leelanau County was mapped at a scale of 1:20,000 and correlated in January 1967. Its data was partially updated in June 2003. The overall data for Leelanau County was considered out-of-date at the time this report was assembled. The data for this document was extracted in January 2013. In some instances, because data was clipped from more than one county-based set of soil maps, some same-named detailed soil map units may have more than one map symbol and their properties may vary. There are 152 different map units in the park and 642 map unit components. Two duplicate water map units were combined.

Sections of this report were reviewed by State-based staff of NRCS and by soils staff at the University of California, Davis.

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 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 occur 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.

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 delineated the boundaries of these bodies on digital imagery and identified each as a specific map unit.

Detailed Soil Map Units

The map units delineated on the detailed soil maps in this survey represent the soils or miscellaneous areas in the park. 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.

A map unit delineation on a soil map represents an area dominated by one or more major kinds of soil 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 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 minor components that belong to taxonomic classes other than those of the major soils.

Most minor 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, components. They may or may not be mentioned in a particular map unit description. Other minor components, however, have properties and behavioral characteristics divergent enough to affect use or to require different management. These are called contrasting, or dissimilar, components. They generally are in small areas and could not be mapped separately because of the scale used. Some small areas of strongly contrasting soils or miscellaneous areas are identified by a special symbol on the maps. The contrasting components are mentioned in the map unit descriptions. A few areas of minor components 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 minor components 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 maps provides sufficient information for the development of resource plans. If intensive use of small areas is planned, however, 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*. All the soils of a series have major horizons that are similar in composition, thickness, and arrangement. The soils of a given 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 map are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Deer Park sand, 6 to 18 percent slopes, is a phase of the Deer Park series.

Some map units are made up of two or more major soils or miscellaneous areas. These map units are complexes. 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 map. The pattern and proportion of the soils or miscellaneous areas are somewhat similar in all areas. Au Gres-Kalkaska sands, 0 to 4 percent slopes, is an example.

This survey includes *miscellaneous areas*. Such areas have little or no soil material and support little or no vegetation. Dune land is an example.

For some map units, component percentages do not add up to 100 percent due to the vintage of the data. In older soil surveys, components of minor extent were not assigned a component percentage.

Table 1 lists each map unit in the park, its major and minor components, and the percentage of each component in the 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.

190775—Adrian-Houghton mucks

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,495 feet

Mean annual precipitation: 25 to 35 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 60 to 140 days

Map Unit Composition

Adrian and similar soils: 55 percent Houghton and similar soils: 45 percent

Description of the Adrian Soil

Classification

Sandy or sandy-skeletal, mixed, euic, mesic Terric Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 16 to 51 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface

Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: High (about 11.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Typical Profile

Oa—0 to 8 inches; muck Oe—8 to 24 inches; muck 2Cg—24 to 60 inches; sand

Description of the Houghton Soil

Classification

Euic, mesic Typic Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: More than 51 inches of organic material Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained
Salinity maximum: Not saline
Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 23.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Typical Profile

Oa—0 to 10 inches; muck Oe—10 to 60 inches; muck

190777—Alcona-Richter sandy loams, 0 to 2 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,600 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Alcona and similar soils: 55 percent Richter and similar soils: 30 percent Dissimilar minor components: 15 percent

Description of the Alcona Soil

Classification

Coarse-loamy, mixed, active, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: Stratified sandy and loamy glaciofluvial deposits and/or

glaciolacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Water table (depth, kind): About 30 to 72 inches, perched (see table 19)

Drainage class: Moderately well drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 8.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2s

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 12 inches; loamy fine sand 12 to 18 inches; loamy sand 18 to 24 inches; sandy loam

24 to 60 inches; stratified loamy sand to sandy loam

Description of the Richter Soil

Classification

Coarse-loamy, mixed, semiactive, frigid Alfic Haplaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 25 to 40 inches of sandy and/or loamy material over stratified,

calcareous sandy and silty glaciofluvial deposits Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 to 18 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2w

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 27 inches; fine sandy loam

27 to 60 inches; stratified loamy fine sand to sandy loam

Minor Components

Hettinger soils

Percent of map unit: 15 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190778—Alcona-Richter sandy loams, 2 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Alcona and similar soils: 65 percent Richter and similar soils: 25 percent Dissimilar minor components: 10 percent

Description of the Alcona Soil

Classification

Coarse-loamy, mixed, active, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: Stratified sandy and loamy glaciofluvial deposits and/or

glaciolacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Water table (depth, kind): About 30 to 72 inches, perched (see table 19)

Drainage class: Moderately well drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 8.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 12 inches; loamy fine sand 12 to 18 inches; loamy sand 18 to 24 inches; sandy loam

24 to 60 inches; stratified loamy sand to sandy loam

Description of the Richter Soil

Classification

Coarse-loamy, mixed, semiactive, frigid Alfic Haplaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 25 to 40 inches of sandy and/or loamy material over stratified,

calcareous sandy and silty glaciofluvial deposits Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 to 18 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 27 inches; fine sandy loam

27 to 60 inches; stratified loamy fine sand to sandy loam

Minor Components

East Lake soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190779—Alpena gravelly sandy loam, 0 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,000 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 100 to 150 days

Map Unit Composition

Alpena and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Alpena Soil

Classification

Sandy-skeletal, mixed, frigid Entic Hapludolls

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 0 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 4 to 10 inches of sandy and loamy material over calcareous sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Very low (about 2.1 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 4 inches; gravelly sandy loam 4 to 60 inches; cobbly coarse sand

Minor Components

Kiva soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Slope range: 2 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 2 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190780—Au Gres-Kalkaska sands, 0 to 4 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 22 to 44 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Au Gres and similar soils: 45 percent Kalkaska and similar soils: 35 percent Dissimilar minor components: 20 percent

Description of the Au Gres Soil

Classification

Sandy, mixed, frigid Typic Endoaquods

Settino

Landform position (three-dimensional): Rise

Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 to 18 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.2 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4w

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 12 inches; sand 12 to 24 inches; sand 24 to 60 inches; sand

Description of the Kalkaska Soil

Classification

Sandy, mixed, frigid Typic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 3.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 7 inches; sand 7 to 15 inches; sand 15 to 32 inches; sand 32 to 60 inches; sand

Minor Components

Markey soils

Percent of map unit: 10 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Roscommon soils

Percent of map unit: 10 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190781—Bach loam

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 19 to 34 inches Mean annual air temperature: 36 to 46 degrees F

Frost-free period: 70 to 172 days

Map Unit Composition

Bach and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Bach Soil

Classification

Fine-loamy, mixed, semiactive, calcareous, frigid Mollic Haplaquepts

Setting

Landform: Depressions

Landform position (three-dimensional): Talf

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: Calcareous silty lacustrine deposits Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface

Drainage class: Poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: High (about 9.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Typical Profile

0 to 8 inches; loam 8 to 19 inches; silt loam

19 to 60 inches; stratified fine sand to silt

Minor Components

Edwards soils

Percent of map unit: 5 percent Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Sanilac soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190782—Deer Park sand, 6 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 695 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 41 to 45 degrees F

Frost-free period: 120 to 150 days

Map Unit Composition

Deer Park and similar soils: 100 percent

Description of the Deer Park Soil

Classification

Mixed, frigid Spodic Udipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: Sandy eolian deposits and/or lacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very low (about 2.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 1 inch; sand 1 to 4 inches; sand 4 to 60 inches; sand

190783—Deer Park sand, 18 to 45 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 695 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 41 to 45 degrees F

Frost-free period: 120 to 150 days

Map Unit Composition

Deer Park and similar soils: 100 percent

Description of the Deer Park Soil

Classification

Mixed, frigid Spodic Udipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 18 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: Sandy eolian deposits and/or lacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very low (about 2.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 1 inch; sand 1 to 4 inches; sand 4 to 60 inches; sand

190784—Deer Park-Roscommon sands, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,495 feet

Mean annual precipitation: 22 to 44 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Deer Park and similar soils: 70 percent Roscommon and similar soils: 25 percent Dissimilar minor components: 5 percent

Description of the Deer Park Soil

Classification

Mixed, frigid Spodic Udipsamments

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: Sandy eolian deposits and/or lacustrine deposits

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very low (about 2.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 1 inch; sand 1 to 4 inches; sand 4 to 60 inches; sand

Description of the Roscommon Soil

Classification

Mixed, frigid Mollic Psammaquents

Setting

Landform: Depressions

Landform position (three-dimensional): Talf

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface

Drainage class: Poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 5

Available water capacity: Low (about 4.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Typical Profile

0 to 6 inches; sand 6 to 60 inches; sand

Minor Components

Markey soils

Percent of map unit: 5 percent Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190786—Dune land

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Map Unit Composition

Dune land: 100 percent

Description of Dune Land

General

The source materials for dune land are glacial outwash and till which were reworked by wind and wave action. Areas of dune land are not stabilized by vegetation.

Setting

Slope range: 6 to 60 percent Representative aspect: North

Properties and Qualities

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

190787—East Lake loamy sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

East Lake and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Kalkaska soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190788—East Lake loamy sand, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

East Lake and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

losco soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Footslope and toeslope

Geomorphic position (three-dimensional): Base slope

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Munuscong soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Tonkey soils

Percent of map unit: 2 percent

Landform: Depressions
Representative aspect: North
Slope range: 0 to 2 percent
Down-slope shape: Linear
Across-slope shape: Linear
Meets hydric soil criteria: Yes

190789—East Lake loamy sand, 12 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

East Lake and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Kalkaska soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190790—East Lake loamy sand, 18 to 25 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

East Lake and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Kalkaska soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190791—Eastport sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 695 feet

Mean annual precipitation: 27 to 31 inches Mean annual air temperature: 43 to 46 degrees F

Frost-free period: 130 to 150 days

Map Unit Composition

Eastport and similar soils: 93 percent Dissimilar minor components: 7 percent

Description of the Eastport Soil

Classification

Mixed, frigid Spodic Udipsamments

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: Sandy eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 3.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 3 inches; sand 3 to 26 inches; sand 26 to 60 inches; sand

Minor Components

Alpena soils

Percent of map unit: 7 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 0 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190792—Edwards muck-Marl beds complex

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1.400 feet

Mean annual precipitation: 19 to 44 inches Mean annual air temperature: 36 to 46 degrees F

Frost-free period: 60 to 172 days

Map Unit Composition

Edwards and similar soils: 70 percent

Marl beds: 20 percent

Dissimilar minor components: 10 percent

Description of the Edwards Soil

Classification

Marly, euic, mesic, frigid Limnic Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 16 to 51 inches of organic material over marl deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: Frequent
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.0 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 75

Available water capacity: Very high (about 18.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Typical Profile

Oa-0 to 30 inches; muck

Lma—30 to 60 inches; marly material

Description of the Marl Beds

Setting

Landform: Depressions
Slope range: 0 to 1 percent
Representative aspect: North
Soil temperature class: Frigid
Soil temperature regime: Frigid

Properties and Qualities

Runoff: High

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None Depth to water table: At the surface Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.0 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 75

Available water capacity: Very high (about 13.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7w

Meets hydric soil criteria: Yes Hydrologic soil group: D

Typical Profile

Oa-0 to 7 inches; muck

Lma—7 to 60 inches; marly material

Minor Components

Lupton soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Markey soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190794—Emmet-Leelanau complex, 2 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,600 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Emmet and similar soils: 60 percent Leelanau and similar soils: 30 percent Dissimilar minor components: 10 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand 28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Minor Components

East Lake soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Alcona soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Nester soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190795—Emmet-Leelanau complex, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Emmet and similar soils: 60 percent Leelanau and similar soils: 30 percent Dissimilar minor components: 10 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand 28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Minor Components

East Lake soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190796—Emmet-Leelanau complex, 12 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Emmet and similar soils: 50 percent Leelanau and similar soils: 30 percent Dissimilar minor components: 20 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head slope, and side slope

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head slope, and nose slope

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand 28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Minor Components

East Lake soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 2 to 12 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Wallace soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 2 to 12 percent Down-slope shape: Linear Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Alcona soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Shoulder, backslope, footslope, and toeslope Geomorphic position (three-dimensional): Interfluve, base slope, side slope, head

slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Richter soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190797—Emmet-Leelanau complex, 18 to 25 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Emmet and similar soils: 50 percent Leelanau and similar soils: 30 percent Dissimilar minor components: 20 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head

slope, and side slope Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand 28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Minor Components

East Lake soils

Percent of map unit: 10 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 10 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190799—Emmet-Leelanau complex, 25 to 50 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Emmet and similar soils: 45 percent Leelanau and similar soils: 30 percent Dissimilar minor components: 25 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head

slope, and side slope Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand 28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Minor Components

East Lake soils

Percent of map unit: 13 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 12 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190801—Emmet-Mancelona gravelly sandy loams, 4 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 100 to 150 days

Map Unit Composition

Emmet and similar soils: 70 percent Mancelona and similar soils: 25 percent Dissimilar minor components: 5 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head

slope, and side slope Slope range: 4 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; gravelly sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Head slope, nose slope, side slope, interfluve,

base slope, and crest Slope range: 4 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; gravelly sandy loam 8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam

30 to 60 inches; very gravelly coarse sand

Minor Components

Nester soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kiva soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope, head slope, and nose slope

Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190803—Emmet-Mancelona gravelly sandy loams, 18 to 35 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 22 to 44 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 60 to 150 days

Map Unit Composition

Emmet and similar soils: 60 percent Mancelona and similar soils: 30 percent Dissimilar minor components: 10 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head

slope, and side slope Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; gravelly sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Head slope, nose slope, side slope, interfluve,

base slope, and crest Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; gravelly sandy loam 8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Minor Components

Alpena soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Backslope, footslope, and toeslope Geomorphic position (three-dimensional): Nose slope, base slope, and side slope

Representative aspect: North

Slope range: 0 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kiva soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 18 to 25 percent Down-slope shape: Linear

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Lupton soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Markey soils

Percent of map unit: 2 percent Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Nester soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190805—Emmet-Omena sandy loams, 2 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Emmet and similar soils: 50 percent Omena and similar soils: 45 percent Dissimilar minor components: 5 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Omena Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: Loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 6.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 14 inches; sandy loam 14 to 60 inches; sandy loam

Minor Components

Kiva soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Nester soils

Percent of map unit: 1 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190806—Emmet-Omena sandy loams, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,600 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Emmet and similar soils: 50 percent Omena and similar soils: 45 percent Dissimilar minor components: 5 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Omena Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: Loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 6.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 14 inches; sandy loam 14 to 60 inches; sandy loam

Minor Components

Hettinger soils

Percent of map unit: 1 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Kiva soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent

Down-slope shape: Linear and convex

Across-slope shape: Linea, convex, and concave

Meets hydric soil criteria: No

Tonkey soils

Percent of map unit: 1 percent Landform: Depressions Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190807—Emmet-Omena sandy loams, 12 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches

Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Emmet and similar soils: 50 percent Omena and similar soils: 45 percent Dissimilar minor components: 5 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Omena Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: Loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 6.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 14 inches; sandy loam 14 to 60 inches; sandy loam

Minor Components

Kiva soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent Down-slope shape: Linear

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190808—Emmet-Omena sandy loams, 18 to 25 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Emmet and similar soils: 50 percent Omena and similar soils: 45 percent Dissimilar minor components: 5 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head

slope, and side slope Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Omena Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: High

Parent material: Loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 6.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 14 inches; sandy loam 14 to 60 inches; sandy loam

Minor Components

Kiva soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 18 to 25 percent Down-slope shape: Linear

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190809—Emmet-Omena sandy loams, 25 to 50 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Emmet and similar soils: 50 percent Omena and similar soils: 45 percent Dissimilar minor components: 5 percent

Description of the Emmet Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, base slope, nose slope, head

slope, and side slope Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 24 to 50 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 26 inches; sandy loam 26 to 32 inches; sandy clay loam 32 to 60 inches; sandy loam

Description of the Omena Soil

Classification

Coarse-loamy, mixed, active, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: High

Parent material: Loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None

Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 6.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 14 inches; sandy loam 14 to 60 inches; sandy loam

Minor Components

Kiva soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 18 to 25 percent Down-slope shape: Linear

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190811—Hettinger-Muck complex

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,600 feet

Mean annual precipitation: 19 to 44 inches Mean annual air temperature: 36 to 46 degrees F

Frost-free period: 60 to 172 days

Map Unit Composition

Hettinger and similar soils: 45 percent

Muck: 30 percent

Dissimilar minor components: 25 percent

Description of the Hettinger Soil

Classification

Fine-loamy, mixed, active, nonacid, frigid Mollic Haplaquepts

Setting

Landform: Depressions

Landform position (three-dimensional): Talf

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 12 to 36 inches of fine-loamy material over stratified, calcareous silty

and clayey glaciolacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained
Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 25

Available water capacity: High (about 10.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: C/D

Typical Profile

0 to 8 inches; loam

8 to 23 inches; silty clay loam

23 to 60 inches; stratified clay loam to silty clay loam

Description of Muck

Setting

Landform: Depressions Slope range: 0 to 2 percent

Properties and Qualities

Runoff: Very low

Parent material: Organic material

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the surface
Drainage class: Very poorly drained

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Typical Profile

Oa1—0 to 11 inches; muck Oa2—11 to 23 inches; muck 2C—23 to 60 inches; loam

Minor Components

Kiva soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Lupton soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Mancelona soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Markey soils

Percent of map unit: 3 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Tonkey soils

Percent of map unit: 3 percent Landform: Depressions Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Edwards soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Roscommon soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190812—Hettinger-Tonkey loams

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,600 feet

Mean annual precipitation: 22 to 44 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 60 to 150 days

Map Unit Composition

Hettinger and similar soils: 45 percent Tonkey and similar soils: 30 percent Dissimilar minor components: 25 percent

Description of the Hettinger Soil

Classification

Fine-loamy, mixed, active, nonacid, frigid Mollic Haplaquepts

Setting

Landform: Depressions

Landform position (three-dimensional): Talf

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 12 to 36 inches of fine-loamy material over stratified, calcareous silty

and clayey glaciolacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: Frequent

Depth to water table: At the soil surface

Drainage class: Poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 25

Available water capacity: High (about 10.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: C/D

Typical Profile

0 to 8 inches; loam

8 to 23 inches; silty clay loam

23 to 60 inches; stratified clay loam to silty clay loam

Description of the Tonkey Soil

Classification

Coarse-loamy, mixed, semiactive, nonacid, frigid Mollic Haplaquepts

Setting

Landform: Depressions
Slope range: 0 to 2 percent
Down-slope shape: Linear
Across-slope shape: Linear
Representative aspect: North
Soil temperature class: Frigid
Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: Stratified loamy and sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface

Drainage class: Poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 5

Available water capacity: Moderate (about 8.1 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Typical Profile

0 to 8 inches; loam

8 to 20 inches; loamy sand

20 to 60 inches; stratified sand to sandy loam

Minor Components

Mancelona soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Markey soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Munuscong soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Roscommon soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Lupton soils

Percent of map unit: 3 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Epoufette soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190814—Kalkaska sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Kalkaska and similar soils: 85 percent Dissimilar minor components: 15 percent

Description of the Kalkaska Soil

Classification

Sandy, mixed, frigid Typic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 3.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 7 inches; sand 7 to 15 inches; sand 15 to 32 inches; sand 32 to 60 inches; sand

Minor Components

Au Gres soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

East Lake soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

losco soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Munuscong soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Tonkey soils

Percent of map unit: 2 percent Landform: Depressions Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190815—Kalkaska sand, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Kalkaska and similar soils: 85 percent Dissimilar minor components: 15 percent

Description of the Kalkaska Soil

Classification

Sandy, mixed, frigid Typic Haplorthods

Settina

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 3.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 7 inches; sand 7 to 15 inches; sand 15 to 32 inches; sand 32 to 60 inches; sand

Minor Components

East Lake soils

Percent of map unit: 5 percent Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Emmet soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, base slope, nose slope,

head slope, and side slope Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190816—Kalkaska sand, 12 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Kalkaska and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Kalkaska Soil

Classification

Sandy, mixed, frigid Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 3.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 7 inches; sand 7 to 15 inches; sand 15 to 32 inches; sand 32 to 60 inches; sand

Minor Components

East Lake soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Alcona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Shoulder, backslope, footslope, and toeslope Geomorphic position (three-dimensional): Interfluve, base slope, side slope, head

slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190817—Kalkaska sand, 18 to 25 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Kalkaska and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Kalkaska Soil

Classification

Sandy, mixed, frigid Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 3.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 7 inches; sand 7 to 15 inches; sand 15 to 32 inches; sand 32 to 60 inches; sand

Minor Components

East Lake soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope, head slope, and nose slope

Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Emmet soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, base slope, nose slope,

head slope, and side slope Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190818—Kalkaska sand, 25 to 45 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Kalkaska and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Kalkaska Soil

Classification

Sandy, mixed, frigid Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 25 to 45 percent

Down-slope shape: Linear and convex

Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 3.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 7 inches; sand 7 to 15 inches; sand 15 to 32 inches; sand 32 to 60 inches; sand

Minor Components

East Lake soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Deer Park soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Wallace soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 2 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190819—Kalkaska-East Lake loamy sands, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Kalkaska and similar soils: 55 percent East Lake and similar soils: 35 percent Dissimilar minor components: 10 percent

Description of the Kalkaska Soil

Classification

Sandy, mixed, frigid Typic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None

Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 7 inches; loamy sand 7 to 15 inches; sand 15 to 32 inches; sand 32 to 60 inches; sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Alcona soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Richter soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190820—Kiva-Mancelona gravelly sandy loams, 2 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,000 feet

Mean annual precipitation: 27 to 32 inches

Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 100 to 150 days

Map Unit Composition

Kiva and similar soils: 65 percent Mancelona and similar soils: 30 percent Dissimilar minor components: 5 percent

Description of the Kiva Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 10 to 24 inches of loamy material over sandy and gravelly glaciofluvial

deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 6 inches; gravelly sandy loam 6 to 20 inches; gravelly sandy loam 20 to 60 inches; gravelly coarse sand

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches
Drainage class: Somewhat excessively drained
Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; gravelly sandy loam

8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Minor Components

Alpena soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190821—Kiva-Mancelona gravelly sandy loams, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,600 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Kiva and similar soils: 50 percent Mancelona and similar soils: 30 percent Dissimilar minor components: 20 percent

Description of the Kiva Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 10 to 24 inches of loamy material over sandy and gravelly glaciofluvial

deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 6 inches; gravelly sandy loam 6 to 20 inches; gravelly sandy loam 20 to 60 inches; gravelly coarse sand

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Head slope, nose slope, side slope, interfluve,

base slope, and crest Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; gravelly sandy loam

8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Minor Components

Alcona soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Alpena soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 0 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Emmet soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, base slope, nose slope, head slope, and side slope

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Richter soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190823—Kiva-Mancelona gravelly sandy loams, 18 to 25 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches

Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Kiva and similar soils: 50 percent Mancelona and similar soils: 30 percent Dissimilar minor components: 20 percent

Description of the Kiva Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 18 to 25 percent Down-slope shape: Linear

Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: High

Parent material: 10 to 24 inches of loamy material over sandy and gravelly glaciofluvial

deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 6 inches; gravelly sandy loam 6 to 20 inches; gravelly sandy loam 20 to 60 inches; gravelly coarse sand

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Head slope, nose slope, side slope, interfluve,

base slope, and crest Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; gravelly sandy loam

8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Minor Components

Alpena soils

Percent of map unit: 10 percent

Geomorphic position (two-dimensional): Backslope, footslope, and toeslope Geomorphic position (three-dimensional): Nose slope, base slope, and side slope

Representative aspect: North Slope range: 0 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 10 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190824—Lake beaches

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Map Unit Composition

Lake beaches: 100 percent

Description of Lake Beaches

General

This map unit occurs along the lake and is non-vegetated.

Settina

Slope range: 0 to 13 percent Representative aspect: North

190825—Lake bluffs

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Map Unit Composition

Lake bluffs: 100 percent

Description of Lake Bluffs

General

This map unit occurs along steep bluffs and is non-vegetated.

Setting

Slope range: 20 to 30 percent Representative aspect: North

190826—Leelanau-East Lake loamy sands, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Leelanau and similar soils: 60 percent East Lake and similar soils: 30 percent Dissimilar minor components: 10 percent

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand

28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Alcona soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent

Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190827—Leelanau-East Lake loamy sands, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Leelanau and similar soils: 65 percent East Lake and similar soils: 25 percent Dissimilar minor components: 10 percent

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand 28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Mancelona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Alcona soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Richter soils

Percent of map unit: 1 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear

Across-slope shape: Linear Meets hydric soil criteria: No

Tonkey soils

Percent of map unit: 1 percent Landform: Depressions Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190828—Leelanau-East Lake loamy sands, 12 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches

Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Leelanau and similar soils: 65 percent East Lake and similar soils: 25 percent Dissimilar minor components: 10 percent

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand 28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Alcona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Shoulder, backslope, footslope, and toeslope Geomorphic position (three-dimensional): Interfluve, base slope, side slope, head

slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190829—Leelanau-East Lake loamy sands, 18 to 25 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Leelanau and similar soils: 50 percent East Lake and similar soils: 35 percent Dissimilar minor components: 15 percent

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand 28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Kalkaska soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope, interfluve, base slope, and crest

Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Alcona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Interfluve, base slope, side slope, and nose

slope

Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190830—Leelanau-East Lake loamy sands, 25 to 45 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 36 inches Mean annual air temperature: 39 to 50 degrees F

Frost-free period: 70 to 180 days

Map Unit Composition

Leelanau and similar soils: 50 percent East Lake and similar soils: 35 percent Dissimilar minor components: 15 percent

Description of the Leelanau Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head slope, and nose slope

Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 52 inches of sandy and loamy material over calcareous sandy

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 28 inches; loamy sand 28 to 36 inches; sandy loam 36 to 60 inches; loamy sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Alcona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Interfluve, base slope, side slope, and nose

slope

Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Mancelona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Head slope, nose slope, side slope,

interfluve, base slope, and crest

Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nester soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Wind eroded land

Percent of map unit: 3 percent Representative aspect: North Slope range: 12 to 45 percent

190831—Lupton-Markey mucks

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,495 feet

Mean annual precipitation: 19 to 44 inches Mean annual air temperature: 36 to 46 degrees F

Frost-free period: 60 to 172 days

Map Unit Composition

Lupton and similar soils: 60 percent Markey and similar soils: 30 percent Dissimilar minor components: 10 percent

Description of the Lupton Soil

Classification

Euic, frigid Typic Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: More than 51 inches of organic material Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained
Salinity maximum: Not saline

Sodicity maximum: Not sodic Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 23.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Typical Profile

Oa1—0 to 10 inches; muck Oa2—10 to 60 inches; muck

Description of the Markey Soil

Classification

Sandy or sandy-skeletal, mixed, euic, frigid Terric Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 16 to 51 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 3

Available water capacity: High (about 10.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Typical Profile

Oa—0 to 20 inches; muck 2C—20 to 60 inches; sand

Minor Components

Edwards soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Roscommon soils

Percent of map unit: 5 percent Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190832—Mancelona sandy loam, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 100 to 150 days

Map Unit Composition

Mancelona and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; sandy loam 8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Minor Components

East Lake soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kiva soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Nester soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190833—Mancelona sandy loam, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Mancelona and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Head slope, nose slope, side slope, interfluve,

base slope, and crest Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; sandy loam 8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Minor Components

East Lake soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kiva soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190834—Mancelona-East Lake loamy sands, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Mancelona and similar soils: 60 percent East Lake and similar soils: 30 percent Dissimilar minor components: 10 percent

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None

Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Kalkaska soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 25 to 45 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kiva soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Sanilac soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190835—Mancelona-East Lake loamy sands, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Mancelona and similar soils: 55 percent East Lake and similar soils: 35 percent Dissimilar minor components: 10 percent

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Head slope, nose slope, side slope, interfluve,

base slope, and crest Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Alpena soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 0 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kiva soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Tonkey soils

Percent of map unit: 1 percent Landform: Depressions Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190836—Mancelona-East Lake loamy sands, 12 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Mancelona and similar soils: 50 percent East Lake and similar soils: 30 percent Dissimilar minor components: 20 percent

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Head slope, nose slope, side slope, interfluve,

base slope, and crest Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None

Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Kalkaska soils

Percent of map unit: 10 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Kiva soils

Percent of map unit: 10 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent Down-slope shape: Linear

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190837—Mancelona-East Lake loamy sands, 18 to 25 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 25 to 35 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 60 to 150 days

Map Unit Composition

Mancelona and similar soils: 45 percent East Lake and similar soils: 30 percent Dissimilar minor components: 25 percent

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Head slope, nose slope, side slope, interfluve,

base slope, and crest Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None

Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Kalkaska soils

Percent of map unit: 10 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Kiva soils

Percent of map unit: 10 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 18 to 25 percent Down-slope shape: Linear

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Adrian soils

Percent of map unit: 3 percent Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Houghton soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190838—Mancelona-East Lake loamy sands, 25 to 45 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Mancelona and similar soils: 50 percent East Lake and similar soils: 30 percent Dissimilar minor components: 20 percent

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Head slope, nose slope, side slope, interfluve,

base slope, and crest Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Description of the East Lake Soil

Classification

Sandy, mixed, frigid Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; loamy sand 8 to 26 inches; loamy sand

26 to 60 inches; gravelly coarse sand

Minor Components

Emmet soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, base slope, nose slope,

head slope, and side slope Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Slope range: 25 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Kiva soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 18 to 25 percent Down-slope shape: Linear

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190839—Mancelona-Richter gravelly sandy loams, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,600 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Mancelona and similar soils: 70 percent Richter and similar soils: 25 percent Dissimilar minor components: 5 percent

Description of the Mancelona Soil

Classification

Sandy, mixed, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 18 to 40 inches of sandy and/or gravelly material over calcareous

sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 18

Available water capacity: Low (about 3.8 inches)

Interpretive Groups

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 8 inches; gravelly sandy loam

8 to 25 inches; loamy sand

25 to 30 inches; gravelly sandy loam 30 to 60 inches; very gravelly coarse sand

Description of the Richter Soil

Classification

Coarse-loamy, mixed, semiactive, frigid Alfic Haplaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 25 to 40 inches of sandy and/or loamy material over stratified,

calcareous sandy and silty glaciofluvial deposits Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 to 18 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 27 inches; fine sandy loam

27 to 60 inches; stratified loamy fine sand to sandy loam

Minor Components

Epoufette soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Tonkey soils

Percent of map unit: 2 percent

Landform: Depressions
Representative aspect: North
Slope range: 0 to 2 percent
Down-slope shape: Linear
Across-slope shape: Linear
Meets hydric soil criteria: Yes

Wallace soils

Percent of map unit: 1 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Convex Meets hydric soil criteria: No

190840—Nester silt loam, 2 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Nester and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Nester Soil

Classification

Fine, mixed, semiactive, frigid Typic Eutroboralfs

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: High

Parent material: 20 to 36 inches of loamy and clayey material over calcareous loamy

and clayey till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 25

Available water capacity: Moderate (about 8.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: C

Typical Profile

0 to 6 inches; silt loam 6 to 8 inches; silt loam 8 to 28 inches; silty clay loam 28 to 60 inches; silty clay loam

Minor Components

Emmet soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Sanilac soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190841—Nester silt loam, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Nester and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Nester Soil

Classification

Fine, mixed, semiactive, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very high

Parent material: 20 to 36 inches of loamy and clayey material over calcareous loamy

and clayey till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 25

Available water capacity: Moderate (about 8.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: C

Typical Profile

0 to 6 inches; silt loam 6 to 8 inches; silt loam

8 to 28 inches; silty clay loam 28 to 60 inches; silty clay loam

Minor Components

Emmet soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, base slope, nose slope,

head slope, and side slope Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Omena soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

190842—Nester silt loam, 12 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 36 inches Mean annual air temperature: 39 to 50 degrees F

Frost-free period: 70 to 180 days

Map Unit Composition

Nester and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Nester Soil

Classification

Fine, mixed, semiactive, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very high

Parent material: 20 to 36 inches of loamy and clayey material over calcareous loamy

and clayey till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 25

Available water capacity: Moderate (about 8.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: C

Typical Profile

0 to 6 inches; silt loam 6 to 8 inches; silt loam

8 to 28 inches; silty clay loam 28 to 60 inches; silty clay loam

Minor Components

Emmet soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, base slope, nose slope,

head slope, and side slope Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Omena soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Wind eroded land

Percent of map unit: 1 percent Representative aspect: North Slope range: 12 to 18 percent

190843—Nester silt loam, 18 to 25 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 27 to 32 inches Mean annual air temperature: 41 to 46 degrees F

Frost-free period: 90 to 150 days

Map Unit Composition

Nester and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Nester Soil

Classification

Fine, mixed, semiactive, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very high

Parent material: 20 to 36 inches of loamy and clayey material over calcareous loamy

and clayey till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 25

Available water capacity: Moderate (about 8.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: C

Typical Profile

0 to 6 inches; silt loam 6 to 8 inches; silt loam

8 to 28 inches; silty clay loam 28 to 60 inches; silty clay loam

Minor Components

Emmet soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, base slope, nose slope,

head slope, and side slope Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Omena soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 25 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190844—Nester silt loam, 25 to 50 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches

Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Nester and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Nester Soil

Classification

Fine, mixed, semiactive, frigid Typic Eutroboralfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very high

Parent material: 20 to 36 inches of loamy and clayey material over calcareous loamy

and clayey till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 25

Available water capacity: Moderate (about 8.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: C

Typical Profile

0 to 6 inches; silt loam 6 to 8 inches; silt loam

8 to 28 inches; silty clay loam 28 to 60 inches; silty clay loam

Minor Components

Emmet soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, base slope, nose slope, head slope, and side slope

Representative aspect: South

Aspect range: Southeast to southwest (clockwise)

Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Leelanau soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Omena soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 25 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 25 to 45 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

190846—Pits, gravel

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Map Unit Composition

Pits: 100 percent

Description of Pits

This map unit consists of areas of old, inactive gravel pits.

190847—Richter-Alcona sandy loams, 0 to 2 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,600 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Richter and similar soils: 45 percent Alcona and similar soils: 40 percent Dissimilar minor components: 15 percent

Description of the Richter Soil

Classification

Coarse-loamy, mixed, semiactive, frigid Alfic Haplaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 25 to 40 inches of sandy and/or loamy material over stratified,

calcareous sandy and silty glaciofluvial deposits Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 to 18 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2w

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 27 inches; fine sandy loam

27 to 60 inches; stratified loamy fine sand to sandy loam

Description of the Alcona Soil

Classification

Coarse-loamy, mixed, active, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: Stratified sandy and loamy glaciofluvial deposits and/or

glaciolacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 8.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2s

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 12 inches; loamy fine sand 12 to 18 inches; loamy sand 18 to 24 inches; sandy loam

24 to 60 inches; stratified loamy sand to sandy loam

Minor Components

Tonkey soils

Percent of map unit: 15 percent

Landform: Depressions
Representative aspect: North
Slope range: 0 to 2 percent
Down-slope shape: Linear
Across-slope shape: Linear
Meets hydric soil criteria: Yes

190848—Richter-Alcona sandy loams, 2 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,600 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Richter and similar soils: 45 percent Alcona and similar soils: 40 percent Dissimilar minor components: 15 percent

Description of the Richter Soil

Classification

Coarse-loamy, mixed, semiactive, frigid Alfic Haplaguods

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 25 to 40 inches of sandy and/or loamy material over stratified,

calcareous sandy and silty glaciofluvial deposits Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 to 18 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Moderate (about 7.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 27 inches; fine sandy loam

27 to 60 inches; stratified loamy fine sand to sandy loam

Description of the Alcona Soil

Classification

Coarse-loamy, mixed, active, frigid Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: Stratified sandy and loamy glaciofluvial deposits and/or

glaciolacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 8.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sandy loam 8 to 12 inches; loamy fine sand 12 to 18 inches; loamy sand 18 to 24 inches; sandy loam

24 to 60 inches; stratified loamy sand to sandy loam

Minor Components

Tonkey soils

Percent of map unit: 10 percent Landform: Depressions Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Nester soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190849—Roscommon sand-Markey muck

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 22 to 44 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Roscommon and similar soils: 50 percent Markey and similar soils: 30 percent Dissimilar minor components: 20 percent

Description of the Roscommon Soil

Classification

Mixed, frigid Mollic Psammaguents

Setting

Landform: Depressions

Landform position (three-dimensional): Talf

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 5

Available water capacity: Low (about 4.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Typical Profile

0 to 6 inches; sand 6 to 60 inches; sand

Description of the Markey Soil

Classification

Sandy or sandy-skeletal, mixed, euic, frigid Terric Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: 16 to 51 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 3

Available water capacity: High (about 10.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Typical Profile

Oa—0 to 20 inches; muck 2C—20 to 60 inches; sand

Minor Components

Au Gres soils

Percent of map unit: 10 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

East Lake soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190850—Sanilac silt loam, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,400 feet

Mean annual precipitation: 19 to 34 inches Mean annual air temperature: 36 to 46 degrees F

Frost-free period: 70 to 172 days

Map Unit Composition

Sanilac and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Sanilac Soil

Classification

Fine-loamy, mixed, semiactive, calcareous, frigid Aeric Endoaquepts

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: Calcareous silty lacustrine deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: Occasional Frequency of ponding: None

Depth to water table: About 12 to 18 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: High (about 10.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: C

Typical Profile

0 to 6 inches; silt loam 6 to 16 inches; silt loam 16 to 24 inches; silt loam

24 to 60 inches; stratified very fine sand to silt loam

Minor Components

Bach soils

Percent of map unit: 4 percent Landform: Depressions Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Epoufette soils

Percent of map unit: 3 percent Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Hettinger soils

Percent of map unit: 2 percent Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Edwards soils

Percent of map unit: 1 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190851—Tonkey-Munuscong-losco sandy loams, 0 to 2 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Tonkey and similar soils: 40 percent Munuscong and similar soils: 25 percent losco and similar soils: 25 percent

Dissimilar minor components: 10 percent

Description of the Tonkey Soil

Classification

Coarse-loamy, mixed, semiactive, nonacid, frigid Mollic Haplaguepts

Setting

Landform: Depressions
Slope range: 0 to 2 percent
Down-slope shape: Linear
Across-slope shape: Linear
Representative aspect: North
Soil temperature class: Frigid
Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: Stratified loamy and sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface

Drainage class: Poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 5

Available water capacity: Moderate (about 7.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Typical Profile

0 to 8 inches; sandy loam 8 to 20 inches; fine sandy loam

20 to 60 inches; stratified sand to sandy loam

Description of the Munuscong Soil

Classification

Coarse-loamy over clayey, mixed, active, nonacid, frigid Mollic Haplaquepts

Setting

Landform: Depressions

Landform position (three-dimensional): Talf

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 20 to 40 inches of loamy material over clayey lacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None

Frequency of ponding: Frequent Depth to water table: At the soil surface

Drainage class: Poorly drained

Shrink-swell potential: High (about 7.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 8.2 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Typical Profile

0 to 10 inches; sandy loam 10 to 24 inches; fine sandy loam

24 to 60 inches; silty clay

Description of the losco Soil

Classification

Sandy over loamy, mixed, active, frigid Argic Endoaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy glaciofluvial deposits over loamy till or

glacialacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 to 18 inches (see table 19)

Drainage class: Somewhat poorly drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 23

Available water capacity: Moderate (about 8.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3w

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; loamy sand 8 to 27 inches; sand

27 to 34 inches; silty clay loam 34 to 60 inches; silty clay loam

Minor Components

Au Gres soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Nester soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

190852—Tonkey-Munuscong-losco sandy loams, 2 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 34 inches Mean annual air temperature: 39 to 46 degrees F

Frost-free period: 70 to 150 days

Map Unit Composition

Tonkey and similar soils: 35 percent Munuscong and similar soils: 30 percent losco and similar soils: 20 percent

Dissimilar minor components: 15 percent

Description of the Tonkey Soil

Classification

Coarse-loamy, mixed, semiactive, nonacid, frigid Mollic Haplaquepts

Setting

Landform: Depressions
Slope range: 0 to 2 percent
Down-slope shape: Linear
Across-slope shape: Linear
Representative aspect: North

Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: Stratified loamy and sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface

Drainage class: Poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 5

Available water capacity: Moderate (about 7.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Typical Profile

0 to 8 inches; sandy loam 8 to 20 inches; fine sandy loam

20 to 60 inches; stratified sand to sandy loam

Description of the Munuscong Soil

Classification

Coarse-loamy over clayey, mixed, active, nonacid, frigid Mollic Haplaquepts

Setting

Landform: Depressions

Landform position (three-dimensional): Talf

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Medium

Parent material: 20 to 40 inches of loamy material over clayey lacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface

Drainage class: Poorly drained

Shrink-swell potential: High (about 7.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 8.2 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Typical Profile

0 to 10 inches; sandy loam 10 to 24 inches; fine sandy loam 24 to 60 inches; silty clay

Description of the Iosco Soil

Classification

Sandy over loamy, mixed, active, frigid Argic Endoaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy glaciofluvial deposits over loamy till or

glacialacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 to 18 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 23

Available water capacity: Moderate (about 8.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3w

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; loamy sand 8 to 27 inches; sand

27 to 34 inches; silty clay loam 34 to 60 inches; silty clay loam

Minor Components

Au Gres soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kalkaska soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Nester soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 2 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Hettinger soils

Percent of map unit: 3 percent

Landform: Depressions

Geomorphic position (three-dimensional): Talf

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

190853-Water

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Map Unit Composition

Water: 100 percent

Description of Water

This map unit consists of lakes, ponds, and streams.

190854—Wallace-Kalkaska sands, 2 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,895 feet

Mean annual precipitation: 27 to 36 inches Mean annual air temperature: 39 to 50 degrees F

Frost-free period: 70 to 180 days

Map Unit Composition

Wallace and similar soils: 50 percent Kalkaska and similar soils: 45 percent Dissimilar minor components: 5 percent

Description of the Wallace Soil

Classification

Sandy, mixed, frigid, shallow, ortstein Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 2 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Low

Parent material: Sandy deposits with ortstein on glaciofluvial, eolian, and/or

glaciolacustrine deposits

Restrictive feature(s): Ortstein at a depth of 8 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very low (about 0.6 inch)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

0 to 8 inches; sand 8 to 24 inches; sand 24 to 60 inches; sand

Description of the Kalkaska Soil

Classification

Sandy, mixed, frigid Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 2 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Frigid Soil temperature regime: Frigid

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 3.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

0 to 7 inches; sand 7 to 15 inches; sand 15 to 32 inches; sand 32 to 60 inches; sand

Minor Components

Eastport soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Wind eroded land

Percent of map unit: 2 percent Representative aspect: North Slope range: 0 to 12 percent

190855—Wind eroded land, sloping

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,000 feet

Mean annual precipitation: 28 to 36 inches Mean annual air temperature: 39 to 50 degrees F

Frost-free period: 100 to 180 days

Map Unit Composition

Wind eroded land: 100 percent

Description of Wind Eroded Land

General

This map unit is a non-soil area that has no stabilizing vegetation.

Setting

Slope range: 0 to 12 percent Representative aspect: North

Properties and Qualities

Runoff: Very low

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.2 inches)

190856—Wind eroded land, steep

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 600 to 1,000 feet

Mean annual precipitation: 28 to 36 inches Mean annual air temperature: 39 to 50 degrees F

Frost-free period: 100 to 180 days

Map Unit Composition

Wind eroded land: 100 percent

Description of Wind Eroded Land

General

This map unit is a non-soil area that has no stabilizing vegetation.

Setting

Slope range: 12 to 45 percent Representative aspect: North

Properties and Qualities

Runoff: Low

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.2 inches)

193236—Beaches

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Mean annual precipitation: 27 to 38 inches

Mean annual air temperature: 37 to 55 degrees F

Map Unit Composition

Beaches: 100 percent

Description of Beaches

This map unit consists of non-soil areas that are not stabilized by vegetation.

193237—Thompsonville-Milnichol fine sands, 0 to 3 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Thompsonville and similar soils: 50 percent Milnichol and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Thompsonville Soil

Classification

Sandy, mixed, mesic Alfic Oxyaquic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 40 to 60 inches of sandy glaciofluvial deposits over stratified loamy

and silty materials

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 18 inches (see table 19)

Drainage class: Moderately well drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 8.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Bunchberry dogwood, pink lady's slipper, wintergreen, western brackenfern, and lowbush blueberry

Typical Profile

A—0 to 5 inches; fine sand E—5 to 15 inches; fine sand Bs1—15 to 29 inches; fine sand Bs2—29 to 37 inches; fine sand Bs3—37 to 55 inches; sand

2B/E-55 to 72 inches; silty clay loam

2C-72 to 80 inches; stratified very fine sandy loam to silty clay loam

Description of the Milnichol Soil

Classification

Sandy, mixed, mesic Typic Epiaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 40 to 60 inches of sandy glaciofluvial deposits over loamy alluvium

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 8.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4w

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Bunchberry dogwood, wintergreen, partridgeberry, western brackenfern, American starflower, and Canada mayflower

Typical Profile

A—0 to 2 inches; fine sand E—2 to 12 inches; fine sand Bhs—12 to 15 inches; fine sand Bs1—15 to 25 inches; fine sand Bs2—25 to 33 inches; fine sand C—33 to 47 inches; fine sand

2C1-47 to 50 inches; stratified loamy fine sand to fine sandy loam

2C2—50 to 68 inches; silty clay loam 2C3—68 to 80 inches; silt loam

Minor Components

Covert soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Pipestone soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193255—Spinks-Coloma sands, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent Coloma and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent

Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Description of the Coloma Soil

Classification

Mixed, mesic Lamellic Udipsamments

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None

Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 3 inches; sand
E—3 to 4 inches; sand
Bw1—4 to 8 inches; sand
Bw2—8 to 15 inches; sand
Bw3—15 to 25 inches; sand
Bw4—25 to 40 inches; sand
E and Bt—40 to 80 inches; sand

Minor Components

Shavenaugh soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Benona soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193256—Spinks-Coloma sands, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent Coloma and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Description of the Coloma Soil

Classification

Mixed, mesic Lamellic Udipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 3 inches; sand
E—3 to 4 inches; sand
Bw1—4 to 8 inches; sand
Bw2—8 to 15 inches; sand
Bw3—15 to 25 inches; sand
Bw4—25 to 40 inches; sand
E and Bt—40 to 80 inches; sand

Minor Components

Shavenaugh soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Benona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

193257—Spinks-Coloma sands, 12 to 18 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 55 percent Coloma and similar soils: 35 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy vellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand

C-72 to 80 inches; sand

Description of the Coloma Soil

Classification

Mixed, mesic Lamellic Udipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, Canada mayflower

Typical Profile

A—0 to 3 inches; sand
E—3 to 4 inches; sand
Bw1—4 to 8 inches; sand
Bw2—8 to 15 inches; sand
Bw3—15 to 25 inches; sand
Bw4—25 to 40 inches; sand
E and Bt—40 to 80 inches; sand

Minor Components

Shavenaugh soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Benona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193258—Spinks-Coloma sands, 18 to 35 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent Coloma and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Settina

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Description of the Coloma Soil

Classification

Mixed, mesic Lamellic Udipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 3 inches; sand
E—3 to 4 inches; sand
Bw1—4 to 8 inches; sand
Bw2—8 to 15 inches; sand
Bw3—15 to 25 inches; sand
Bw4—25 to 40 inches; sand
E and Bt—40 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193260—Copemish sand, 3 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 27 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Copemish and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Copemish Soil

Classification

Sandy, mixed, mesic, ortstein Entic Haplorthods

Setting

Landform: Beach ridges and outwash plains

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 3 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Ortstein in sandy glaciofluvial deposits Restrictive feature(s): Ortstein at a depth of 8 to 14 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very low (about 0.8 inch)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Velvetleaf huckleberry, lowbush blueberry, Canada mayflower, wintergreen, and western brackenfern

Typical Profile

A—0 to 2 inches; sand E1—2 to 7 inches; sand E2—7 to 11 inches; sand Bs1—11 to 28 inches; sand Bs2—28 to 36 inches; sand C—36 to 80 inches; sand

Minor Components

Covert soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Backslope, footslope, and toeslope Geomorphic position (three-dimensional): Side slope and base slope

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 3 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Saugatuck soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Footslope and toeslope

Geomorphic position (three-dimensional): Base slope

Representative aspect: North Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193262—Kaleva sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Kaleva and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Kaleva Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Canada mayflower, mapleleaf viburnum, American starflower, bloodroot, trillium, sweet cicely, spinulose shield fern, western brackenfern, and trout lily

Typical Profile

A—0 to 3 inches; sand E—3 to 9 inches; sand Bhs—9 to 11 inches; sand Bs1—11 to 16 inches; sand Bs2—16 to 21 inches; sand C1—21 to 70 inches; sand C2—70 to 80 inches; sand

Minor Components

Benzonia soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Nessen soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 1 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193263—Kaleva sand, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Kaleva and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Kaleva Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Spinulose shield fern, trout lily, Canada mayflower, sweet cicely, western brackenfern, bloodroot, American starflower, trillium, and mapleleaf viburnum

Typical Profile

A-0 to 3 inches; sand

E—3 to 9 inches; sand Bhs—9 to 11 inches; sand Bs1—11 to 16 inches; sand Bs2—16 to 21 inches; sand C1—21 to 70 inches; sand C2—70 to 80 inches; sand

Minor Components

Benzonia soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Nessen soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 1 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

193265—Grattan sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Grattan and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Grattan Soil

Classification

Sandy, mixed, mesic Entic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Hawthorn, serviceberry, bigleaf aster, sweet cicely, wintergreen, Canada yew, lowbush blueberry, trillium, Canada mayflower, western brackenfern, and American starflower

Typical Profile

A—0 to 4 inches; sand E—4 to 13 inches; sand Bs1—13 to 18 inches; sand Bs2—18 to 25 inches; sand BC—25 to 53 inches; sand C—53 to 80 inches; sand

Minor Components

Kaleva soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear Meets hydric soil criteria: No

Shavenaugh soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193266—Grattan sand, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Grattan and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Grattan Soil

Classification

Sandy, mixed, mesic Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head slope, and nose slope

Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0 Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Serviceberry, bigleaf aster, hawthorn, wintergreen, sweet cicely, western brackenfern, Canada yew, American starflower, trillium, lowbush blueberry, and Canada mayflower

Typical Profile

A—0 to 4 inches; sand E—4 to 13 inches; sand Bs1—13 to 18 inches; sand Bs2—18 to 25 inches; sand BC—25 to 53 inches; sand C—53 to 80 inches; sand

Minor Components

Kaleva soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Shavenaugh soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

193267—Grattan sand, 12 to 18 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches

Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Grattan and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Grattan Soil

Classification

Sandy, mixed, mesic Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Serviceberry, bigleaf aster, hawthorn, wintergreen, sweet cicely, western brackenfern, Canada yew, American starflower, trillium, lowbush blueberry, and Canada mayflower

Typical Profile

A—0 to 4 inches; sand E—4 to 13 inches; sand Bs1—13 to 18 inches; sand Bs2—18 to 25 inches; sand BC—25 to 53 inches; sand C—53 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Shavenaugh soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193269—Grattan sand, 35 to 50 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Grattan and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Grattan Soil

Classification

Sandy, mixed, mesic Entic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Serviceberry, bigleaf aster, hawthorn, wintergreen, sweet cicely, western brackenfern, Canada yew, American starflower, trillium, lowbush blueberry, and Canada mayflower

Typical Profile

A—0 to 4 inches; sand E—4 to 13 inches; sand Bs1—13 to 18 inches; sand Bs2—18 to 25 inches; sand BC—25 to 53 inches; sand C—53 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193270—Covert sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Covert and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Covert Soil

Classification

Sandy, mixed, mesic Oxyaquic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 24 inches (see table 19)

Drainage class: Moderately well drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.1 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Bunchberry dogwood, pink lady's slipper, wintergreen, western brackenfern, and lowbush blueberry

Typical Profile

A—0 to 1 inch; sand E—1 to 8 inches; sand Bs1—8 to 18 inches; sand Bs2—18 to 25 inches; sand BC—25 to 29 inches; sand C1—29 to 38 inches; sand C2—38 to 47 inches; sand C3—47 to 80 inches; sand

Minor Components

Grattan soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Pipestone soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Saugatuck soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Shavenaugh soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193271—Pipestone sand, 0 to 4 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Pipestone and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Pipestone Soil

Classification

Sandy, mixed, mesic Typic Endoaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4w

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Bunchberry dogwood, wintergreen, Canada mayflower, partridgeberry, western brackenfern, and American starflower

Typical Profile

A—0 to 2 inches; sand E—2 to 9 inches; sand Bhs—9 to 12 inches; sand Bs—12 to 24 inches; sand BC—24 to 32 inches; sand C—32 to 80 inches; sand

Minor Components

Saugatuck soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 3 percent Down-slope shape: Linear

Across-slope shape: Linear Meets hydric soil criteria: No

Covert soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Dair soils

Percent of map unit: 3 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

193272—Dair muck

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Dair and similar soils: 90 percent

Dissimilar minor components: 10 percent

Description of the Dair Soil

Classification

Mixed, mesic Typic Psammaquents

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 4 to 8 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 6.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Sedge, redosier dogwood, speckled alder, sensitive fern, blueflag iris, and yellow marsh marigold

Typical Profile

Oa-0 to 4 inches; muck

A-4 to 7 inches; mucky sandy loam

Bw—7 to 11 inches; sand C—11 to 21 inches; sand Cg1—21 to 50 inches; sand Cg2—50 to 80 inches; sand

Minor Components

Adrian soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Pipestone soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193277—Benona sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches

Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benona and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Benona Soil

Classification

Sandy, mixed, mesic Lamellic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 6.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, currant, twistedstalk, trillium, Canada mayflower, sweet cicely, trout lily, wild sarsaparilla, common ladyfern, western brackenfern, and spinulose shield fern

Typical Profile

A—0 to 2 inches; sand
E—2 to 6 inches; sand
Bs1—6 to 9 inches; sand
Bs2—9 to 17 inches; sand
Bw—17 to 28 inches; sand
E′—28 to 46 inches; sand
E and Bt—46 to 80 inches; sand

Minor Components

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Shavenaugh soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193278—Benona sand, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benona and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Benona Soil

Classification

Sandy, mixed, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 6.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Spinulose shield fern, western brackenfern, common ladyfern, wild sarsaparilla, trout lily, sweet cicely, Canada mayflower, baneberry, currant, twistedstalk, and trillium

Typical Profile

A—0 to 2 inches; sand
E—2 to 6 inches; sand
Bs1—6 to 9 inches; sand
Bs2—9 to 17 inches; sand
Bw—17 to 28 inches; sand
E'—28 to 46 inches; sand
E and Bt—46 to 80 inches; sand

Minor Components

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 3 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Shavenaugh soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

193279—Benona sand, 12 to 18 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benona and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Benona Soil

Classification

Sandy, mixed, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 6.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Spinulose shield fern, western brackenfern, common ladyfern, wild sarsaparilla, trout lily, sweet cicely, Canada mayflower, baneberry, currant, twistedstalk, and trillium

Typical Profile

A—0 to 2 inches; sand
E—2 to 6 inches; sand
Bs1—6 to 9 inches; sand
Bs2—9 to 17 inches; sand
Bw—17 to 28 inches; sand
E´—28 to 46 inches; sand
E and Bt—46 to 80 inches; sand

Minor Components

Coloma soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Fogg soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Shavenaugh soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193284—Udorthents-Udipsamments complex, very steep

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Udorthents and similar soils: 55 percent Udipsamments and similar soils: 35 percent Dissimilar minor components: 10 percent

Description of the Udorthents

Classification

Udorthents

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, side slope, base slope, head slope,

interfluve, and nose slope Slope range: 35 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North

Soil temperature class: Not used Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very high

Parent material: Loamy and/or clayey material

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 16.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: B

Typical Profile

AC-0 to 80 inches; sandy loam

Description of the Udipsamments

Classification

Udipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, side slope, base slope, head slope,

interfluve, and nose slope Slope range: 35 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Not used Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy material

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

AC-0 to 80 inches; sand

Minor Components

Coloma soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 35 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Filer soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193285—Lumley-Makinen complex

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Lumley and similar soils: 55 percent Makinen and similar soils: 40 percent Dissimilar minor components: 5 percent

Description of the Lumley Soil

Classification

Dysic, mesic Typic Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent

Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: More than 51 inches of acid organic material Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 0.0 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 33.1 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Leatherleaf, bog Labrador tea, and sphagnum

Typical Profile

Oi1—0 to 3 inches; peat Oi2—3 to 6 inches; peat Oa1—6 to 8 inches; muck Oa2—8 to 20 inches; muck Oa3—20 to 45 inches; muck Oa4—45 to 53 inches; muck Oa5—53 to 80 inches; muck

Description of the Makinen Soil

Classification

Sandy or sandy-skeletal, mixed, dysic, mesic Terric Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 16 to 51 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: Frequent

Depth to water table: At the soil surface Drainage class: Very poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 15.4 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Leatherleaf, bog Labrador tea, and sphagnum

Typical Profile

Oa1—0 to 4 inches; muck Oa2—4 to 14 inches; muck Oa3—14 to 22 inches; muck Oa4—22 to 31 inches; muck C—31 to 80 inches; sand

Minor Components

Saugatuck soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193286—Histosols and Aquents, ponded

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Histosols and similar soils: 55 percent Aquents and similar soils: 45 percent

Description of the Histosols

Classification

Histosols

Setting

Landform: Marshes

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 16 to more than 51 inches of organic material Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 0.0 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 20.1 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 8w

Meets hydric soil criteria: Yes Hydrologic soil group: D

Typical Profile

Oa—0 to 45 inches; muck C—45 to 80 inches; sand

Description of the Aquents

Classification

Aquents

Setting

Landform: Marshes

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Wet glaciofluvial deposits and/or glaciolacustrine deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: Frequent Depth to water table: At the soil si

Depth to water table: At the soil surface Drainage class: Very poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 8w

Meets hydric soil criteria: Yes Hydrologic soil group: D

Typical Profile

AC-0 to 80 inches; sand

193287—Dune land-Quartzipsamments complex, hilly to very steep

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Dune land: 55 percent

Quartzipsamments and similar soils: 40 percent

Dissimilar minor components: 5 percent

Description of Dune Land

General

This map unit component consists of non-soil areas that have no stabilizing vegetation.

Setting

Slope range: 18 to 70 percent Representative aspect: North

Properties and Qualities

Runoff: Low

Parent material: Eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Description of the Quartzipsamments

Classification

Quartzipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 35 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy eolian deposits and/or glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.0 inches)

Interpretive Groups

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

AC-0 to 80 inches; sand

Minor Components

Nordhouse soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193288—Udipsamments, nearly level and undulating

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Udipsamments and similar soils: 100 percent

Description of the Udipsamments

Classification

Udipsamments

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent

Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy material

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

AC-0 to 80 inches; sand

193342—Gorvan-Houghton-Glendora complex, frequently flooded

Map Unit Setting

Major land resource areas (MLRA): 96—Western Michigan Fruit Belt; 98—Southern

Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Gorvan and similar soils: 35 percent Houghton and similar soils: 30 percent Glendora and similar soils: 20 percent Dissimilar minor components: 15 percent

Description of the Gorvan Soil

Classification

Fine-loamy over sandy or sandy-skeletal, mixed, semiactive, mesic Fluvaquentic Endoaquolls

Setting

Landform: Flood plains

Landform position (three-dimensional): Talf

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Silty and clayey alluvium over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: Frequent
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained
Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 5

Available water capacity: Moderate (about 8.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Vegetation

Existing plants: Grape, poison ivy, horsetail, mint, and willow

Typical Profile

A1—0 to 4 inches; silt loam A2—4 to 11 inches; silt loam Cg—11 to 27 inches; silt loam 2Cg—27 to 80 inches; sand

Description of the Houghton Soil

Classification

Euic, mesic Typic Haplosaprists

Setting

Landform: Flood plains

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: More than 51 inches of organic material Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: Frequent
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 0.0 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 32.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Vegetation

Existing plants: Willow, mint, horsetail, poison ivy, and grape

Typical Profile

Oa1—0 to 12 inches; muck Oa2—12 to 26 inches; muck Oa3—26 to 80 inches; muck

Description of the Glendora Soil

Classification

Mixed, mesic Mollic Psammaquents

Setting

Landform: Flood plains

Landform position (three-dimensional): Talf

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy alluvium

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: Frequent
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Willow, mint, horsetail, poison ivy, and grape

Typical Profile

A—0 to 6 inches; mucky loamy sand Cg1—6 to 9 inches; loamy sand Cg2—9 to 30 inches; sand Cg3—30 to 80 inches; sand

Minor Components

Abscota soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Adrian soils

Percent of map unit: 5 percent

Landform: Flood plains

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Dair soils

Percent of map unit: 3 percent

Landform: Flood plains

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Aquents

Percent of map unit: 2 percent Landform: Flood plains

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

193349—Spinks-Coloma sands, 35 to 70 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent Coloma and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 35 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy vellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand

C-72 to 80 inches; sand

Description of the Coloma Soil

Classification

Mixed, mesic Lamellic Udipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 35 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 3 inches; sand
E—3 to 4 inches; sand
Bw1—4 to 8 inches; sand
Bw2—8 to 15 inches; sand
Bw3—15 to 25 inches; sand
Bw4—25 to 40 inches; sand
E and Bt—40 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193351—Benona sand, 18 to 35 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benona and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Benona Soil

Classification

Sandy, mixed, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 6.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Spinulose shield fern, western brackenfern, common ladyfern, wild sarsaparilla, trout lily, sweet cicely, Canada mayflower, baneberry, currant, twistedstalk, and trillium

Typical Profile

A—0 to 2 inches; sand
E—2 to 6 inches; sand
Bs1—6 to 9 inches; sand
Bs2—9 to 17 inches; sand
Bw—17 to 28 inches; sand
E´—28 to 46 inches; sand
E and Bt—46 to 80 inches; sand

Minor Components

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Fogg soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193354—Dune land-Quartzipsamments complex, undulating to hilly

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Dune land: 50 percent

Quartzipsamments and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of Dune Land

General

This map unit component consists of non-soil areas that have no stabilizing vegetation.

Setting

Slope range: 6 to 18 percent Representative aspect: North

Properties and Qualities

Runoff: Low

Parent material: Eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Description of the Quartzipsamments

Classification

Quartzipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 6 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy eolian deposits and/or glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.0 inches)

Interpretive Groups

Meets hydric soil criteria: No Hydrologic soil group: A

Typical Profile

AC-0 to 80 inches; sand

Minor Components

Nordhouse soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 6 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Goodharbor soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 1 to 12 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Platteriver soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Footslope and toeslope Geomorphic position (three-dimensional): Base slope and side slope

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193357—Shavenaugh sand, 18 to 35 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Shavenaugh and similar soils: 85 percent Dissimilar minor components: 15 percent

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Mapleleaf viburnum, rattlesnake fern, dutchman's breeches, trout lily, springbeauty, bloodroot, hepatica, sweet cicely, wild leek, trillium, blue cohosh, and common ladyfern

Typical Profile

A—0 to 5 inches; sand E—5 to 8 inches; sand Bw1—8 to 16 inches; sand Bw2—16 to 28 inches; sand Bw3—28 to 34 inches; sand Bt—34 to 44 inches; loamy sand

2C-44 to 80 inches; very gravelly sand

Minor Components

Nessen soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Kaleva soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193359—Shavenaugh sand, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Shavenaugh and similar soils: 85 percent Dissimilar minor components: 15 percent

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Mapleleaf viburnum, rattlesnake fern, dutchman's breeches, trout lily, springbeauty, bloodroot, hepatica, sweet cicely, wild leek, trillium, blue cohosh, and common ladyfern

Typical Profile

A—0 to 5 inches; sand
E—5 to 8 inches; sand
Bw1—8 to 16 inches; sand
Bw2—16 to 28 inches; sand
Bw3—28 to 34 inches; sand
Bt—34 to 44 inches; loamy sand
2C—44 to 80 inches; very gravelly sand

Minor Components

Nessen soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kaleva soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

193360—Shavenaugh sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern

Indiana Drift Plain Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Shavenaugh and similar soils: 85 percent Dissimilar minor components: 15 percent

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Common ladyfern, western brackenfern, blue cohosh, sweet cicely, hepatica, bloodroot, trillium, wild leek, springbeauty, trout lily, dutchman's breeches, rattlesnake fern, and mapleleaf viburnum

Typical Profile

A—0 to 5 inches; sand
E—5 to 8 inches; sand
Bw1—8 to 16 inches; sand
Bw2—16 to 28 inches; sand
Bw3—28 to 34 inches; sand
Bt—34 to 44 inches; loamy sand
2C—44 to 80 inches; very gravelly sand

Minor Components

Nessen soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kaleva soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193362—Benzonia sand, 18 to 35 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benzonia and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North

Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Dutchman's breeches, wild leek, springbeauty, bloodroot, twistedstalk, serviceberry, trout lily, western brackenfern, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand
E—5 to 11 inches; sand
Bhs1—11 to 15 inches; sand
Bhs2—15 to 20 inches; sand
Bs1—20 to 27 inches; sand
Bs2—27 to 35 inches; sand
E and Bt—35 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Fogg soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193363—Benzonia sand, 12 to 18 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benzonia and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North

Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Dutchman's breeches, wild leek, springbeauty, bloodroot, twistedstalk, serviceberry, trout lily, western brackenfern, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand
E—5 to 11 inches; sand
Bhs1—11 to 15 inches; sand
Bhs2—15 to 20 inches; sand
Bs1—20 to 27 inches; sand
Bs2—27 to 35 inches; sand
E and Bt—35 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Fogg soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193364—Benzonia sand, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benzonia and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Dutchman's breeches, wild leek, springbeauty, bloodroot, twistedstalk, serviceberry, trout lily, western brackenfern, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand E—5 to 11 inches; sand Bhs1—11 to 15 inches; sand Bhs2—15 to 20 inches; sand Bs1—20 to 27 inches; sand Bs2—27 to 35 inches; sand E and Bt—35 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kaleva soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Nessen soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

193365—Benzonia sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benzonia and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Trillium, western brackenfern, trout lily, bellwort, serviceberry, twistedstalk, bloodroot, springbeauty, wild leek, dutchman's breeches, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand E—5 to 11 inches; sand Bhs1—11 to 15 inches; sand Bhs2—15 to 20 inches; sand Bs1—20 to 27 inches; sand Bs2—27 to 35 inches; sand E and Bt—35 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kaleva soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Nessen soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear Meets hydric soil criteria: No

193371—Dair-Pipestone complex, 0 to 2 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Dair and similar soils: 50 percent Pipestone and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Dair Soil

Classification

Mixed, mesic Typic Psammaguents

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 4 to 8 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 6.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Speckled alder, yellow marsh marigold, sedge, redosier dogwood, blueflag iris, and sensitive fern

Typical Profile

Oa-0 to 4 inches; muck

A-4 to 7 inches; mucky sandy loam

Bw—7 to 11 inches; sand C—11 to 21 inches; sand Cg1—21 to 50 inches; sand Cg2—50 to 80 inches; sand

Description of the Pipestone Soil

Classification

Sandy, mixed, mesic Typic Endoaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4w

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Bunchberry dogwood, wintergreen, partridgeberry, western brackenfern, American starflower, and Canada mayflower

Typical Profile

A—0 to 2 inches; sand E—2 to 9 inches; sand Bhs—9 to 12 inches; sand Bs—12 to 24 inches; sand BC—24 to 32 inches; sand C—32 to 80 inches; sand

Minor Components

Covert soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Houghton soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

193372—Access Denied

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Map Unit Composition

Access Denied: 100 percent

Description of Access Denied

This map unit consists of areas that were not mapped because access to the property was denied.

193423—Benona sand, 35 to 70 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benona and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Benona Soil

Classification

Sandy, mixed, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 35 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North

Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 6.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Spinulose shield fern, western brackenfern, common ladyfern, wild sarsaparilla, trout lily, sweet cicely, Canada mayflower, baneberry, currant, twistedstalk, and trillium

Typical Profile

A—0 to 2 inches; sand
E—2 to 6 inches; sand
Bs1—6 to 9 inches; sand
Bs2—9 to 17 inches; sand
Bw—17 to 28 inches; sand
E´—28 to 46 inches; sand
E and Bt—46 to 80 inches; sand

Minor Components

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Fogg soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193484—Pits, sand and gravel

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Pits, sand and gravel: 100 percent

Description Pits, Sand and Gravel

Areas of this map unit consist of abandoned sand and gravel pits.

193494—Nordhouse sand, 18 to 70 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Nordhouse and similar soils: 100 percent

Description of the Nordhouse Soil

Classification

Mesic, uncoated Spodic Quartzipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 18 to 70 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.2 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Canada yew, mapleleaf viburnum, twistedstalk, sweet cicely, blueberry, and Canada mayflower

Typical Profile

A—0 to 3 inches; sand E—3 to 11 inches; sand Bs—11 to 40 inches; sand C1—40 to 60 inches; sand C2—60 to 80 inches; sand

193496—Nordhouse sand, 6 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Nordhouse and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Nordhouse Soil

Classification

Mesic, uncoated Spodic Quartzipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 6 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Parent material: Sandy eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.2 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Canada yew, mapleleaf viburnum, twistedstalk, sweet cicely, blueberry, and Canada mayflower

Typical Profile

A—0 to 3 inches; sand E—3 to 11 inches; sand Bs—11 to 40 inches; sand C1—40 to 60 inches; sand C2—60 to 80 inches; sand

Minor Components

Platteriver soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Footslope and toeslope Geomorphic position (three-dimensional): Side slope and base slope

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Dair soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (two-dimensional): Toeslope

Geomorphic position (three-dimensional): Base slope and dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

193497—Nordhouse sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Nordhouse and similar soils: 95 percent Dissimilar minor components: 5 percent

Description of the Nordhouse Soil

Classification

Mesic, uncoated Spodic Quartzipsamments

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.2 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Canada yew, mapleleaf viburnum, twistedstalk, sweet cicely, blueberry, and Canada mayflower

Typical Profile

A—0 to 3 inches; sand E—3 to 11 inches; sand Bs—11 to 40 inches; sand C1—40 to 60 inches; sand C2—60 to 80 inches; sand

Minor Components

Platteriver soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent

Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Dair soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

193498—Nordhouse-Platteriver-Dair complex, 0 to 6 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Nordhouse and similar soils: 40 percent Platteriver and similar soils: 35 percent Dair and similar soils: 25 percent

Description of the Nordhouse Soil

Classification

Mesic, uncoated Spodic Quartzipsamments

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.2 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Canada yew, mapleleaf viburnum, twistedstalk, sweet cicely, blueberry, and Canada mayflower

Typical Profile

A—0 to 3 inches; sand E—3 to 11 inches; sand Bs—11 to 40 inches; sand C1—40 to 60 inches; sand C2—60 to 80 inches; sand

Description of the Platteriver Soil

Classification

Mixed, mesic Oxyaquic Udipsamments

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 18 inches (see table 19)

Drainage class: Moderately well drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Bunchberry dogwood, pink lady's slipper, wintergreen, western brackenfern, lowbush blueberry, kinnikinnick

Typical Profile

Oa—0 to 1 inch; highly decomposed plant material

A—1 to 3 inches; sand

E—3 to 14 inches; sand Bw1—14 to 20 inches; sand Bw2—20 to 29 inches; sand C—29 to 80 inches; sand

Description of the Dair Soil

Classification

Mixed, mesic Typic Psammaquents

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 4 to 8 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface

Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 6.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Speckled alder, yellow marsh marigold, sedge, redosier dogwood,

blueflag iris, and sensitive fern

Typical Profile

Oa-0 to 4 inches; muck

A-4 to 7 inches; mucky sandy loam

Bw—7 to 11 inches; sand C—11 to 21 inches; sand Cg1—21 to 50 inches; sand Cg2—50 to 80 inches; sand

193503—Spinks-Shavenaugh sands, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent Shavenaugh and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Blackberry, baneberry, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, bloodroot, mapleleaf viburnum, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, blackberry, bloodroot, goldenrod, trillium, mapleleaf viburnum, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand
E—5 to 8 inches; sand
Bw1—8 to 16 inches; sand
Bw2—16 to 28 inches; sand
Bw3—28 to 34 inches; sand
Bt—34 to 44 inches; loamy sand
2C—44 to 80 inches; very gravelly sand

Minor Components

Coloma soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193504—Spinks-Shavenaugh sands, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent Shavenaugh and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, blackberry, bloodroot, goldenrod, trillium, mapleleaf viburnum, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, blackberry, bloodroot, goldenrod, trillium, mapleleaf viburnum, and downy yellow violet

Typical Profile

A—0 to 5 inches; sand
E—5 to 8 inches; sand
Bw1—8 to 16 inches; sand
Bw2—16 to 28 inches; sand
Bw3—28 to 34 inches; sand
Bt—34 to 44 inches; loamy sand

2C-44 to 80 inches; very gravelly sand

Minor Components

Coloma soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North

Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

193505—Spinks-Shavenaugh sands, 12 to 18 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent Shavenaugh and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, blackberry, bloodroot, goldenrod, trillium, mapleleaf viburnum, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet

cicely, western brackenfern, blackberry, bloodroot, goldenrod, trillium, mapleleaf viburnum, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand
E—5 to 8 inches; sand
Bw1—8 to 16 inches; sand
Bw2—16 to 28 inches; sand
Bw3—28 to 34 inches; sand
Bt—34 to 44 inches; loamy sand

2C-44 to 80 inches; very gravelly sand

Minor Components

Coloma soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193506—Spinks-Shavenaugh sands, 18 to 35 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent Shavenaugh and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, blackberry, bloodroot, goldenrod, trillium, mapleleaf viburnum, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, blackberry, bloodroot, goldenrod, trillium, mapleleaf viburnum, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand E—5 to 8 inches; sand Bw1—8 to 16 inches; sand Bw2—16 to 28 inches; sand Bw3—28 to 34 inches; sand Bt—34 to 44 inches; loamy sand

2C-44 to 80 inches; very gravelly sand

Minor Components

Coloma soils

Percent of map unit: 6 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193507—Spinks-Shavenaugh sands, 35 to 50 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent Shavenaugh and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, blackberry, bloodroot, goldenrod, trillium, mapleleaf viburnum, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, blackberry, bloodroot, goldenrod, trillium, mapleleaf viburnum, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand
E—5 to 8 inches; sand
Bw1—8 to 16 inches; sand
Bw2—16 to 28 inches; sand
Bw3—28 to 34 inches; sand
Bt—34 to 44 inches; loamy sand

2C-44 to 80 inches; very gravelly sand

Minor Components

Coloma soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193508—Madaus muck

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Madaus and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Madaus Soil

Classification

Coarse-silty over sandy or sandy-skeletal, carbonatic over mixed, mesic Histic Humaquepts

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Less than 16 inches of organic material over silty marl over sandy

glaciofluvial deposits over clayey lacustrine deposits Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained
Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 60

Available water capacity: Very high (about 13.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Vegetation

Existing plants: Jack in the pulpit, sedge, dogwood, common elderberry, and poison sumac

Typical Profile

Oa—0 to 12 inches; muck

Lca1—12 to 34 inches; marly silt loam Lca2—34 to 38 inches; marly silt loam

2C—38 to 62 inches; sand 3C—62 to 80 inches; clay

Minor Components

Dair soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Houghton soils

Percent of map unit: 5 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

193509—Boyer-Shavenaugh complex, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Boyer and similar soils: 50 percent Shavenaugh and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Boyer Soil

Classification

Coarse-loamy, mixed, semiactive, mesic Typic Hapludalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of loamy and sandy material over calcareous sandy

and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Moderate (about 6.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, bloodroot, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 3 inches; fine sandy loam E—3 to 4 inches; gravelly sandy loam Bt1—4 to 14 inches; gravelly sandy loam Bt2—14 to 30 inches; gravelly sandy loam 2C1—30 to 45 inches; very gravelly sand

2C2—45 to 80 inches; stratified gravelly sand to sand

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, bloodroot, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 5 inches; sand
E—5 to 8 inches; sand
Bw1—8 to 16 inches; sand
Bw2—16 to 28 inches; sand
Bw3—28 to 34 inches; sand
Bt—34 to 44 inches; loamy sand
2C—44 to 80 inches; very gravelly sand

Minor Components

Nessen soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Covert soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear Meets hydric soil criteria: No

193510—Boyer-Shavenaugh complex, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Boyer and similar soils: 50 percent Shavenaugh and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Boyer Soil

Classification

Coarse-loamy, mixed, semiactive, mesic Typic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Medium

Parent material: 20 to 40 inches of loamy and sandy material over calcareous sandy

and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Moderate (about 6.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, bloodroot, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 3 inches; fine sandy loam
E—3 to 4 inches; gravelly sandy loam
Bt1—4 to 14 inches; gravelly sandy loam
Bt2—14 to 30 inches; gravelly sandy loam
2C1—30 to 45 inches; very gravelly sand

2C2-45 to 80 inches; stratified gravelly sand to sand

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, bloodroot, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 5 inches; sand E—5 to 8 inches; sand Bw1—8 to 16 inches; sand Bw2—16 to 28 inches; sand Bw3—28 to 34 inches; sand Bt—34 to 44 inches; loamy sand

2C—44 to 80 inches; very gravelly sand

Minor Components

Coloma soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Nessen soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

193511—Boyer-Shavenaugh complex, 18 to 35 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Boyer and similar soils: 50 percent Shavenaugh and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Boyer Soil

Classification

Coarse-loamy, mixed, semiactive, mesic Typic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: High

Parent material: 20 to 40 inches of loamy and sandy material over calcareous sandy

and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Moderate (about 6.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, bloodroot, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 3 inches; fine sandy loam
E—3 to 4 inches; gravelly sandy loam
Bt1—4 to 14 inches; gravelly sandy loam
Bt2—14 to 30 inches; gravelly sandy loam
2C1—30 to 45 inches; very gravelly sand

2C2—45 to 80 inches; stratified gravelly sand to sand

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, bloodroot, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 5 inches; sand E—5 to 8 inches; sand Bw1—8 to 16 inches; sand Bw2—16 to 28 inches; sand Bw3—28 to 34 inches; sand Bt—34 to 44 inches; loamy sand 2C—44 to 80 inches; very gravelly sand

Minor Components

Coloma soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nessen soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

193513—Dair-Adrian mucks

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Dair and similar soils: 50 percent Adrian and similar soils: 45 percent Dissimilar minor components: 5 percent

Description of the Dair Soil

Classification

Mixed, mesic Typic Psammaquents

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 4 to 8 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained
Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 6.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Speckled alder, yellow marsh marigold, sedge, redosier dogwood, blueflag iris, sensitive fern, Jack in the pulpit, goldthread, horsetail, rush, willow, and cattail

Typical Profile

Oa-0 to 4 inches; muck

A-4 to 7 inches; mucky sandy loam

Bw—7 to 11 inches; sand C—11 to 21 inches; sand Cg1—21 to 50 inches; sand Cg2—50 to 80 inches; sand

Description of the Adrian Soil

Classification

Sandy or sandy-skeletal, mixed, euic, mesic Terric Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 16 to 51 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained
Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 16.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Speckled alder, Jack in the pulpit, yellow marsh marigold, sedge, redosier dogwood, goldthread, horsetail, blueflag iris, rush, sensitive fern, willow, and cattail

Typical Profile

Oa1—0 to 7 inches; muck Oa2—7 to 20 inches; muck Oa3—20 to 35 inches; muck Cg—35 to 80 inches; sand

Minor Components

Covert soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

193514—Platteriver-Pipestone sands, 0 to 4 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Platteriver and similar soils: 55 percent Pipestone and similar soils: 40 percent Dissimilar minor components: 5 percent

Description of the Platteriver Soil

Classification

Mixed, mesic Oxyaquic Udipsamments

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 18 inches (see table 19)

Drainage class: Moderately well drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 4.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Kinnikinnick, bunchberry dogwood, pink lady's slipper, wintergreen, western brackenfern, and lowbush blueberry

Typical Profile

Oa—0 to 1 inch; highly decomposed plant material

A—1 to 3 inches; sand E—3 to 14 inches; sand Bw1—14 to 20 inches; sand Bw2—20 to 29 inches; sand C—29 to 80 inches; sand

Description of the Pipestone Soil

Classification

Sandy, mixed, mesic Typic Endoaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4w

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Bunchberry dogwood, wintergreen, partridgeberry, western brackenfern, American starflower, and Canada mayflower

Typical Profile

A—0 to 2 inches; sand E—2 to 9 inches; sand Bhs—9 to 12 inches; sand Bs—12 to 24 inches; sand BC—24 to 32 inches; sand C—32 to 80 inches; sand

Minor Components

Dair soils

Percent of map unit: 5 percent Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

202010—Houghton-Adrian mucks

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Houghton and similar soils: 55 percent Adrian and similar soils: 40 percent Dissimilar minor components: 5 percent

Description of the Houghton Soil

Classification

Euic, mesic Typic Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: More than 51 inches of organic material Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 0.0 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 32.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: B/D

Vegetation

Existing plants: Speckled alder, cattail, sedge, blueflag iris, goldthread, redosier dogwood, rush, Jack in the pulpit, horsetail, and willow

Typical Profile

Oa1—0 to 12 inches; muck Oa2—12 to 26 inches; muck Oa3—26 to 80 inches; muck

Description of the Adrian Soil

Classification

Sandy or sandy-skeletal, mixed, euic, mesic Terric Haplosaprists

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 16 to 51 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained
Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Very high (about 16.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Speckled alder, cattail, sedge, blueflag iris, goldthread, redosier dogwood, rush, Jack in the pulpit, horsetail, and willow

Typical Profile

Oa1—0 to 7 inches; muck Oa2—7 to 20 inches; muck

Oa3—20 to 35 inches; muck Cg—35 to 80 inches; sand

Minor Components

Dair soils

Percent of map unit: 5 percent Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

202016—Spinks-Tekenink, sandy substratum, complex, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent

Tekenink, sandy substratum and similar soils: 40 percent

Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline

Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Description of the Tekenink, Sandy Substratum Soil

Classification

Coarse-loamy, mixed, semiactive, mesic Typic Glossudalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 60 to 80 inches of loamy and/or sandy till over sandy glaciofluvial

deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Moderate (about 8.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 8 inches; loamy fine sand E—8 to 16 inches; loamy fine sand Bw—16 to 21 inches; sandy loam E/B—21 to 49 inches; loamy sand Bt—49 to 62 inches; sandy loam 2C1—62 to 72 inches; loamy sand 2C2—72 to 80 inches; sand

Minor Components

Coloma soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Remus soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Shavenaugh soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

631170—Fogg-Benzonia sands, 35 to 50 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fogg and similar soils: 50 percent Benzonia and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Fogg Soil

Classification

Sandy, mixed, mesic Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 40 to 60 inches of sandy glaciofluvial deposits over loamy till over

sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 7.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Jack in the pulpit, kinnikinnick, springbeauty, dutchman's breeches, trout lily, wintergreen, sweet cicely, bloodroot, false Solomon's seal, twistedstalk, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 2 inches; sand E—2 to 7 inches; sand Bhs—7 to 13 inches; sand Bs1—13 to 21 inches; sand Bs2—21 to 34 inches; sand

E/B—34 to 43 inches; loamy fine sand B/E—43 to 48 inches; sandy loam Bt—48 to 55 inches; sandy loam

E and Bt—55 to 80 inches; sand

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Jack in the pulpit, kinnikinnick, springbeauty, dutchman's breeches, trout lily, wintergreen, sweet cicely, bloodroot, false Solomon's seal, twistedstalk, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand
E—5 to 11 inches; sand
Bhs1—11 to 15 inches; sand
Bhs2—15 to 20 inches; sand
Bs1—20 to 27 inches; sand
Bs2—27 to 35 inches; sand
E and Bt—35 to 80 inches; sand

Minor Components

Mollineaux soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

631171—Fogg-Benzonia sands, 18 to 35 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fogg and similar soils: 50 percent Benzonia and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Fogg Soil

Classification

Sandy, mixed, mesic Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 7.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Jack in the pulpit, kinnikinnick, springbeauty, dutchman's breeches, trout lily, wintergreen, sweet cicely, bloodroot, false Solomon's seal, twistedstalk, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 2 inches; sand E—2 to 7 inches; sand Bhs—7 to 13 inches; sand Bs1—13 to 21 inches; sand Bs2—21 to 34 inches; sand

E/B—34 to 43 inches; loamy fine sand B/E—43 to 48 inches; sandy loam Bt—48 to 55 inches; sandy loam E and Bt—55 to 80 inches; sand

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Jack in the pulpit, kinnikinnick, springbeauty, dutchman's breeches, trout lily, wintergreen, sweet cicely, bloodroot, false Solomon's seal, twistedstalk, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand E—5 to 11 inches; sand Bhs1—11 to 15 inches; sand Bhs2—15 to 20 inches; sand Bs1—20 to 27 inches; sand Bs2—27 to 35 inches; sand E and Bt—35 to 80 inches; sand

Minor Components

Mollineaux soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

631172—Fogg-Benzonia sands, 12 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fogg and similar soils: 50 percent Benzonia and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Fogg Soil

Classification

Sandy, mixed, mesic Alfic Haplorthods

Settina

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 40 to 60 inches of sandy glaciofluvial deposits over loamy till over

sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 7.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Jack in the pulpit, kinnikinnick, springbeauty, dutchman's breeches, trout lily, wintergreen, sweet cicely, bloodroot, false Solomon's seal, twistedstalk, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 2 inches; sand E—2 to 7 inches; sand Bhs—7 to 13 inches; sand Bs1—13 to 21 inches; sand Bs2—21 to 34 inches; sand

E/B—34 to 43 inches; loamy fine sand B/E—43 to 48 inches; sandy loam Bt—48 to 55 inches; sandy loam E and Bt—55 to 80 inches; sand

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches
Drainage class: Somewhat excessively drained
Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Jack in the pulpit, kinnikinnick, springbeauty, dutchman's breeches, trout lily, wintergreen, sweet cicely, bloodroot, false Solomon's seal, twistedstalk, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand E—5 to 11 inches; sand Bhs1—11 to 15 inches; sand Bhs2—15 to 20 inches; sand Bs1—20 to 27 inches; sand Bs2—27 to 35 inches; sand E and Bt—35 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Mollineaux soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

631173—Fogg-Benzonia sands, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches

Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fogg and similar soils: 50 percent Benzonia and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Fogg Soil

Classification

Sandy, mixed, mesic Alfic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 40 to 60 inches of sandy glaciofluvial deposits over loamy till over

sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 7.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Jack in the pulpit, kinnikinnick, springbeauty, dutchman's breeches, trout lily, wintergreen, sweet cicely, bloodroot, false Solomon's seal, twistedstalk, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 2 inches; sand E—2 to 7 inches; sand Bhs—7 to 13 inches; sand Bs1—13 to 21 inches; sand Bs2—21 to 34 inches; sand

E/B—34 to 43 inches; loamy fine sand B/E—43 to 48 inches; sandy loam

Bt—48 to 55 inches; sandy loam E and Bt—55 to 80 inches; sand

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Jack in the pulpit, kinnikinnick, springbeauty, dutchman's breeches, trout lily, wintergreen, sweet cicely, bloodroot, false Solomon's seal, twistedstalk, trillium, bellwort, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand
E—5 to 11 inches; sand
Bhs1—11 to 15 inches; sand
Bhs2—15 to 20 inches; sand
Bs1—20 to 27 inches; sand
Bs2—27 to 35 inches; sand
E and Bt—35 to 80 inches; sand

Minor Components

Tekenink, sandy substratum soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Benona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Kaleva soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

631174—Fogg-Benzonia sands, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fogg and similar soils: 50 percent Benzonia and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Fogg Soil

Classification

Sandy, mixed, mesic Alfic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 40 to 60 inches of sandy glaciofluvial deposits over loamy till over

sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 7.9 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Jack in the pulpit, kinnikinnick, springbeauty, dutchman's breeches, trout lily, wintergreen, Canada mayflower, sweet cicely, bloodroot, false Solomon's seal, twistedstalk, trillium, and bellwort

Typical Profile

A—0 to 2 inches; sand E—2 to 7 inches; sand Bhs—7 to 13 inches; sand Bs1—13 to 21 inches; sand Bs2—21 to 34 inches; sand

E/B—34 to 43 inches; loamy fine sand B/E—43 to 48 inches; sandy loam Bt—48 to 55 inches; sandy loam

E and Bt—55 to 80 inches; sand

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Settino

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Somewhat excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Trillium, dutchman's breeches, false Solomon's seal, bellwort, bloodroot, kinnikinnick, Jack in the pulpit, wintergreen, trout lily, twistedstalk, sweet cicely, springbeauty, and Canada mayflower

Typical Profile

A—0 to 5 inches; sand
E—5 to 11 inches; sand
Bhs1—11 to 15 inches; sand
Bhs2—15 to 20 inches; sand
Bs1—20 to 27 inches; sand
Bs2—27 to 35 inches; sand
E and Bt—35 to 80 inches; sand

Minor Components

Tekenink, sandy substratum soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Benona soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Kaleva soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

680939—Fern-Spinks sands, 6 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fern and similar soils: 50 percent Spinks and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Fern Soil

Classification

Loamy, mixed, active, mesic Arenic Oxyaquic Glossudalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy glaciofluvial deposits over loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 24 inches (see table 19)

Drainage class: Moderately well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: High (about 10.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Western brackenfern, baneberry, goldenrod, bigleaf aster, downy yellow violet, trillium, Canada mayflower, and wild leek

Typical Profile

Ap—0 to 9 inches; sand E—9 to 10 inches; sand

Bw—10 to 24 inches; sand 2B/E—24 to 29 inches; clay loam 2Bt—29 to 42 inches; clay loam 2BC—42 to 50 inches; clay loam 2C—50 to 80 inches; clay loam

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Western brackenfern, baneberry, goldenrod, bigleaf aster, downy yellow violet, trillium, wild leek, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Minor Components

Coloma soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Perrinton soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

680943—Milnichol fine sand, 0 to 4 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Milnichol and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Milnichol Soil

Classification

Sandy, mixed, mesic Typic Epiaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 40 to 60 inches of sandy glaciofluvial deposits over loamy alluvium

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None

Frequency of ponding: None

Depth to water table: About 6 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Moderate (about 8.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4w

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Wintergreen, American starflower, partridgeberry, bunchberry dogwood, western brackenfern, and Canada mayflower

Typical Profile

A—0 to 2 inches; fine sand E—2 to 12 inches; fine sand Bhs—12 to 15 inches; fine sand Bs1—15 to 25 inches; fine sand Bs2—25 to 33 inches; fine sand C—33 to 47 inches; fine sand

2C1-47 to 50 inches; stratified loamy fine sand to fine sandy loam

2C2—50 to 68 inches; silty clay loam 2C3—68 to 80 inches; silt loam

Minor Components

Pipestone soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Covert soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Thompsonville soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

680945—Fern sand, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fern and similar soils: 90 percent

Dissimilar minor components: 10 percent

Description of the Fern Soil

Classification

Loamy, mixed, active, mesic Arenic Oxyaquic Glossudalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy glaciofluvial deposits over loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 24 inches (see table 19)

Drainage class: Moderately well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: High (about 10.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 9 inches; sand E—9 to 10 inches; sand

Bw—10 to 24 inches; sand 2B/E—24 to 29 inches; clay loam 2Bt—29 to 42 inches; clay loam 2BC—42 to 50 inches; clay loam 2C—50 to 80 inches; clay loam

Minor Components

Marlette soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

680946—Fern sand, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1.115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fern and similar soils: 90 percent

Dissimilar minor components: 10 percent

Description of the Fern Soil

Classification

Loamy, mixed, active, mesic Arenic Oxyaquic Glossudalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 20 to 40 inches of sandy glaciofluvial deposits over loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 24 inches (see table 19)

Drainage class: Moderately well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: High (about 10.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, Canada mayflower, western brackenfern, goldenrod, trillium, and downy yellow violet

Typical Profile

Ap—0 to 9 inches; sand E—9 to 10 inches; sand Bw—10 to 24 inches; sand 2B/E—24 to 29 inches; clay loam 2BC—42 to 50 inches; clay loam 2C—50 to 80 inches; clay loam

Minor Components

Marlette soils

Percent of map unit: 4 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

680971—Nessen-Kaleva sands, 18 to 35 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Nessen and similar soils: 50 percent Kaleva and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Nessen Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 40 to 55 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Low (about 4.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, spinulose shield fern, trout lily, hepatica, Canada mayflower, sweet cicely, western brackenfern, bloodroot, American starflower, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 4 inches; sand
E—4 to 11 inches; sand
Bhs—11 to 15 inches; sand
Bs1—15 to 24 inches; sand
Bs2—24 to 39 inches; sand
Bt—39 to 44 inches; gravelly sand

2C—44 to 80 inches; stratified sand to gravelly sand

Description of the Kaleva Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, spinulose shield fern, trout lily, hepatica, Canada mayflower, sweet cicely, western brackenfern, bloodroot, American starflower, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 3 inches; sand E—3 to 9 inches; sand Bhs—9 to 11 inches; sand Bs1—11 to 16 inches; sand Bs2—16 to 21 inches; sand C1—21 to 70 inches; sand C2—70 to 80 inches; sand

Minor Components

Shavenaugh soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

680972—Nessen-Kaleva sands, 12 to 18 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Nessen and similar soils: 50 percent Kaleva and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Nessen Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 40 to 55 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Low (about 4.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, spinulose shield fern, trout lily, hepatica, Canada mayflower, sweet cicely, western brackenfern, bloodroot, American starflower, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 4 inches; sand
E—4 to 11 inches; sand
Bhs—11 to 15 inches; sand
Bs1—15 to 24 inches; sand
Bs2—24 to 39 inches; sand
Bt—39 to 44 inches; gravelly sand
2C—44 to 80 inches; stratified sand to gravelly sand

Description of the Kaleva Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base slope, and side slope

Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, spinulose shield fern, trout lily, hepatica, Canada mayflower, sweet cicely, western brackenfern, bloodroot, American starflower, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 3 inches; sand E—3 to 9 inches; sand Bhs—9 to 11 inches; sand Bs1—11 to 16 inches; sand Bs2—16 to 21 inches; sand C1—21 to 70 inches; sand C2—70 to 80 inches; sand

Minor Components

Shavenaugh soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

680973—Nessen-Kaleva sands, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches

Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Nessen and similar soils: 50 percent Kaleva and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Nessen Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 40 to 55 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Low (about 4.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, spinulose shield fern, trout lily, hepatica, Canada mayflower, sweet cicely, western brackenfern, bloodroot, American starflower, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 4 inches; sand E—4 to 11 inches; sand Bhs—11 to 15 inches; sand Bs1—15 to 24 inches; sand Bs2—24 to 39 inches; sand

Bt-39 to 44 inches; gravelly sand

2C-44 to 80 inches; stratified sand to gravelly sand

Description of the Kaleva Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Crest, interfluve, side slope, base slope, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, spinulose shield fern, trout lily, hepatica, Canada mayflower, sweet cicely, western brackenfern, bloodroot, American starflower, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 3 inches; sand E—3 to 9 inches; sand Bhs—9 to 11 inches; sand Bs1—11 to 16 inches; sand Bs2—16 to 21 inches; sand C1—21 to 70 inches; sand C2—70 to 80 inches; sand

Minor Components

Shavenaugh soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Crest, interfluve, side slope, base slope,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

680974—Nessen-Kaleva sands, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift: 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Nessen and similar soils: 50 percent Kaleva and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Nessen Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 40 to 55 inches of sandy material over calcareous sandy and gravelly

glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Low (about 4.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, hepatica, bloodroot, mapleleaf viburnum, spinulose shield fern, trout lily, Canada mayflower, sweet cicely, western brackenfern, American starflower, and trillium

Typical Profile

A—0 to 4 inches; sand
E—4 to 11 inches; sand
Bhs—11 to 15 inches; sand
Bs1—15 to 24 inches; sand
Bs2—24 to 39 inches; sand
Bt—39 to 44 inches; gravelly sand

2C-44 to 80 inches; stratified sand to gravelly sand

Description of the Kaleva Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, spinulose shield fern, trout lily, hepatica, Canada mayflower, sweet cicely, western brackenfern, bloodroot, American starflower, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 3 inches; sand E—3 to 9 inches; sand Bhs—9 to 11 inches; sand Bs1—11 to 16 inches; sand Bs2—16 to 21 inches; sand C1—21 to 70 inches; sand C2—70 to 80 inches; sand

Minor Components

Shavenaugh soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Boyer soils

Percent of map unit: 2 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear

Across-slope shape: Linear Meets hydric soil criteria: No

893251—Boyer-Shavenaugh complex, 12 to 18 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Boyer and similar soils: 50 percent Shavenaugh and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Boyer Soil

Classification

Coarse-loamy, mixed, semiactive, mesic Typic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Medium

Parent material: 20 to 40 inches of loamy and sandy material over calcareous sandy

and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Moderate (about 6.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, bloodroot, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 3 inches; fine sandy loam
E—3 to 4 inches; gravelly sandy loam
Bt1—4 to 14 inches; gravelly sandy loam
Bt2—14 to 30 inches; gravelly sandy loam
2C1—30 to 45 inches; very gravelly sand

2C2—45 to 80 inches; stratified gravelly sand to sand

Description of the Shavenaugh Soil

Classification

Mixed, mesic Psammentic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 20

Available water capacity: Low (about 5.0 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wild leek, common ladyfern, rattlesnake fern, blue cohosh, springbeauty, dutchman's breeches, trout lily, hepatica, sweet cicely, western brackenfern, bloodroot, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 5 inches; sand E—5 to 8 inches; sand

Bw1—8 to 16 inches; sand Bw2—16 to 28 inches; sand Bw3—28 to 34 inches; sand Bt—34 to 44 inches; loamy sand

2C-44 to 80 inches; very gravelly sand

Minor Components

Coloma soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Nessen soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

894062—Remus-Spinks complex, 18 to 35 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Remus and similar soils: 50 percent Spinks and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Remus Soil

Classification

Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very high

Parent material: 40 to more than 60 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Very high (about 13.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 9 inches; fine sandy loam Bw—9 to 15 inches; fine sandy loam E/B—15 to 24 inches; loamy sand B/E—24 to 35 inches; sandy clay loam Bt—35 to 66 inches; sandy clay loam

C-66 to 80 inches; loam

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Minor Components

Coloma soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

894063—Remus-Spinks complex, 12 to 18 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 96—Western Michigan Fruit Belt; 98—Southern

Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Remus and similar soils: 50 percent Spinks and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Remus Soil

Classification

Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: High

Parent material: 40 to more than 60 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Very high (about 13.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 9 inches; fine sandy loam Bw—9 to 15 inches; fine sandy loam E/B—15 to 24 inches; loamy sand B/E—24 to 35 inches; sandy clay loam Bt—35 to 66 inches; sandy clay loam

C—66 to 80 inches; loam

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, Canada mayflower, western brackenfern, goldenrod, trillium, and downy yellow violet

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand C—72 to 80 inches; sand

Minor Components

Coloma soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Tekenink, sandy substratum soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

894064—Fern-Remus complex, 6 to 12 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fern and similar soils: 50 percent

Remus and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Fern Soil

Classification

Loamy, mixed, active, mesic Arenic Oxyaquic Glossudalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: 20 to 40 inches of sandy glaciofluvial deposits over loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 24 inches (see table 19)

Drainage class: Moderately well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: High (about 10.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 9 inches; sand E—9 to 10 inches; sand Bw—10 to 24 inches; sand 2B/E—24 to 29 inches; clay loam 2Bt—29 to 42 inches; clay loam 2BC—42 to 50 inches; clay loam 2C—50 to 80 inches; clay loam

Description of the Remus Soil

Classification

Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: High

Parent material: 40 to more than 60 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Very high (about 13.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 9 inches; fine sandy loam Bw—9 to 15 inches; fine sandy loam E/B—15 to 24 inches; loamy sand B/E—24 to 35 inches; sandy clay loam Bt—35 to 66 inches; sandy clay loam

C-66 to 80 inches; loam

Minor Components

Coloma soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Marlette soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 6 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

894065—Fern-Remus complex, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 96—Western Michigan Fruit Belt; 98—Southern

Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Fern and similar soils: 50 percent Remus and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Fern Soil

Classification

Loamy, mixed, active, mesic Arenic Oxyaquic Glossudalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: 20 to 40 inches of sandy glaciofluvial deposits over loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 24 inches (see table 19)

Drainage class: Moderately well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: High (about 10.7 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 3s

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 9 inches; sand E—9 to 10 inches; sand Bw—10 to 24 inches; sand 2B/E—24 to 29 inches; clay loam 2BC—42 to 50 inches; clay loam 2C—50 to 80 inches; clay loam

Description of the Remus Soil

Classification

Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Medium

Parent material: 40 to more than 60 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Very high (about 13.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 2e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 9 inches; fine sandy loam Bw—9 to 15 inches; fine sandy loam E/B—15 to 24 inches; loamy sand B/E—24 to 35 inches; sandy clay loam Bt—35 to 66 inches; sandy clay loam

C-66 to 80 inches; loam

Minor Components

Coloma soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Marlette soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

894104—Mollineaux-Remus complex, 18 to 35 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Mollineaux and similar soils: 50 percent Remus and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Mollineaux Soil

Classification

Sandy over loamy, mixed, active, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Medium

Parent material: Sandy glaciofluvial deposits over loamy till Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 8.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 6 inches; loamy sand E—6 to 9 inches; loamy sand Bs1—9 to 15 inches; loamy sand Bs2—15 to 27 inches; loamy sand E and Bt1—27 to 38 inches; loamy sand B/E—38 to 64 inches; clay loam E and Bt2—64 to 80 inches; sand

Description of the Remus Soil

Classification

Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very high

Parent material: 40 to more than 60 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Very high (about 13.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 9 inches; fine sandy loam Bw—9 to 15 inches; fine sandy loam E/B—15 to 24 inches; loamy sand B/E—24 to 35 inches; sandy clay loam Bt—35 to 66 inches; sandy clay loam

C-66 to 80 inches; loam

Minor Components

Coloma soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Onekama soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex

Across-slope shape: Convex and concave

Meets hydric soil criteria: No

894105—Mollineaux-Remus complex, 12 to 18 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Mollineaux and similar soils: 50 percent Remus and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Mollineaux Soil

Classification

Sandy over loamy, mixed, active, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits over loamy till Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 8.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

A—0 to 6 inches; loamy sand E—6 to 9 inches; loamy sand Bs1—9 to 15 inches; loamy sand Bs2—15 to 27 inches; loamy sand E and Bt1—27 to 38 inches; loamy sand B/E—38 to 64 inches; clay loam E and Bt2—64 to 80 inches; sand

Description of the Remus Soil

Classification

Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: High

Parent material: 40 to more than 60 inches of loamy material over calcareous loamy till

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Moderate (about 4.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 10

Available water capacity: Very high (about 13.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 9 inches; fine sandy loam Bw—9 to 15 inches; fine sandy loam E/B—15 to 24 inches; loamy sand B/E—24 to 35 inches; sandy clay loam Bt-35 to 66 inches; sandy clay loam

C-66 to 80 inches; loam

Minor Components

Coloma soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Benzonia soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Onekama soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 12 to 18 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

894165—Spinks-Tekenink, sandy substratum, complex, 35 to 50 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Spinks and similar soils: 50 percent

Tekenink, sandy substratum and similar soils: 40 percent

Dissimilar minor components: 10 percent

Description of the Spinks Soil

Classification

Sandy, mixed, mesic Lamellic Hapludalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits and/or eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy vellow violet, and Canada mayflower

Typical Profile

Ap—0 to 5 inches; sand Bw1—5 to 10 inches; sand Bw2—10 to 17 inches; sand E and Bt1—17 to 62 inches; sand E and Bt2—62 to 72 inches; sand

C-72 to 80 inches; sand

Description of the Tekenink, Sandy Substratum Soil

Classification

Coarse-loamy, mixed, semiactive, mesic Typic Glossudalfs

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head slope, and nose slope

Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Medium

Parent material: 60 to 80 inches of loamy and/or sandy till over sandy glaciofluvial

deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches

Drainage class: Well drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Moderate (about 8.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7e

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Baneberry, wild leek, bigleaf aster, western brackenfern, goldenrod, trillium, downy yellow violet, and Canada mayflower

Typical Profile

Ap—0 to 8 inches; loamy fine sand E—8 to 16 inches; loamy fine sand Bw—16 to 21 inches; sandy loam E/B—21 to 49 inches; loamy sand Bt—49 to 62 inches; sandy loam 2C1—62 to 72 inches; loamy sand 2C2—72 to 80 inches; sand

Minor Components

Coloma soils

Percent of map unit: 4 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Remus soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 18 to 35 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Shavenaugh soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

899682—Kaleva sand, 35 to 50 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Kaleva and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Kaleva Soil

Classification

Sandy, mixed, mesic Typic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Spinulose shield fern, trout lily, Canada mayflower, sweet cicely, western brackenfern, bloodroot, American starflower, trillium, and mapleleaf viburnum

Typical Profile

A—0 to 3 inches; sand E—3 to 9 inches; sand Bhs—9 to 11 inches; sand Bs1—11 to 16 inches; sand Bs2—16 to 21 inches; sand C1—21 to 70 inches; sand C2—70 to 80 inches; sand

Minor Components

Benzonia soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

899722—Goodharbor sand, 1 to 12 percent slopes

Map Unit Setting

Major land resource area (MLRA): 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Goodharbor and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Goodharbor Soil

Classification

Mesic, uncoated Typic Quartzipsamments

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Nose slope, head slope, interfluve, crest, base

slope, and side slope Slope range: 1 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Very low

Parent material: Sandy eolian deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches Drainage class: Excessively drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 15

Available water capacity: Low (about 4.8 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 6s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Wintergreen, lowbush blueberry, and kinnikinnick

Typical Profile

A—0 to 1 inch; sand E—1 to 3 inches; sand Bw1—3 to 23 inches; sand Bw2—23 to 40 inches; sand C—40 to 80 inches; sand

Minor Components

Nordhouse soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and

toeslope

Geomorphic position (three-dimensional): Nose slope, head slope, interfluve, crest,

base slope, and side slope Representative aspect: North Slope range: 1 to 12 percent Down-slope shape: Linear

Across-slope shape: Linear and convex

Meets hydric soil criteria: No

Platteriver soils

Percent of map unit: 5 percent

Geomorphic position (two-dimensional): Footslope and toeslope Geomorphic position (three-dimensional): Side slope and base slope

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

899731—Covert-Pipestone sands, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern Indiana Drift Plain

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Covert and similar soils: 50 percent Pipestone and similar soils: 40 percent Dissimilar minor components: 10 percent

Description of the Covert Soil

Classification

Sandy, mixed, mesic Oxyaquic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 24 inches (see table 19)

Drainage class: Moderately well drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.1 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Bunchberry dogwood, pink lady's slipper, wintergreen, western brackenfern, and lowbush blueberry

Typical Profile

A—0 to 1 inch; sand E—1 to 8 inches; sand Bs1—8 to 18 inches; sand Bs2—18 to 25 inches; sand BC—25 to 29 inches; sand C1—29 to 38 inches; sand C2—38 to 47 inches; sand C3—47 to 80 inches; sand

Description of the Pipestone Soil

Classification

Sandy, mixed, mesic Typic Endoaquods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 6 inches (see table 19)

Drainage class: Somewhat poorly drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.3 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4w

Meets hydric soil criteria: No Hydrologic soil group: B

Vegetation

Existing plants: Bunchberry dogwood, wintergreen, partridgeberry, western brackenfern, American starflower, and Canada mayflower

Typical Profile

A—0 to 2 inches; sand E—2 to 9 inches; sand Bhs—9 to 12 inches; sand Bs—12 to 24 inches; sand BC—24 to 32 inches; sand C—32 to 80 inches; sand

Minor Components

Dair soils

Percent of map unit: 5 percent Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

Saugatuck soils

Percent of map unit: 5 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 3 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

899733—Covert-Dair complex, 0 to 6 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy Drift; 96—Western Michigan Fruit Belt; 98—Southern Michigan and Northern

Indiana Drift Plain Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Covert and similar soils: 50 percent Dair and similar soils: 45 percent Dissimilar minor components: 5 percent

Description of the Covert Soil

Classification

Sandy, mixed, mesic Oxyaquic Haplorthods

Setting

Landform position (three-dimensional): Rise

Slope range: 0 to 6 percent Down-slope shape: Linear Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: About 24 inches (see table 19)

Drainage class: Moderately well drained Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.1 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 4s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Bunchberry dogwood, pink lady's slipper, wintergreen, western brackenfern, and lowbush blueberry

Typical Profile

A—0 to 1 inch; sand E—1 to 8 inches; sand Bs1—8 to 18 inches; sand Bs2—18 to 25 inches; sand BC—25 to 29 inches; sand C1—29 to 38 inches; sand C2—38 to 47 inches; sand C3—47 to 80 inches; sand

Description of the Dair Soil

Classification

Mixed, mesic Typic Psammaquents

Setting

Landform: Depressions

Landform position (three-dimensional): Dip

Slope range: 0 to 2 percent Down-slope shape: Linear

Across-slope shape: Linear Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Negligible

Parent material: 4 to 8 inches of organic material over sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None
Frequency of ponding: Frequent
Depth to water table: At the soil surface
Drainage class: Very poorly drained

Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Moderate (about 6.5 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 5w

Meets hydric soil criteria: Yes Hydrologic soil group: A/D

Vegetation

Existing plants: Speckled alder, yellow marsh marigold, sedge, redosier dogwood, blueflag iris, and sensitive fern

Typical Profile

Oa-0 to 4 inches; muck

A-4 to 7 inches; mucky sandy loam

Bw—7 to 11 inches; sand C—11 to 21 inches; sand Cg1—21 to 50 inches; sand Cg2—50 to 80 inches; sand

Minor Components

Pipestone soils

Percent of map unit: 3 percent

Geomorphic position (three-dimensional): Rise

Representative aspect: North Slope range: 0 to 4 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: No

Houghton soils

Percent of map unit: 2 percent

Landform: Depressions

Geomorphic position (three-dimensional): Dip

Representative aspect: North Slope range: 0 to 2 percent Down-slope shape: Linear Across-slope shape: Linear Meets hydric soil criteria: Yes

899734—Benzonia sand, 35 to 50 percent slopes

Map Unit Setting

Major land resource areas (MLRA): 94A—Northern Michigan and Wisconsin Sandy

Drift; 96—Western Michigan Fruit Belt

Elevation: 575 to 1,115 feet

Mean annual precipitation: 28 to 38 inches Mean annual air temperature: 37 to 55 degrees F

Frost-free period: 113 to 185 days

Map Unit Composition

Benzonia and similar soils: 90 percent Dissimilar minor components: 10 percent

Description of the Benzonia Soil

Classification

Sandy, isotic, mesic Lamellic Haplorthods

Setting

Landform position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Landform position (three-dimensional): Side slope, base slope, crest, interfluve, head

slope, and nose slope Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Representative aspect: North Soil temperature class: Mesic Soil temperature regime: Mesic

Properties and Qualities

Runoff: Low

Parent material: Sandy glaciofluvial deposits

Restrictive feature(s): None within a depth of 60 inches

Frequency of flooding: None Frequency of ponding: None

Depth to water table: More than 72 inches
Drainage class: Somewhat excessively drained
Shrink-swell potential: Low (about 1.5 LEP)

Salinity maximum: Not saline Sodicity maximum: Not sodic

Calcium carbonate equivalent (maximum weight percentage): 0

Available water capacity: Low (about 5.6 inches)

Interpretive Groups

Land capability subclass (nonirrigated): 7s

Meets hydric soil criteria: No Hydrologic soil group: A

Vegetation

Existing plants: Dutchman's breeches, wild leek, springbeauty, bloodroot, twistedstalk, serviceberry, trout lily, western brackenfern, trillium, bellwort, and Canada mayflower

Typical Profile

A-0 to 5 inches; sand

E—5 to 11 inches; sand Bhs1—11 to 15 inches; sand Bhs2—15 to 20 inches; sand Bs1—20 to 27 inches; sand Bs2—27 to 35 inches; sand E and Bt—35 to 80 inches; sand

Minor Components

Benona soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Coloma soils

Percent of map unit: 3 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Fogg soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Grattan soils

Percent of map unit: 2 percent

Geomorphic position (two-dimensional): Summit, shoulder, backslope, footslope, and toeslope

Geomorphic position (three-dimensional): Side slope, base slope, crest, interfluve,

head slope, and nose slope Representative aspect: North Slope range: 35 to 50 percent

Down-slope shape: Linear and convex Across-slope shape: Convex and concave

Meets hydric soil criteria: No

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils within Sleeping Bear Dunes National Lakeshore. 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, droughtiness, 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 as farmland and as sites for buildings, sanitary facilities, highways and other transportation systems, and recreational facilities. 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 park. 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, and trees and shrubs.

Interpretive Ratings

The interpretive tables in this survey rate the soils in the park for various uses. Many of the tables identify the limitations that affect specified uses and indicate the severity of those limitations. The ratings in these tables are both verbal and numerical.

Rating Class Terms

Rating classes are expressed in the tables in terms that indicate the extent to which the soils are limited by all of the soil features that affect a specified use or in terms that indicate the suitability of the soils for the use. Thus, the tables may show limitation classes or suitability classes. Terms for the limitation classes are *not limited*, *slightly limited*, *somewhat limited*, and *very limited*. The suitability ratings are expressed as *well suited*, *moderately well suited*, *poorly suited*, and *unsuited* or as *good*, *fair*, and *poor*.

Numerical Ratings

Numerical ratings in the tables indicate the relative severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.00 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact

on the use and the point at which the soil feature is not a limitation. The limitations appear in order from the most limiting to the least limiting. Thus, if more than one limitation is identified, the most severe limitation is listed first and the least severe one is listed last.

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 used in grouping the soils do not include major and generally expensive landforming 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 interpretations designed to show suitability and limitations of groups of soils for rangeland, for forestland, or for engineering purposes.

In the capability system, soils are generally grouped at three levels—capability class, subclass, and unit (USDA-SCS, 1961). 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 slight limitations that restrict their use.

Class 2 soils have moderate limitations that restrict the choice of plants or that require moderate conservation practices.

Class 3 soils have severe limitations that restrict the choice of plants or that require special conservation practices, or both.

Class 4 soils have very severe limitations that restrict the choice of plants or that require very careful management, or both.

Class 5 soils are subject to little or no erosion but have other limitations, impractical to remove, that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 6 soils have severe limitations that make them generally unsuitable for cultivation and that restrict their use mainly to pasture, rangeland, forestland, or wildlife habitat.

Class 7 soils have very severe limitations that make them unsuitable for cultivation and that restrict their use mainly to grazing, forestland, or wildlife habitat.

Class 8 soils and miscellaneous areas have limitations that preclude commercial plant production and that restrict their use to recreational purposes, wildlife habitat, watershed, or esthetic purposes.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, e, w, s, or c, to the class numeral, for example, 2e. The letter e shows that the main hazard is the risk of erosion unless close-growing plant cover is maintained; w shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); s shows that the soil is limited mainly because it is shallow, droughty, or stony; and c, used in only some parts of the United States, shows that the chief limitation is climate that is 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, forestland, wildlife habitat, or recreation.

The capability classification of map units in this park is given in the section "Detailed Soil Map Units" and in table 2.

Prime and Other Important Farmland

Table 3 lists the map units in the park that are considered important farmlands. Important farmlands consist of prime farmland, unique farmland, and farmland of statewide or local importance. This list does not constitute a recommendation for a particular land use.

In an effort to identify the extent and location of important farmlands, the Natural Resources Conservation Service, in cooperation with other interested Federal, State, and local government organizations, has inventoried land that can be used for the production of the Nation's food supply.

Prime farmland 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, forestland, or other land, but it is not urban or built-up land or water areas. The soil quality, growing season, and moisture supply are those needed for the soil to economically produce sustained high yields of crops 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. The water supply is dependable and of adequate quality. Prime farmland 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. Slope ranges mainly from 0 to 6 percent. More detailed information about the criteria for prime farmland is available at the local office of the Natural Resources Conservation Service.

For some soils identified as prime farmland, measures that overcome a hazard or limitation, such as flooding, wetness, and droughtiness, are needed. Onsite evaluation is needed to determine whether or not the hazard or limitation has been overcome by corrective measures.

A recent trend in land use in some areas 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.

Unique farmland is land other than prime farmland that is used for the production of specific high-value food and fiber crops, such as citrus, tree nuts, olives, cranberries, and other fruits and vegetables. It has the special combination of soil quality, growing season, moisture supply, temperature, humidity, air drainage, elevation, and aspect needed for the soil to economically produce sustainable high yields of these crops when properly managed. The water supply is dependable and of adequate quality. Nearness to markets is an additional consideration. Unique farmland is not based on national criteria. It commonly is in areas where there is a special microclimate, such as the wine country in California.

In some areas, land that does not meet the criteria for prime or unique farmland is considered to be *farmland of statewide importance* for the production of food, feed, fiber, forage, and oilseed crops. The criteria for defining and delineating farmland of statewide importance are determined by the appropriate State agencies. Generally, this land includes areas of soils that nearly meet the requirements for prime farmland and that economically produce high yields of crops when treated and managed according to acceptable farming methods. Some areas may produce as high a yield

as prime farmland if conditions are favorable. Farmland of statewide importance may include tracts of land that have been designated for agriculture by State law.

In some areas that are not identified as having national or statewide importance, land is considered to be *farmland of local importance* for the production of food, feed, fiber, forage, and oilseed crops. This farmland is identified by the appropriate local agencies. Farmland of local importance may include tracts of land that have been designated for agriculture by local ordinance.

Hydric Soils

Table 4 lists the map unit components that are rated as hydric soils in the park. This list can help in planning land uses; however, onsite investigation is recommended to determine the hydric soils on a specific site (National Research Council, 1995; USDANRCS, 2010).

The three essential characteristics of wetlands are hydrophytic vegetation, hydric soils, and wetland hydrology (Cowardin et al., 1979; U.S. Army Corps of Engineers, 1987; National Research Council, 1995; Tiner, 1985). Criteria for all of the characteristics must be met for areas to be identified as wetlands. Undrained hydric soils that have natural vegetation should support a dominant population of ecological wetland plant species. Hydric soils that have been converted to other uses should be capable of being restored to wetlands.

Hydric soils are defined by the National Technical Committee for Hydric Soils (NTCHS) as soils that formed under conditions of saturation, flooding, or ponding long enough during the growing season to develop anaerobic conditions in the upper part (Federal Register, 1994). These soils, under natural conditions, are either saturated or inundated long enough during the growing season to support the growth and reproduction of hydrophytic vegetation.

The NTCHS definition identifies general soil properties that are associated with wetness. In order to determine whether a specific soil is a hydric soil or nonhydric soil, however, more specific information, such as information about the depth and duration of the water table, is needed. Thus, criteria that identify those estimated soil properties unique to hydric soils have been established (Federal Register, 2002). These criteria are used to identify map unit components that normally are associated with wetlands. The criteria used are selected estimated soil properties that are described in "Soil Taxonomy" (Soil Survey Staff, 1999) and "Keys to Soil Taxonomy" (Soil Survey Staff, 2010) and in the "Soil Survey Manual" (Soil Survey Division Staff, 1993).

If soils are wet enough for a long enough period of time to be considered hydric, they should exhibit certain properties that can be easily observed in the field. These visible properties are indicators of hydric soils. The indicators used to make onsite determinations of hydric soils are specified in "Field Indicators of Hydric Soils in the United States" (USDA-NRCS, 2010).

Hydric soils are identified by examining and describing the soil to a depth of about 20 inches. This depth may be greater if determination of an appropriate indicator so requires. It is always recommended that soils be excavated and described to the depth necessary for an understanding of the redoximorphic processes. Then, using the completed soil descriptions, soil scientists can compare the soil features required by each indicator and specify which indicators have been matched with the conditions observed in the soil. The soil can be identified as a hydric soil if at least one of the approved indicators is present.

Map units that are dominantly made up of hydric soils may have small areas, or inclusions, of nonhydric soils in the higher positions on the landform, and map units dominantly made up of nonhydric soils may have inclusions of hydric soils in the lower positions on the landform.

The criteria for hydric soils are represented by codes in the table (for example, 2B3). Definitions for the codes are as follows:

- 1. All Histels except for Folistels and Histosols except for Folists.
- 2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
 - A. are somewhat poorly drained and have a water table at the surface (0.0 feet) during the growing season, or
 - B. are poorly drained or very poorly drained and have either:
 - 1) a water table at the surface (0.0 feet) during the growing season if textures are coarse sand, sand, or fine sand in all layers within a depth of 20 inches, or
 - 2) a water table at a depth of 0.5 foot or less during the growing season if saturated hydraulic conductivity (K_{sat}) is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches, or
 - 3) a water table at a depth of 1.0 foot or less during the growing season if saturated hydraulic conductivity (K_{sat}) is less than 6.0 in/hr in any layer within a depth of 20 inches.
- 3. Soils that are frequently ponded for periods of long or very long duration during the growing season.
- 4. Soils that are frequently flooded for periods of long or very long duration during the growing season.

Landform and Parent Material

Table 5 displays information about climate, landscape, landform, and parent material for each soil in the map units.

Percent of the map unit is the extent of the named soil in the map unit.

Slope is 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. The table shows the low and high range of slope for the named component or soil.

Elevation is the height of an object or area on the earth's surface in reference to a fixed point, such as mean sea level. The typical low and high range of elevation is displayed for each soil.

MAP is the mean annual precipitation for areas of the soil in the map unit.

Landform is a specific shape of the earth in the area where a soil typically occurs.

Examples are a mountain summit and a valley bottom.

Parent material is the material in which soils formed. Examples are the underlying geological material (including bedrock), a surficial deposit (such as volcanic ash), and organic material. Soils inherit their chemical and physical properties from the parent material.

Land Management

In table 6, parts I through IV, interpretive ratings are given for various aspects of land management. The ratings are both verbal and numerical.

Some rating class terms indicate the degree to which the soils are suited to a specified land management practice. *Well suited* indicates that the soil has features that are favorable for the specified practice and has no limitations. Good performance can be expected, and little or no maintenance is needed. *Moderately suited* indicates that the soil has features that are moderately favorable for the specified practice. One or more soil properties are less than desirable, and fair performance can be expected. Some maintenance is needed. *Poorly suited* indicates that the soil has one or more properties that are unfavorable for the specified practice. Overcoming the unfavorable properties requires special design, extra maintenance, and costly alteration. *Unsuited*

indicates that the expected performance of the soil is unacceptable for the specified practice or that extreme measures are needed to overcome the undesirable soil properties.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the specified land management practice (1.00) and the point at which the soil feature is not a limitation (0.00).

Rating class terms for *fire damage* and *seedling mortality* are expressed as low, moderate, and high. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for fire damage or seedling mortality is highest (1.00) and the point at which the potential is lowest (0.00).

Rating class terms for *hazard of erosion* are expressed as slight, moderate, severe, and very severe. Where these terms are used, the numerical ratings indicate gradations between the point at which the potential for erosion is highest (1.00) and the point at which the potential is lowest (0.00).

The paragraphs that follow indicate the soil properties considered in rating the soils for land management practices.

Planting

Ratings in the columns *suitability for hand planting* and *suitability for mechanical planting* are based on slope, depth to a restrictive layer, content of sand, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, moderately suited, poorly suited, or unsuited to these methods of planting. It is assumed that necessary site preparation is completed before seedlings are planted.

Ratings in the column *soil rutting hazard* are based on depth to a water table, rock fragments on or below the surface, the Unified classification, depth to a restrictive layer, and slope. Ruts form as a result of the operation of planting equipment. The hazard is described as slight, moderate, or severe. A rating of *slight* indicates that the soil is subject to little or no rutting, *moderate* indicates that rutting is likely, and *severe* indicates that ruts form readily.

Hazard of Erosion and Suitability for Roads

Ratings in the column *hazard of erosion* are based on slope and on soil erodibility factor K. The soil loss is caused by sheet or rill erosion in areas where 50 to 75 percent of the surface has been exposed by different kinds of disturbance. The hazard is described as slight, moderate, severe, or very severe. A rating of *slight* indicates that erosion is unlikely under ordinary climatic conditions; *moderate* indicates that some erosion is likely and that erosion-control measures may be needed; *severe* indicates that erosion is very likely and that erosion-control measures, including revegetation of bare areas, are advised; and *very severe* indicates that significant erosion is expected, loss of soil productivity and off-site damage are likely, and erosion-control measures are costly and generally impractical.

Ratings in the column hazard of erosion on roads and trails are based on the soil erodibility factor K, slope, and content of rock fragments. The ratings apply to unsurfaced roads and trails. The hazard is described as slight, moderate, or severe. A rating of slight indicates that little or no erosion is likely; moderate indicates that some erosion is likely, that the roads or trails may require occasional maintenance, and that simple erosion-control measures are needed; and severe indicates that significant erosion is expected, that the roads or trails require frequent maintenance, and that costly erosion-control measures are needed.

Ratings in the column *suitability for roads (natural surface)* are based on slope, rock fragments on the surface, plasticity index, content of sand, the Unified classification,

depth to a water table, ponding, flooding, and the hazard of soil slippage. The ratings indicate the suitability for using the natural surface of the soil for roads. The soils are described as well suited, moderately suited, or poorly suited to this use.

Site Preparation

Ratings in the column *suitability for mechanical site preparation (deep)* are based on slope, depth to a restrictive layer, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 3 feet is considered in the ratings.

Ratings in the column *suitability for mechanical site preparation (surface)* are based on slope, depth to a restrictive layer, plasticity index, rock fragments on or below the surface, depth to a water table, and ponding. The soils are described as well suited, poorly suited, or unsuited to this management activity. The part of the soil from the surface to a depth of about 1 foot is considered in the ratings.

Site Restoration

Ratings in the column *potential for damage to soil by fire* are based on texture of the surface layer, content of rock fragments and organic matter in the surface layer, thickness of the surface layer, and slope. The soils are described as having a low, moderate, or high potential for this kind of damage. The ratings indicate an evaluation of the potential impact of prescribed fires or wildfires that are intense enough to remove the duff layer and consume organic matter in the surface layer.

Ratings in the column *potential for seedling mortality* are based on flooding, ponding, depth to a water table, content of lime, reaction, salinity, available water capacity, soil moisture regime, soil temperature regime, aspect, and slope. The soils are described as having a low, moderate, or high potential for seedling mortality.

Recreation

The soils of the park are rated in table 7, parts I and II, according to limitations that affect their suitability for recreation. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect the recreational uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

The ratings in the 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 7 can be supplemented by other information in this survey, for example, interpretations for building site development, construction materials, 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.

Foot traffic and equestrian 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.

Mountain bike and off-road vehicle trails require little or no site preparation. They are not covered with surfacing material or vegetation. Considerable compaction of the soil material is likely. The ratings are based on the soil properties that influence erodibility, trafficability, dustiness, and the ease of revegetation. These properties are stoniness, depth to a water table, ponding, slope, flooding, 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, landscaping, sanitary facilities, 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 particle-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 7 feet of the surface, soil wetness, depth to a water table, ponding, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kinds of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to evaluate the potential of areas for residential, commercial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for 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, ponds, 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.

Dwellings and Small Commercial Buildings

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 8 shows the degree and kind of soil limitations that affect dwellings and small commercial buildings.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Dwellings are single-family houses of three stories or less. For dwellings without basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost

penetration, whichever is deeper. For dwellings with basements, the foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of about 7 feet. The ratings for dwellings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility. Compressibility is inferred from the Unified classification. The properties that affect the ease and amount of excavation include depth to a water table, ponding, flooding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Small commercial buildings are structures that are less than three stories high and do not have basements. The foundation is assumed to consist of spread footings of reinforced concrete built on undisturbed soil at a depth of 2 feet or at the depth of maximum frost penetration, whichever is deeper. The ratings are based on the soil properties that affect the capacity of the soil to support a load without movement and on the properties that affect excavation and construction costs. The properties that affect the load-supporting capacity include depth to a water table, ponding, flooding, subsidence, linear extensibility (shrink-swell potential), and compressibility (which is inferred from the Unified classification). The properties that affect the ease and amount of excavation include flooding, depth to a water table, ponding, slope, depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, and the amount and size of rock fragments.

Roads and Streets, Shallow Excavations, and Landscaping

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 9 shows the degree and kind of soil limitations that affect local roads and streets, shallow excavations, and landscaping.

The ratings in the table are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect building site development. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material; a base of gravel, crushed rock, or soil material stabilized by lime or cement; and a surface of flexible material (asphalt), rigid material (concrete), or gravel with a binder. The ratings are based on the soil properties that affect the ease of excavation and grading and the traffic-supporting capacity. The properties that affect the ease of excavation and grading are depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, depth to a water table, ponding, flooding, the amount of large stones, and slope. The properties that affect the traffic-supporting capacity are soil strength (as inferred

from the AASHTO group index number), subsidence, linear extensibility (shrink-swell potential), the potential for frost action, depth to a water table, and ponding.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for graves, utility lines, open ditches, or other purposes. The ratings are based on the soil properties that influence the ease of digging and the resistance to sloughing. Depth to bedrock or a cemented pan, hardness of bedrock or a cemented pan, the amount of large stones, and dense layers influence the ease of digging, filling, and compacting. Depth to the seasonal high water table, flooding, and ponding may restrict the period when excavations can be made. Slope influences the ease of using machinery. Soil texture, depth to the water table, and linear extensibility (shrink-swell potential) influence the resistance to sloughing.

Landscaping requires soils on which turf, 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.

Sewage Disposal

Table 10 shows the degree and kind of soil limitations that affect septic tank absorption fields and sewage lagoons. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 72 inches or between a depth of 24 inches and a restrictive layer 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. Saturated hydraulic conductivity (K_{sat}), depth to a water table, ponding, depth to bedrock or a cemented pan, and flooding affect absorption of the effluent. Stones and boulders, ice, and bedrock or a cemented pan interfere with installation. Subsidence interferes with installation and maintenance. Excessive slope may cause lateral seepage and surfacing of the effluent in downslope areas.

Some soils are underlain by loose sand and gravel or fractured bedrock at a depth of less than 4 feet below the distribution lines. In these soils the absorption field may not adequately filter the effluent, particularly when the system is new. As a result, the ground water may become contaminated.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Nearly

impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water. Considered in the ratings are slope, saturated hydraulic conductivity (K_{sat}), depth to a water table, ponding, depth to bedrock or a cemented pan, flooding, large stones, and content of organic matter.

Saturated hydraulic conductivity (K_{sat}) 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 K_{sat} rate of more than 14 micrometers per second 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.

Source of Gravel and Sand

Table 11 gives information about the soils as potential sources of gravel and sand. Normal compaction, minor processing, and other standard construction practices are assumed.

Gravel and *sand* 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. Only the likelihood of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material. The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the Unified classification of the soil), the thickness of suitable material, and the content of rock fragments. If the bottom layer of the soil contains sand or gravel, the soil is considered a likely source regardless of thickness. The assumption is that the sand or gravel layer below the depth of observation exceeds the minimum thickness. The ratings are for the whole soil, from the surface to a depth of about 6 feet.

The soils are rated *good*, *fair*, or *poor* as potential sources of sand and gravel. A rating of *good* or *fair* means that the source material is likely to be in or below the soil. The bottom layer and the thickest layer of the soils are assigned numerical ratings. These ratings indicate the likelihood that the layer is a source of sand or gravel. The number 0.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

Source of Reclamation Material, Roadfill, and Topsoil

Table 12 gives information about the soils as potential sources of reclamation material, roadfill, and topsoil. Normal compaction, minor processing, and other standard construction practices are assumed.

The soils are rated *good*, *fair*, or *poor* as potential sources of reclamation material, roadfill, and topsoil. The features that limit the soils as sources of these materials are specified in the table. Numerical ratings between 0.00 and 0.99 are given after the specified features. These numbers indicate the degree to which the features limit the soils as sources of topsoil, reclamation material, or roadfill. The lower the number, the greater the limitation.

Reclamation material is used in areas that have been drastically disturbed by surface mining or similar activities. When these areas are reclaimed, layers of soil material or unconsolidated geological material, or both, are replaced in a vertical sequence. The reconstructed soil favors plant growth. The ratings in the table do not apply to quarries and other mined areas that require an offsite source of reconstruction material. The ratings are based on the soil properties that affect erosion and stability of the surface and the productive potential of the reconstructed soil. These properties include the content of sodium, salts, and calcium carbonate; reaction; available water capacity; erodibility; texture; content of rock fragments; and content of organic matter and other features that affect fertility.

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.

Ponds and Embankments

Table 13 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas; embankments, dikes, and levees; and aquifer-fed excavated ponds. The ratings are both verbal and numerical. Rating class terms indicate the extent to which the soils are limited by all of the soil features that affect these uses. *Not limited* indicates that the soil has features that are very favorable for the specified use. Good performance and very low maintenance can be expected. *Somewhat limited* indicates that the soil has features that are moderately favorable for the specified use. The limitations can be overcome or minimized by special planning, design, or installation. Fair performance and moderate maintenance can be expected. *Very limited* indicates that the soil has one or more features that are unfavorable for the specified use. The limitations generally cannot be overcome without major soil reclamation, special design, or expensive installation procedures. Poor performance and high maintenance can be expected.

Numerical ratings in the table indicate the severity of individual limitations. The ratings are shown as decimal fractions ranging from 0.01 to 1.00. They indicate

gradations between the point at which a soil feature has the greatest negative impact on the use (1.00) and the point at which the soil feature is not a limitation (0.00).

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the saturated hydraulic conductivity (K_{sat}) of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. Embankments that have zoned construction (core and shell) are not considered. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth even greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Aquifer-fed excavated ponds are pits or dugouts that extend to a ground-water aquifer or to a depth below a permanent water table. Excluded are ponds that are fed only by surface runoff and embankment ponds that impound water 3 feet or more above the original surface. Excavated ponds are affected by depth to a permanent water table, $K_{\rm sat}$ of the aquifer, and quality of the water as inferred from the salinity of the soil. Depth to bedrock and the content of large stones affect the ease of excavation.

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 particle-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 properties, physical and chemical properties, and pertinent soil and water features.

Engineering Properties

Table 14 gives the engineering classifications and the range of engineering properties for the layers of each soil in the park.

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."

Classification of the soils is determined according to the Unified soil classification system (ASTM, 2005) and the system adopted by the American Association of State Highway and Transportation Officials (AASHTO, 2004).

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, CL-ML.

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 ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and plasticity index (Atterberg limits) indicate the plasticity characteristics of a soil. The estimates are based on test data from the survey area or from nearby areas and on field examination.

Physical Soil Properties

Table 15 shows estimates of some physical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the park. 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.

Particle size is the effective diameter of a soil particle as measured by sedimentation, sieving, or micrometric methods. Particle sizes are expressed as classes with specific effective diameter class limits. The broad classes are sand, silt, and clay, ranging from the larger to the smaller.

Sand as a soil separate consists of mineral soil particles that are 0.05 millimeter to 2 millimeters in diameter. In this table, the estimated sand content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Silt as a soil separate consists of mineral soil particles that are 0.002 to 0.05 millimeter in diameter. In this table, the estimated silt content of each soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

Clay as a soil separate consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, 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 content of sand, silt, and clay affects the physical behavior of a soil. Particle size is important for engineering and agronomic interpretations, for determination of soil hydrologic qualities, and for soil classification.

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, saturated hydraulic conductivity (K_{sat}), 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 (ovendry) 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 linear extensibility, 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.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on the basis of measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; *high*, 6 to 9 percent; and *very high*, greater than 9 percent.

Organic matter is the plant and animal residue in the soil at various stages of decomposition. In this table, 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 tilth. It is a source of nitrogen and other nutrients for crops and soil organisms.

Erosion Properties

Table 16 shows estimates of some erosion factors that affect a soil's potential for different uses. These estimates are given for each layer of every soil for K factors and are given as one rating for the entire soil for the T factor, the wind erodibility group, and the wind erodibility index. Values are reported for each soil in the park. Estimates are based on field observations and on test data for these and similar soils.

Erosion factors are shown in the table as the K factor (Kw and Kf) and the T factor. Soil erosion factors Kw and Kf quantify soil detachment by runoff and raindrop impact. These erosion factors are indexes used to predict the long-term average soil loss from sheet and rill erosion under crop systems and conservation techniques. Factor K is one of six 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 K_{sat} . 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.

The procedure for determining the Kf factor is outlined in Agriculture Handbook 703, "Predicting Soil Erosion by Water: A Guide to Conservation Planning with the Revised Universal Soil Loss Equation (RUSLE)," USDA, Agricultural Research Service, 1997.

Depth to the upper and lower boundaries of each layer is indicated.

Erosion factor Kw indicates the erodibility of the whole soil. The estimates are modified by the presence of rock fragments. In horizons where total rock fragments are 15 percent or more, by volume, the Kw factor is always less than the Kf factor.

Erosion factor Kf indicates the erodibility of the fine-earth fraction, or the material less than 2 millimeters in size. Soil horizons that do not have rock fragments are assigned equal Kw and Kf factors.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind and/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 described in the "National Soil Survey Handbook."

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.

Total Soil Carbon

Table 17 gives estimates of total soil carbon. Soil carbon occurs as organic and inorganic carbon.

Soil organic carbon (SOC) is carbon (C) in soil that originated from a biological source, such as plants, animals, or micro-organisms. SOC is found in both organic and mineral soil layers. The term "soil organic carbon" refers only to the carbon occurring in soil organic matter (SOM). Soil organic carbon makes up about one-half the weight of soil organic matter. The rest of SOM is mostly oxygen, nitrogen, and hydrogen.

Soil inorganic carbon (SIC) is carbon found in soil carbonates, typically as calcium carbonate layers in the soil or as clay-sized fractions throughout the soil. Carbonates in soils are most common in areas where evaporation rates exceed precipitation, as is the case in most desert environments. Typically, the carbonates accumulated from carbonatic dust or from solution during periods of wetter climates. Soil inorganic carbon also occurs in soils that formed in marl in all regions of the country.

The SOC and SIC contents are reported in kilograms per square meter to a depth of 2 meters or to a representative depth of either hard bedrock or a cemented horizon. The SOC and SIC values are on a whole soil basis, corrected for rock fragments.

SOC can be an indicator of overall soil fertility and soil quality that affects ecosystem function. SOM is the main reservoir for most plant nutrients, such as phosphorus and nitrogen. Managing for SOC by managing for SOM increases the content of these elements and improves soil resiliency.

Soil organic matter binds soil particles together and thus increases soil porosity and water infiltration and allows better root penetration and waterflow into the soil. Greater inflow of water reduces the hazard of erosion and the rate of surface water runoff.

Greater SOC levels improve not only soil quality but also the quality of air and water. Soil acts as a filter and improves water quality. Fertile soils that support plant life remove CO₂ from the atmosphere and increase oxygen levels through photosynthesis. Maintaining the level of soil organic carbon reduces C release into the atmosphere and thus can lessen the effects of global warming.

SIC influences the types of plants that will grow. High SIC levels are commonly associated with a higher soil pH, which limits the types of plants that will thrive.

Like SOM, soil carbonates, the source of SIC, also bind soil particles together. They fill voids in the soil and thus can reduce soil porosity. Compacted soil carbonates may restrict root penetration and waterflow into the soil.

Chemical Soil Properties

Table 18 shows estimates of some chemical characteristics and features that affect soil behavior. These estimates are given for the layers of each soil in the park. 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 cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. Soils having a low cation-exchange capacity hold fewer cations and may require more frequent applications of fertilizer than soils having a high cation-exchange capacity. The ability to retain cations reduces the hazard of ground-water pollution.

Effective cation-exchange capacity refers to the sum of extractable cations plus aluminum expressed in terms of milliequivalents per 100 grams of soil. It is determined for soils that have pH of less than 5.5.

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.

Water Features

Table 19 gives estimates of various soil 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.

If a soil is assigned to a dual hydrologic group (A/D, B/D, or C/D), the first letter is for drained areas and the second is for undrained areas.

The *months* in the table indicate the portion of the year in which a water table, ponding, and/or flooding is most likely to be a concern.

Water table refers to a saturated zone in the soil. Table 19 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. The table 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 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.

Soil Features

Table 20 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 restrict roots or 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. *Depth to top* is the vertical distance from the soil surface to the upper boundary of the restrictive layer.

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, saturated hydraulic conductivity (K_{sat}), 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.

Formation and Classification of the Soils

This section relates the soils in Sleeping Bear Dunes National Lakeshore to the major factors of soil formation and describes the system of soil classification.

Factors of Soil Formation

By Susan Burlew Southard, Natural Resources Conservation Service.

Soil covers the surface of the earth as a three-dimensional body of varying thickness and is made up of different proportions of organic and mineral material, pore space with gases, and water. Soils differ in their appearance, productivity, and management requirements due to their chemical and physical properties. The characteristics and properties of soils are determined by physical and chemical processes that result from the interaction of five soil-forming factors. These factors of soil formation are interdependent, and few generalizations can be made regarding any one factor unless the effects of the other factors are known. The term "pedogenesis" is often used to connote the processes of soil formation.

The interacting soil-forming factors are parent material, climate, organisms, time, and relief or topography (Jenny, 1941). *Parent material* is the source material in which soils formed. Soils are influenced by the texture and structure of the parent material and its mineralogical and chemical composition. *Climate* is predominantly the temperature and kind and amount of precipitation. It is also seasonal distribution of temperatures and precipitation. *Organisms* are the plants and other organisms living in and on the soil, including humans. *Time* refers to how long the soil-forming factors have been operating on a particular landscape. *Relief* or *topography* is the shape and elevation of the landscape. It affects internal and external soil properties, such as soil drainage, aeration, susceptibility to erosion, and the soil's exposure to the sun and wind.

The processes of soil formation are a sequence of events, involving biogeochemical reactions that are energized by climate and spatially related to relief or topography (Buol et al., 2011). The physical and chemical properties of a soil are altered by these reactions over time. The influence of any one of these factors varies among all parks and within localities of a particular park. Soils may differ significantly from place to place in a park and within very short distances as a result of complex interactions among the five factors. In some cases, however, parks may have vast stretches of the same type of soil because of uniform soil-forming factors.

Setting of Sleeping Bear Dunes National Seashore

Understanding the setting of Sleeping Bear Dunes National Lakeshore (Sleeping Bear Dunes NL) helps in understanding the parent materials contributing to the types of soils within it. Understanding the soils of the park also helps in understanding the relationship between soils and the environment. Soil-forming processes are influenced by rock type, topographic expression, and the hydrologic properties of the area. Soil



Figure 1.—Parent materials for new soils on South Manitou are the dunes seen here at the bluffs. (Image courtesy of Lars Jensen)

formation influences soil properties and behaviors, which are used when determining best management practices.

Sleeping Bear Dunes NL is located along Lake Michigan on northwestern Michigan's lower peninsula. The park consists of 35 miles of Lake Michigan shoreline. It has prominent sand dunes rising as high as 450 feet above the lake. The park includes or borders several small inland lakes and the mouth of the Platte River at its south end. The mainland portion of the park is broken into three sections by the villages of Empire and Glen Arbor.

The park also includes North and South Manitou Islands, each about 6 miles from shore. These islands were high points of ridges that remained after the glaciers receded and were then covered by windblown sand. They are partially forested. North Manitou includes low-lying sandy regions in the southeast that rise to hills and 400-foot-high sand dunes in the northwest (fig. 1). South Manitou features dunes in the west and a wide, concave harbor in the east.

The physical geography of the broader landscape of the State of Michigan and the Great Lakes, including the park, is the result of the erosion and deposition of materials caused by the repeated advance and retreat of glaciers over the last 2 million years. Glaciers scoured the surface of the earth, leveled hills, and altered the previous landscape. Valleys created by the river systems of the previous era were deepened and enlarged to form the basins of the Great Lakes. As the climate warmed, the glaciers retreated. Glacial retreat was followed by an interglacial period during which vegetation and wildlife returned. This cycle was repeated several times. The most important glacial advance for northwestern Michigan in terms of shaping the recent landscape, including Sleeping Bear Dunes NL, was the Wisconsin stage, which retreated from Michigan about 9,500 to 15,000 years ago (USDI-NPS website). As the glaciers retreated, meltwater formed along the front of the ice.

Because the land was greatly depressed from the weight of the glaciers, large postglacial lakes formed. These lakes were much larger than the present-day Great Lakes. Evidence of these lakes can still be seen in the form of beach ridges, eroded bluffs, and flat plains situated hundreds of feet above present lake levels. Various soils have been identified on these landforms. Regional uplift (crustal rebound) caused dramatic changes in the depth, size, and drainage patterns of the post-glacial lakes. Evolving drainage patterns and fluctuating water velocities changed the distribution of the types and sizes of materials deposited. These changes in materials influenced the types of soils that would subsequently form from the deposits.

The steep headlands or bluffs of Sleeping Bear Dunes NL are characteristic of the Lake Michigan shoreline that resisted the force of the advancing ice and directed the ice lobes into the valleys. The ice lobes gouged debris from the valley floors, and the debris was deposited along the sides of the valleys as the ice melted, creating prominent moraines. Generally, these moraines and the valleys between them are oriented in a north-south direction. The formation of the Manistee end moraine is considered to be the climactic event of glacial processes that shaped the park area (USDI-NPS, 1961). The Manistee end moraine forms the uplands near Sleeping Bear Dunes NL.

The park lakeshore is covered by recent alluvium, dune sand, and Pleistocene glacial deposits (Handy and Stark, 1984). Sandy alluvium forms the present-day flood plains. The alluvial deposits of greatest areal extent in the park occur along the Platte River. Two levels of sand dunes occur in the lakeshore—dunes near the current level of Lake Michigan and dunes on plateaus that are old moraines set 300 feet above the lake (USDI-NPS, 2013).

Under the wave-cut bluffs east and north of the Otter Creek Lakes are a series of cold flowing springs. These springs flow southwesterly towards Otter Creek, which flows north-northwest. In this area a lake once existed, and the bed of the extinct lake is heavily underlain with marl deposits (USDI-NPS, 2013).

Parent Material

The unconsolidated mass in which soils form is called parent material. Mineral soil parent material is a product of the weathering of underlying bedrock in place or the weathering of material that has been transported. Organic soils form in place from the accumulation and decomposition of plant material, such as wood, leaves, and aquatic plants. Weathering refers to the chemical and physical disintegration and decomposition of parent material. Few soils weather directly from the underlying rocks. More commonly, soils form in materials that have been moved from elsewhere. Soils generally have a dominant kind of parent material but were influenced by other types of parent material. Material may have been moved only a few feet by gravity (colluvial parent material) or transported long distances by wind (loess or eolian parent material) or water (alluvial parent material).

Glaciofluvial deposits are parent materials deposited by glaciers that have been sorted and redeposited by water. In the northeastern and north-central parts of the United States, soil scientists make a distinction between the glacial fluvial processes of the past and the recent fluvial processes forming alluvium. Late Pleistocene deposits are often described as "outwash" or "glaciofluvial" and glaciolacustrine (glacial lake) deposits as "lacustrine," while Holocene flood-plain deposits (less than 10,000 years old) are termed "alluvium." For example, in Sleeping Bear Dunes NL, Kiva and Kaleva soils have glaciofluvial parent material, Bach soils are lacustrine, and Glendora soils on flood plains formed in sandy alluvium.

Soils are said to have residual parent material if they formed directly from underlying rocks or from an *in situ* plant source. Soils that formed in rock residuum may have the same general chemistry as the original rocks, depending on the degree of weathering that has occurred. No soils in Sleeping Bear Dunes NL formed entirely from residuum from rock sources although many are derived in part or predominantly from residual plant sources. Houghton soils are organic soils in depressional areas that formed in

plant residuum. Organic soils may have chemical and physical properties that are closely related to the original plants from which the soils formed.

The most common soil parent materials in Sleeping Bear Dunes NL are sandy glaciofluvial deposits, till, eolian deposits, and plant residuum. Many of the soils in the park formed in a combination of all of these parent materials. Table 5 lists the major soils in each map unit of the park and their most common landforms and parent material types.

Glaciofluvial Parent Material

Outwash or glaciofluvial deposits are stratified and sorted sediments (chiefly sand and gravel) removed or "washed out" from a glacier by meltwater streams and deposited in front of or beyond the end moraine or the margin of a glacier.

Outwash can have a variety of particle sizes. The particle-size distribution of outwash depends upon the velocity of the meltwaters carrying sediment away from the glaciers. In general, the higher the velocity of water, the larger the particle that water can transport. An outburst flood of a proglacial lake would have high velocity and energy and thus could carry larger rock fragments. Rock fragments found in outwash are more commonly subrounded to rounded because they were tumbled and polished during transport. Soils that formed from outwash may have a high rock content. Most of the soils that formed in glaciofluvial deposits in Sleeping Bear Dunes NL are sandy.

Certain landforms are associated with glaciofluvial deposits, and certain soils occur on these landforms. An *outwash plain* is an extensive lowland landscape of coarse textured, glaciofluvial material. It may be pitted with depressions called kettles that formed by melt-out of incorporated ice blocks of glaciers. A *lake plain* is a nearly level surface marking the floor of an extinct lake fill with well sorted, generally fine textured, stratified deposits. When outwash is confined within valley walls, the outwash deposit is known as a *valley train*. Outwash plains, lake plains, and valley trains are all identified in the park and are associated with certain soils (see table 5).

Soils that formed in glaciofluvial deposits in the park include Grattan, Covert, Coloma, Kaleva, Au Gres, Kalkaska, Mancelona, and Kiva.

Glaciolacustrine Deposits

Post-glacial lakes were formed either by the damming action of a moraine during the retreat of a melting glacier or by meltwater trapped against an ice sheet due to isostatic depression of the earth's crust. At the end of the last ice age (approximately 10,000 years ago), large post-glacial lakes were a widespread feature in the northern hemisphere.

Glaciolacustrine deposits developed in these post-glacial lakes. Lakebeds in the park formed after glacial retreat and during the post-glacial variations in the water level of Lake Michigan. The relict lake areas are now lake plains that have well sorted, generally fine textured, stratified deposits. Glaciolacustrine soils in Sleeping Bear Dunes NL commonly have a high content of silt throughout because the original deposits were silty. Figure 2 shows the relationship of soils to landscape position on lake plains along the Platte River.

Hettinger soils formed in glaciolacustrine deposits and are mapped near the southwestern edge of Lake Manitou, northwest of Narada Lake and northeast of Little Traverse Lake, south of Highway 22. Table 15 shows that Hettinger soils have a relatively high content of silt (ranging on average from 38 to 48 percent, by weight).

Many of the soils in the park formed in glacial lakes that existed just beyond the margin of an advancing or retreating glacier, generally in direct contact with the ice (USDA-NRCS, 2008). Alcona soils formed partially in this ice-margin lacustrine setting. These soils are mapped northeast of Little Traverse Lake in what would have been an extension of the lake during post-glacial times. Little Traverse Lake was cut off from

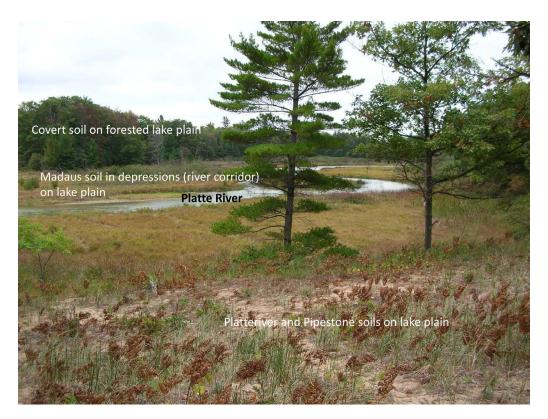


Figure 2.—Representation of the relationship of soils to landscape position along the Platte River. All of these soils formed on lake plains. Madaus soils have a high content of calcium carbonate derived from underlying marl deposits.

Lake Michigan by dunes that are identifiable by the shape and orientation of the east-to-west-running soil mapping lines north of the lake.

The soils in the area of Otter Creek formed in organic residuum over lacustrine deposits of marl. Marl is a lacustrine sediment common in post-glacial lake beds, and it commonly underlies peat bogs. It is rich in calcium carbonate and contains variable amounts of clay and silt. Soils with a high marl content are Edwards and Madaus. These soils have a high content of calcium carbonate and are neutral to alkaline in reaction. The marl is close enough to the surface of the earth to affect the properties and qualities of these soils. Other soils in the park may have buried marl deposits under them but the deposits are buried deep enough to not influence the soil properties at the depth typically observed by soil scientists. Boyer, Shavenaugh, Adrian, Spinks, Fern, Milnichol, and Nessen soils have marl influences in their deepest soil horizons, as evidenced by zones of calcium carbonate accumulation. Table 18 shows the distribution of calcium carbonate in soil horizons and gives pH for the major soils of each map unit in the park.

Till

Till is soil parent material transported and deposited directly by glaciers. It is dominantly unsorted and unstratified material deposited directly by a glacier without subsequent reworking by meltwater. It consists of a heterogeneous mixture of clay, silt, sand, gravel, cobbles, stones, and boulders. Till may have rock fragments of various lithologies that are imbedded within a finer matrix that can range from clay to sand (USDA-NRCS, 2008). The rock fragments generally are angular but can also

be subrounded or rounded. The composition of the till depends on the geology of the area over which the ice passed before the till was deposited. The till in turn affects the properties of the soils, such as kind and amount of rock fragments, color, texture, mineralogy, and pH. The material in the lower part of soils derived from till may be relatively unchanged from when it was deposited.

Different tills are on different landforms. In the park, drumlins are a common landform that formed from till. Drumlins occur in areas where the ice advanced over previously formed till plains. They are elongate in the direction of ice movement. Some tills in the park were deposited as till plains composed of either ground moraines or recessional moraines. A till plain is a broad landscape that forms when a sheet of ice melts in place and deposits the sediments it carried. It is an extensive, flat to gently undulating area underlain predominantly by till and bounded on the distal end by recessional or end moraines. An end terminal moraine is commonly the distal end of a moraine (USDA-NRCS, 2008).

Till-derived and partially till-derived soils in Sleeping Bear Dunes NL include Mollineaux, Remus, Fern, Emmet, Omena, Leelanau, Kalkaska, and Nester. These soils are associated with different moraines and, to a lesser extent, glacial till plains. For example, Fern soils have sandy glaciofluvial deposits over till, Emmet soils are on calcareous till, Omena soils are on loamy noncalcareous till, Kalkaska soils are on glaciofluvial deposits over till (fig. 3), and Nester soils are loamy over calcareous clayey and loamy till. East Lake soils are on moraines with a thick cap of windblown sands. Soils on moraines are in steeper landscape positions than most of the other soils in the park. It is difficult to closely associate soils with moraines consistently since the numerous advances and retreats of the ice left a series of moraines that were often partially or completely destroyed. Figure 4 is a representation of soils mapped on moraines and beach ridges in the park.

Eolian Material

Eolian material, such as windblown sand, is a type of parent material. Windblown loess, another type of eolian parent material, consists mainly of silt-sized particles. During interglacial periods, strong directional winds deposited silt great distances from their lacustrine or outwash origin. Soils influenced by loess have high silt contents in the upper horizons, whereas soils influenced by eolian sands have high sand contents. Windblown deposits buried till, glaciofluvial deposits, and lacustrine deposits in many areas of Sleeping Bear Dunes NL. Table 15 shows the distribution of sand, silt, and clay in the soils and can be used in conjuction with table 5 to determine what influenced the formation of individual soils.

The soils on wooded and active dunes, such as Deer Park, are almost pure eolian sand. A beach ridge is a low, essentially continuous ridge of beach and dune material that was heaped up by the action of waves and currents on the backshore of a beach, beyond the present limit of storm waves, and it occurs singly or as one of a series of approximately parallel deposits. The ridges are roughly parallel to the shoreline and represent successive positions of the retreating shoreline. Many of the higher ridges are dunes that formed due to the prevailing winds along the lakes. The dunes are either active (moving and unvegetated) or stabilized.

The soils on beach ridges and swales include excessively drained soils, such as the sandy Eastport, Deer Park, and Kalkaska soils; the poorly drained to very poorly drained Lupton and Markey muck soils; or the ponded Dair and Roscommon mucky sands. These soils are mapped as complexes due to the association of series of narrow ridges and swales, resulting from historic fluctuating lake levels, and to the formation of dune ridges and backwater sloughs. They are very pronounced in the Platte Bay area in the southwest part of the park, in the Good Harbor Bay area in the northeast part, and on the east side of South Manitou Island. These soils are home to a unique combination of very xerophytic plant communities, in areas on the dry



Figure 3.—Profile of a Kalkaska soil. Kalkaska soils are mapped extensively in Sleeping Bear Dunes National Lakeshore. They are very deep and somewhat excessively drained and formed in sandy deposits on outwash plains. The colorful profile displays some of the major soil-forming processes. Scale is in centimeters. (Image is from the soil survey of Luce County, Michigan.)

sands, and wetland plant communities, in areas of in mucky lowlands. These unique plant associations are due to the complex hydrologic regimes of the soils. The source materials for these soils are glacial outwash and till which were reworked by wind and wave action. Figure 5 shows the landscape-soil relationships in the vicinity of the park's dune climb.

Little Traverse Lake was cut off from Good Harbor Bay and Glen Lake (fig. 6) was cut off from Sleeping Bear Bay by a series of dunes. The dunes are mapped predominantly as Eastport and Deer Park soils, and the areas between the dunes in

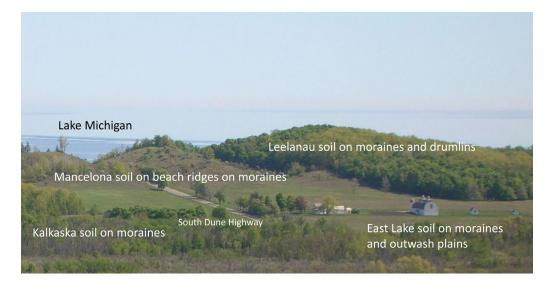


Figure 4.—Soils mapped in the vicinity of the South Dune Highway near Day Farm Road.

the dune slack are mapped as Roscommon soils. Dune slacks are low depressions that lie between dunes where the water table is closer to the surface. This environment produces particular plant associations because of spatial variability in soil wetness and protection from high winds.

Organic Residuum

Many of the soils in the park formed largely from plant residuum. These soils are common in depressions on outwash or lake plains, on moraines, or in dune slacks (like Roscommon soils). The lower, wetter landscape positions favor hydrophilic vegetation. Plants grow and die and their decomposition is retarded by wetness and cold, resulting in overall organic accumulation in the soil.

The contents of soil organic carbon and inorganic carbon for each soil in the park are shown in table 17. Soil organic carbon (SOC) is carbon (C) in soil that originated from a biological source, such as plants, animals, or micro-organisms. SOC makes up about one-half the weight of soil organic matter. The term "soil organic carbon" refers only to the carbon occurring in soil organic matter. Soil inorganic carbon (SIC) is carbon found in soil carbonates, usually as calcium carbonate layers or as clay-sized fractions throughout the soil. Carbonates in soils are most commonly found in areas where evaporation rates exceed precipitation, as is the case in most desert environments. In these dry areas, the carbonates typically accumulated from carbonatic dust or from carbonate-containing parent material. Some of the soils in the park, such as Madaus, have high levels of inorganic carbon as calcium carbonate due to underlying marl deposits. Madaus soils also have very high levels of organic carbon because they occur in depressions on till plains. Based on current soil survey data, Madaus soils have 78 kilograms per square meter (to a depth of 2 meters) of soil organic carbon and 50 kg/m² of soil inorganic carbon. This equals 128 kg/m² of soil carbon or about 580 tons of stored carbon per acre of land where the map unit is 100 percent Madaus soil. Madaus soils are very poorly drained and mapped along the Otter Creek drainage. These soils extend along the drainage to Bass Lake. Other areas of Madaus soils are around Mud and Loon Lakes and in areas adjacent to the Platte River, which drains Loon Lake. In contrast, Nester soils have almost the same amount of soil inorganic carbon (47 kg/m²) but only 5 kg/m² of soil organic carbon. These soils formed on better drained till plains and moraines.

Soils that have the highest contents of SOC are Adrian, Houghton, Edwards, Lupton, and Lumley. Contents range from 132 to 499 kg/m². All of these soils are mapped in depressions on till plains, lake plains, and moraines. Edwards soils are organic soils that are marly throughout and mapped in depressions north of North Bar Lake, in an area south of School Lake, and in an area surrounding Bow Lake. Houghton soils have the highest content of soil organic carbon—499 kg/m²—when calculated to a depth of 2 meters.

Soils with the highest content of SIC are Nester, Madaus, Hettinger, Bach, Omena, Emmet, and Alpena. Hettinger soils, for example, formed from organic residuum over silty lacustrine materials. They are mapped in depressions north of Narada Lake and southwest of Lake Manitou (on North Manitou Island).

As carbon levels in soil increase, carbon is "withdrawn" from the atmosphere and "secluded" in the soil. This is carbon sequestration. CO_2 and CH_4 are greenhouse gases. The process of soil carbon sequestration transfers CO_2 from the atmosphere into the soil.

One way SOC becomes sequestered is in a process called humification. In this process, soil organic matter (SOM), such as leaves, wood, roots, and animals, is decomposed and converted to humic substances. Humic substances are broadly defined products of organic matter decomposition that are relatively resistant to further microbial decomposition. Humic substances with high carbon contents can persist in the soil for hundreds to thousands of years. Examples are humic and fulvic acids and humins. Humification is a common soil-forming process in depressions in the park.

Water can transport both SOC and SIC in soil through the process of eluviation and illuviation. Eluviation is the lateral or downward movement of dissolved or suspended



Figure 5.—Deer Park soils are mapped in dune areas that have become stabilized by grasses. The moraines and drumlins in the distance are at the highest elevations in the park. Wetter soils that have a high content of organic soil carbon occur in depressions, while Mancelona and East Lake soils are in the higher landscape positions on outwash plains.



Figure 6.—Glen Lake is surrounded by sandy soils, such as Kalkaska, Mancelona, and East Park. (Image courtesy of Lars Jenson)

material in soil when rainfall exceeds evaporation. An illuviated zone is where the substances accumulate. Eluviation is a common soil-forming process in the sandy, humid, forested soils of Sleeping Bear Dunes NL.

Soil carbon can also be buried. Burial of SOC occurs in different ways. Burial of carbon-containing soil layers limits exposure of the carbon to the atmosphere and microbial degradation, thus preserving organic carbon in the soil. Floods along the Platte River can episodically bury, cover, and preserve old soil surface horizons with new sediment. Landslides along the bluffs can also bury SOC.

Erosion is a natural process in soils. Removal of soil from one place often results in burial of soil in another place. Burial of soil horizons that contain soil organic matter sequesters that carbon in the soil. Burial of carbon by dunes or landslides is a common process in the park.

Recent Alluvium

Alluvium is the type of parent material deposited by running water. It can have different textures, depending on whether the water moves quickly or slowly. The type of rocks occurring in the source region of the streams and rivers also determine the characteristics of the alluvium. Fast-moving water deposits gravel, cobbles, and sand. Slow-moving water leaves finer textured deposits (clay and silt) when sediments in the water settle out. In Sleeping Bear Dunes NL, Glendora soils formed in recent alluvium. These soils are of minor extent in the park and are only mapped in the corridor between Rush Lake and Long Lake.

Climate

Differences in climate can result in differences in soils. Temperature and moisture influence soil formation and are the two most commonly measured features of soil climate. Weathering is most active when soils are moist and warm because these soil conditions are conducive to rapid chemical reactions and increased biological activity in the soil. Cooler temperatures result in slower chemical reactions. While average temperatures and amounts of precipitation are important in determining soil

properties, the extremes of climate in any given locale also play a major role in soil formation.

The climate in Sleeping Bear Dunes NL is cool and humid. It is presumably similar to the climate under which the soils formed once the glaciers receded. Present-day climate variations are the result of topography and relief and distance from the lakes. The general climate is uniform throughout the area, but microclimates are modified locally by the proximity to Lake Michigan. Table 5 gives the mean annual precipitation of the soils in the area, and table 19 lists the occurrence of soil saturation or wetness (i.e., depth to water table) for each of the soils. Probable occurrences of flooding and ponding are also listed in table 19.

During periods of rainfall or snowmelt, water carrying dissolved or suspended solids moves through the soil in a process called leaching. Leaching becomes active with the onset of rainfall or snowmelt. Different temperatures and moisture amounts cause different patterns of weathering and leaching in the soil. Colder temperatures result in less weathering because of decreased microbial growth, decreased vegetation, and possibly frozen soil. Seasonal and daily changes in temperature affect moisture effectiveness, biological activity, rates of chemical reactions, and the kinds of vegetation.

Fluctuations in temperature and moisture affect the rate of organic matter production, decomposition, and accumulation and the weathering of minerals. These fluctuations can result in frost action.

A few of the soils in the park have a high potential for frost action, and many have a moderate potential. Frost heave is a natural pedogenic process that mixes and breaks up the soil surface. Table 20 lists the potential for frost heave (also referred to as frost action) as low, moderate, or high. Soils that have a high potential for frost action in the park are the poorly drained and very poorly drained Adrian, Houghton, Richter, Bach, Hettinger, Tonkey, Lupton, and Markey soils. Silty and loamy soils in certain soil temperature regimes are also frost-susceptible soils.

Frost heave can result in road potholes and cracked pavements and foundations. Table 9 lists the map units and soils that have a limitation for roads and streets due to frost action. This limitation results in higher maintenance costs for park roads and parking lots. Frost heave results from ice forming beneath the surface of soil during atmospheric freezing conditions. The ice grows in the direction of heat loss, which is vertically toward the surface, starting at the freezing boundary in the soil. A water supply is needed to keep the ice crystals growing. The growing ice is restrained by overlying soil, which applies a load that limits its vertical growth and promotes the formation of a lens-shaped area of ice within the soil (see figure 7). The processes of frost heave were more intense during past glacial times than today.

Organisms

Plants, animals, micro-organisms, and humans affect the formation and shape of soils. Plants capture solar energy via photosynthesis and transfer that energy to the soil, energy that is a fundamental driver of many soil processes. Abandoned animal burrows commonly are filled with loose material from the overlying horizons and transmit water more readily than the surrounding undisturbed soil material. Fungi and bacteria are the primary organisms that decompose organic matter and add nutrients to the soil. Organisms decompose leaves and mix them with the upper part of the soil, resulting in the cycling of nutrients and energy back to vegetation. Micro-organisms affect chemical exchanges between roots and soil. Animals and micro-organisms mix soils and form burrows and pores.

Humans also mix the soil extensively with land management practices or by creating, maintaining, and using roads and trails. Soils in the park were plowed and mixed for agriculture in the past.

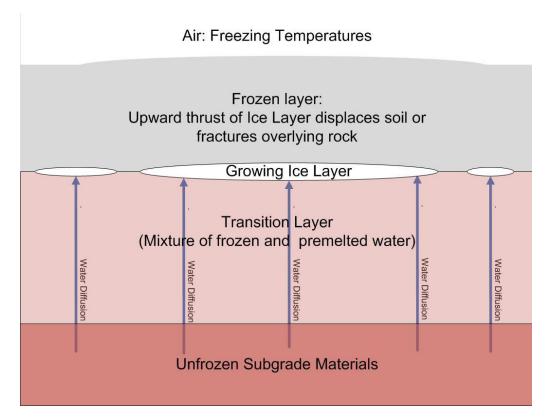


Figure 7.—Diagram illustrating ice lens formation in soils, which results in frost heave or frost action. (Image is from Williamborg [2009].)

The sand dunes of the park provide a distinctive environment for vegetation. Long roots and dense rhizomatous growth of dune grasses seek out water and help hold the dunes together. Grass roots are fibrous and decompose easily, adding organic matter and nitrogen to the soil. Thistles, bearberries, and other drought-resistant plants also contribute to dune stability.

Plant roots also help to develop soil structure and aggregate stability. Beach grass and sand cherry are among the first plants to grow on newly formed dunes. Juniper and jack pine can also root in the sand. These plants play an important role in dune development. They help build dunes by acting as obstacles that slow sand-laden wind and force it to drop the sand. If a strong wind succeeds in stripping plants from a dune, a bowl-shaped blowout may form in the exposed area. Some dunes migrate, pushed by the wind, and sometimes the shifting sands bury trees. As the dunes move on, "ghost forests" of dead trees are exposed (fig. 8).

Farther inland where the soil is more stable and has a higher water-holding capacity, beech/maple hardwood forests with some hemlock, basswood, and black cherry have taken over. Oak and white pine also grow slightly inland from the beach. These large plants of the forested ecosystem of Sleeping Bear Dunes NL affect soil formation. The trees help break up till with their growing roots, resulting in channels that increase water penetration. Besides the mechanical breaking of rocks by large tree roots, the trees capture energy and substance through photosynthesis and then, by the decomposition of plant residue, form organic-mineral complexes that are recycled many times within the ecosystem (Buol et al., 2011).

Differences in natural soil drainage and in parent material affect the composition of forests. In general, well drained upland soils, such as Grattan and Kaleva, were

covered with red oak and white pine. Wetter soils were covered with cedar, black spruce, and aspen. Leaf litter, whether leaves or needles, helps prevent nutrient loss, conserves soil moisture, reduces raindrop impact, and limits frost penetration. Vegetation increases soil stability by protecting the surface against wind and water erosion.

Native vegetation depends on climate, topography, and biological factors plus many soil factors, such as soil density, depth, chemistry, temperature, and moisture. The plant life on South Manitou Island is fairly representative of what the mainland was like before farming and deer grazing. The trees are mostly beech and maple, with a stand of huge white cedars in the southwest part of the island. Trillium grows on both lake islands, along with many other spring wildflowers (fig. 9).

Soils also play a large role in defining animal habitat types. The endangered piping plover nests on the sandy soils of the North Manitou shoreline, and the threatened prairie warbler nests in the mainland dunes along Lake Michigan. These birds move the sandy soils to provide shelter. Sandhill cranes can be found in some wetlands, and thrushes and warblers inhabit the drier woodlands.

Time

Time for parent material, climate, organisms, and topography to interact with the soil is also a soil-forming factor. Over time, soils exhibit features that reflect the interaction of other soil-forming factors. Recently deposited material, such as material deposited by a flood, exhibits no features from soil development activities and its properties are mostly inherited from the new material. The previous soil surface and underlying horizons become buried. The time clock resets for these soils. The different horizons in a soil profile and the degree of development can be directly related to time. Terraces above the active flood plain, while similar in origin to the flood plain, are older land surfaces of old abandoned flood plains and thus have soils with more horizon development.



Figure 8.—Migrating, unstabilized sand dunes cover and kill trees in some areas of the park. (Image courtesy of Lars Jensen)



Figure 9.—Trillium covers the forest floor in many areas of the park. (Image courtesy of Lars Jensen)

Most of the soils in the park have little soil development because they have only been forming since the last glaciation. Dair, Roscommon, Good Harbor, Coloma, and Nordhouse are the least developed soils. Where accumulation and translocation of organic material, clay, and iron have occurred, a colorful profile can develop. This development, however, is not solely a consequence of soil age but was also influenced by different weathering intensities. Well drained soils generally have better soil development than poorly drained soils because they have more water percolation through the profile. Poorer drained soils often lack the downward percolation of water, clays, iron oxides, etc.

The Wallace soil has had more intensive translocation than the Coloma soil even though both soils have existed for the same amount of time. Differences in the landforms on which these soils occur, the soil chemistry, and the soil hydrologic regimes probably account for the differences in the soil weathering between the two soils. Wallace soils are well drained forested soils that formed in sandy deposits on dunes, lake plains, and outwash plains with cemented material called orstein (see table 20). These soils occur on the Upper Peninsula of Michigan and in the northern part of the Lower Peninsula. In Sleeping Bear NL, they are mapped on both lake islands and in scattered areas in the northern part of the peninsula, but mostly just north of Little Traverse Lake. In the park, Coloma soils are also mapped between Crystal and Platt Lakes, south of Platt Road.

Topography and Relief

Topography refers to the shape of the landscape, and relief refers to differences in elevation. The overall landscape in a park, whether it consists of pitted outwash plains, hummocky dune hills, or level lake terraces, is the result of erosional and depositional processes. These processes may have occurred in response to changes in climate, fluctuating sea levels, glaciations, tectonic activities, and/or isostatic rebound. Isostatic rebound is the rise of the land surface after the ice formed during glacial periods recedes from the area. Cyclic periods of landscape stability and instability influence the types of soils that form on the landscape.

Development of the current landscape in the park took place during and after the last glaciation, approximately 10,000 years ago. The age of soils can be estimated

from the age of the geomorphic surfaces, such as the age of tills and outwash. The youngest geomorphic surfaces generally are flood plains, such as those associated with the Platte River and Otter Creek, where sandy alluvium has been deposited (fig. 10). Soils on flood plains, where flooding often occurs, are commonly hydric (see table 4). The location of hydric soils is influenced by topography and relief. Hydric soils in the park are on low-relief depressions, on flood plains, and in marshes.

Areas of stabilized older dunes have a rolling topography. This topography is evident along the Stocking Pierce Scenic Drive (fig. 11).

Slope shape and aspect of the overall landscape can affect the moisture and temperature of the soil. Steep slopes on moraines or drumlins facing the sun are warmer than those facing away from the sun. Steep soils may be eroded and lose their surface horizons as they form. Thus, steep soils may be shallower than the more nearly level ones that receive deposits from areas upslope, such as along some of the landslide areas of the park. Thicker, darker soils, such as Dair and Adrian, are common on bottom land or in depressions on lake plains or moraines. Relief and topography also influence the location of prime farmland map units. Table 3 list the map units considered prime farmland or farmland of local importance in the park. Generally, prime farmland soils are in level or gently rolling areas and are thick.

Figure 12 is a stylized diagram illustrating soils in relation to landscape and relief in the southern part of the park.

Processes of Soil Horizon Differentiation

A soil profile reflects the activities of the five soil-forming factors. A succession of layers or horizons is formed, extending from the surface down to the parent material.

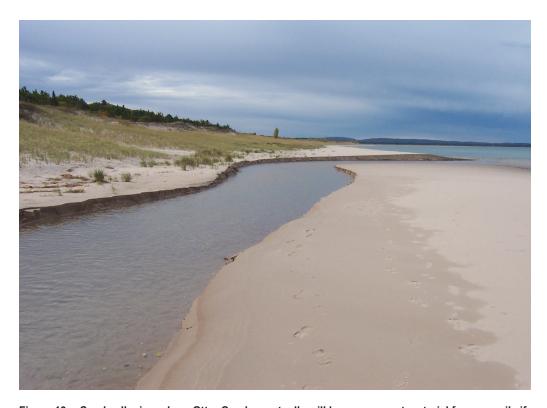


Figure 10.—Sandy alluvium along Otter Creek eventually will become parent material for new soils if, for example, lake levels drop or water courses change. The alluvium will become stabilized by plants, and weathering processes will intensify as the stability of the landscape increases.



Figure 11.—Soils mapped along the Stocking Pierce Scenic Drive include sandy soils that formed in dunes, such as Leelanau, Deer Park, and Kalkaska. (Image courtesy of Lars Jensen)

The horizons differ in one or more properties, such as thickness, color, texture, structure, consistence, porosity, and reaction (pH).

Several major processes are involved in the formation of soil horizons in Sleeping Bear Dunes National Lakeshore. The main soil-forming processes are illuviation, eluviation, podzolization, enrichment, decomposition, humification, and cumulization.

Illuviation is the movement of material *into* a horizon from another horizon while *eluviation* is the movement of material *from* a portion of the soil or horizon.

Podzolization is another process of illuvation and eluviation in which aluminum and iron and/or organic matter are moved, or *translocated*, through the profile. Podzolization includes the translocation of Al and Fe (due to the presence of acidic organic compounds, such as humic and fulvic acids) that results in the chelating of the metallic ions into organo-metallic complexes. The humus-metal complexes are concentrated into an *illuviated* horizon. Concentration of silica may occur in the layer *eluviated* (Buol et al., 2011). The acidic pine litter is key to podzol formation in northern sandy soils. A large percentage of the soils identified in the park have podzolization as a major soil-forming process. This soil-forming process is identified in the soil classification and by the chemical and physical properties.

Enrichment is the process of additions to the soil and is often used in describing organic matter enrichment to the soil surface.

Decomposition is the breakdown of mineral and organic materials to weathering by-products.

Humification is the transformation of organic matter into humic substances. Humic substances are broadly defined products of organic matter decomposition that are relatively resistant to further microbial decomposition. Humification is a type of *decomposition*.

Cumulization is the process of additions of mineral particles to the soil. An example is the cumulization of eolian material to the soils in the park.

An excellent example for the discussion of soil-forming processes is the Kalkaska series. Kalkaska is mapped extensively in the park and has also been named the

official State Soil of Michigan. Kalkaska soils are classified as Spodosols. Spodosols are extensive in the United States in areas that have cool, humid climates and quartzrich sands, and they may have fluctuating water tables. They also may have snow cover, which during a spring thaw flushes the soil with water. Most areas are covered by coniferous vegetation or a mix of hardwoods and conifers. Kalkaska soils formed in sandy outwash deposits and occur mostly on outwash plains. The soil-forming processes discussed above are shown in italics in the following paragraphs.

In the Kalkaska soil shown in figure 3, the 5 centimeters of surface soil has been enriched by organic material. Below the organic surface is a horizon that has been eluviated. This is evidenced by the light gray zone that extends to a depth of about 20 centimeters. This light-colored zone is called an albic horizon. Some of the gray material is in tongue-shaped pockets that extend to greater depths. Any organics that have been decomposed and humified in this eluviated zone have been moved to an illuviation zone. In figure 3, the illuviation zone has the darkest colors and a tongue morphology at depth. The tongue of spodic material that is visible in the left side of the image extends below a depth of 1 meter. The illuviated material is called spodic material and forms a spodic horizon below a depth of 20 centimeters. The tongues of albic and spodic material may have resulted from old tree roots or rodent burrows or from preferential flow paths along mineral material of contrasting pore size. In Kalkaska soils, some of the spodic materials have become cemented into orstein. These soils have a small of amount weakly cemented orstein. However, other soils of the park, such as Wallace, may have orstein that is continuous enough to restrict roots. Wallace soils, which are mapped in various locations in the park, have moderately cemented orstein that forms a continuous layer. The Kalvea soil has the same processes of horizon differentiation as Kalkaska and Wallace soils.

Soil profiles consist commonly of five major horizons—O, A, E, B, and C horizons. The O horizon consists of decomposing organic materials. The A horizon is a mineral horizon that has a content of organic matter that is higher than that of underlying

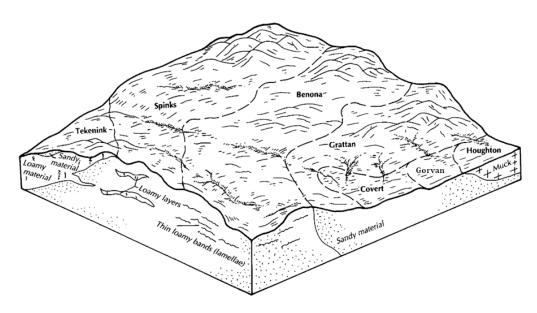


Figure 12.—Soils such as Benona, Spinks, and Grattan are on moraines and outwash plains in the southern portion of the park. Gorvan and Houghton soils are on flood plains. Houghton soils formed in residual plant material, while Gorvan soils formed in silty and clayey alluvium over sandy glaciofluvial deposits. Covert soils are in sandy glaciofluvial deposits on lake and outwash plains.

horizons but lower than that of overlying O horizon. The A horizon may be the surface layer if there is no O horizon.

The E horizon is a zone of maximum eluviation of materials. E horizons usually occur in wetter climates or wetter soil conditions on certain landscapes and may overlie a B horizon. The E horizon is often pale or white, having been stripped of all soil constituents that provide color.

The B horizon is a zone of accumulation of clay, iron, aluminum, or organic matter. B horizons are common in the park. Color plays an important part in distinguishing these horizons. The B horizon is the horizon of maximum accumulation of dissolved or suspended materials, such as iron, clay, or organic materials.

The C horizon is in the bottom part of a soil profile, is little affected by soil-forming processes, and is the horizon most related to the parent material.

Below is a description of the Kalkaska series. Although the location of the described pedon is outside the park boundary, descriptions of Kalkaska soils in the park are similar.

Kalkaska Series

The Kalkaska series consists of very deep, somewhat excessively drained soils that formed in sandy deposits on outwash plains, valley trains, moraines, and stream terraces. Slope ranges from 0 to 70 percent. Mean annual precipitation is about 762 millimeters (30 inches), and mean annual temperature is about 6.1 degrees C (43 degrees F).

Taxonomic Class

Sandy, isotic, frigid Typic Haplorthods

Typical Pedon Location

Kalkaska sand; in Kalkaska County, Michigan; on a west-facing, 1 percent slope in a forested area about 4 miles northwest of Darragh, 1,900 feet north and 100 feet east of the southwest corner of sec. 13, T.28 N., R.7 W., Rapid River Township; USGS Westwood topographic quadrangle; lat. 44 degrees 49 minutes 13 seconds N. and long. 85 degrees 6 minutes 35 seconds W. (Colors are for moist soil unless otherwise stated.)

- Oi—0 to 2 centimeters (0 to 1 inch); partially decomposed forest litter; strongly acid.
- A—2 to 5 centimeters (1 to 2 inches); black (7.5YR 2.5/1) sand, black (10YR 2/1) dry; weak fine granular structure; very friable; many fine and few medium and coarse roots; about 5 percent fine gravel; strongly acid; abrupt smooth boundary. (0 to 10 centimeters, or 4 inches, thick)
- E—5 to 13 centimeters (2 to 5 inches); brown (7.5YR 5/2) sand, gray (10YR 6/1) dry; weak fine granular structure; very friable; common fine and few medium and coarse roots; about 5 percent fine gravel; strongly acid; clear irregular boundary. (5 to 33 centimeters, or 2 to 13 inches, thick)
- Bhs—13 to 18 centimeters (5 to 7 inches); dark reddish brown (5YR 3/3) sand; weak fine granular structure; very friable; common fine and few medium and coarse roots; about 5 percent fine gravel; moderately acid; clear irregular boundary. (2 to 58 centimeters, or 1 to 23 inches, thick)
- Bs1—18 to 56 centimeters (7 to 22 inches); dark brown (7.5YR 3/4) sand; weak fine granular structure; very friable; few fine and medium roots; about 5 percent fine gravel; moderately acid; clear wavy boundary.
- Bs2—56 to 91 centimeters (22 to 36 inches); strong brown (7.5YR 4/6) sand; weak fine granular structure; very friable; few fine roots between ortstein columns; columns of weakly cemented, dark reddish brown (5YR 2.5/2) ortstein 8 to 13 centimeters

- (3 to 5 inches) wide extend through this horizon into BC horizon; ortstein columns are 48 to 61 centimeters (19 to 24 inches) apart; ortstein occupies 7 percent of this horizon; about 5 percent fine gravel; slightly acid; gradual wavy boundary. (Combined thickness of the Bs horizon is 0 to 76 centimeters, or 30 inches.)
- BC—91 to 130 centimeters (36 to 51 inches); yellowish brown (10YR 5/6) sand; weak fine granular structure; very friable; few fine roots between ortstein columns; columns of weakly cemented, dark reddish brown (5YR 2.5/2) ortstein 8 to 13 centimeters (3 to 5 inches) wide extend into this horizon from the Bs2 horizon; ortstein columns are 48 to more than 100 centimeters (19 to more than 40 inches) apart; ortstein occupies 11 percent of the horizon; about 5 percent fine gravel; slightly acid; gradual wavy boundary. (0 to 53 centimeters, or 21 inches, thick)
- C—130 to 203 centimeters (51 to 80 inches); light yellowish brown (10YR 6/4) sand; single grain; loose; about 5 percent fine gravel; slightly acid.

Classification of the Soils

Soils are named and classified on the basis of physical and chemical properties in their horizons (layers). Color, texture, structure, and other properties of the soil to a depth of 2 meters are used to key the soil into a classification system. This system helps people to use soil information and also provides a common language for scientists.

Soils and their horizons differ from one another, depending on how and when they formed. Soil scientists use the five soil-forming factors to help predict where different soils may occur. The degree and expression of the soil horizons reflect the extent of interaction of the soil-forming factors with one or more of the soil-forming processes (Simonson, 1959).

When mapping soils, a soil scientist looks for areas with similar soil-forming factors to find similar soils. The properties of the soils are described. Soils with the same kind of properties are given taxonomic names. Soils are classified, mapped, and interpreted on the basis of various kinds of soil horizons and their arrangement. The distribution of soil orders corresponds with the general patterns of the soil-forming factors within the park.

The system of soil classification used by the National Cooperative Soil Survey has six categories (Soil Survey Staff, 1999 and 2010). 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. The categories are defined in the following paragraphs.

ORDER. Soil taxonomy at the highest hierarchical level identifies 12 soil orders. The names for the orders and taxonomic soil properties relate to Greek, Latin, or other root words that reveal something about the soil. 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 Spodosol.

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. Sixty-four suborders are recognized at the next level of classification. The last syllable in the name of a suborder indicates the order. An example is Orthod (*Orth* meaning common, plus *od*, from Spodosol).

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. There are about 300 great groups. 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 Haplorthods (*Hapl*,

meaning minimal horizonation, plus *Orthod*, the suborder of the Spodisols that is common).

SUBGROUP. There are more than 2,400 subgroups. Each great group has a typic subgroup. The typic subgroup is the central concept of the great group; it is not necessarily the most extensive. Other subgroups are intergrades or extragrades. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other taxonomic class. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Haplorthods.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Generally, the properties for family placement are those of horizons below a traditional agronomic plow depth. Among the properties and characteristics considered are particle-size class, mineralogy class, cation-exchange activity class, soil temperature regime, soil depth, and reaction class. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is sandy, mixed, frigid Typic Haplorthods.

SERIES. The soil series is the lowest category in the soil classification system. 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. An example is the Kalkaska series, which is classified as sandy, mixed, frigid Typic Haplorthods.

Most parks are mapped to the series level. The names of soil series are selected by the soil scientists during the course of mapping. The series names are commonly geographic place names or are coined. Because of access limitations and soil variability, soils in some remote areas are classified at the great group or subgroup level.

Table 21 indicates the order, suborder, great group, subgroup, and family of the soil series in the park. Table 22 displays the classification as a key sorted by order.

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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.
- **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.
- 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

- **Base saturation.** The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, and K), expressed as a percentage of the total cation-exchange capacity.
- **Bedrock.** The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.
- **Canopy.** The leafy crown of trees or shrubs. (See Crown.)
- **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.
- **Clay.** As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

- **Claypan.** A 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.
- **Colluvium.** Soil material or rock fragments, or both, moved by creep, slide, or local wash and deposited at the base of steep slopes.
- **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.
- **Control section.** The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.
- **Corrosion.** Soil-induced electrochemical or chemical action that dissolves or weakens concrete or uncoated steel.
- **Crown.** The upper part of a tree or shrub, including the living branches and their foliage.
- **Culmination of the mean annual increment (CMAI).** The average annual increase per acre in the volume of a stand. Computed by dividing the total volume of the stand by its age. As the stand increases in age, the mean annual increment continues to increase until mortality begins to reduce the rate of increase. The point where the stand reaches its maximum annual rate of growth is called the culmination of the mean annual increment.
- **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.
- 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.
- **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.
- **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.
- **Erosion.** The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep. *Erosion* (geologic). Erosion caused by geologic processes acting over long
 - geologic periods and resulting in the wearing away of mountains and the building

up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of human or animal activities or of a catastrophe in nature, such as a fire, that exposes the surface.

Escarpment. A relatively continuous and steep slope or cliff breaking the general continuity of more gently sloping land surfaces and resulting from erosion or faulting. Synonym: scarp.

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.

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.

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.

Forb. Any herbaceous plant not a grass or a sedge.

Forest cover. All trees and other woody plants (underbrush) covering the ground in a forest.

Forest type. A stand of trees similar in composition and development because of given physical and biological factors by which it may be differentiated from other stands.

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.

Ground water. Water filling all the unblocked pores of the material below the water table.

Hard bedrock. Bedrock that cannot be excavated except by blasting or by the use of special equipment that is not commonly used in construction.

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.

- **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.
- **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.
- **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	

Ksat. Saturated hydraulic conductivity. (See Permeability.)

Leaching. The removal of soluble material from soil or other material by percolating water.

LEP. See Linear extensibility percent.

Linear extensibility (LE). 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.

Linear extensibility percent. Refers to the percent change in 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 strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

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.

Neutral soil. A soil having a pH value of 6.6 to 7.3. (See Reaction, soil.)

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

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.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The 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
	0.01 to 0.06 inch
	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.

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.

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.

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.

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 groundwater 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.
- **Saprolite.** Unconsolidated residual material underlying the soil and grading to hard bedrock below.
- **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.
- **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.
- **Series, soil.** A group of soils that have profiles that are almost alike. 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.
- **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.
- **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.
- **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
•	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
Clav	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.
- 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).
- **Subsoil.** Technically, the B horizon; roughly, the part of the solum below plow depth. **Substratum.** The part of the soil below the solum.
- **Subsurface layer.** Any surface soil horizon (A, E, AB, or EB) below the surface layer. **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.
- **Taxadjuncts.** Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior. Soils are recognized as taxadjuncts only when one or more of their characteristics are slightly outside the range defined for the family of the series for which the soils are named.
- **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."
- **Tilth, soil.** The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

- **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.
- **Upland.** Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.
- **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.

Tables

Table 1.-Soil Legend

Map unit symbol and map unit name	 Components in map unit	Percent of map unit
190775: Adrian-Houghton mucks	 Adrian	 55
	 Houghton 	 45
190777: Alcona-Richter sandy loams, 0 to 2 percent slopes	 Alcona	 55
	 Richter 	 30
190778:	Hettinger 	15
Alcona-Richter sandy loams, 2 to 6 percent slopes	 Alcona 	l 65 l
	Richter	25
	East Lake Kalkaska	5 5
190779:	I I	
Alpena gravelly sandy loam, 0 to 12 percent slopes	Alpena Kiva	90 5
	 Mancelona	 5
190780: Au Gres-Kalkaska sands, 0 to 4 percent slopes	 Au Gres	 45
na cres narnasna sanas, o co i persone sropes	 Kalkaska	 35
	 Markey	 10
	Roscommon	 10
190781: Bach loam	 Bach	 90
	 Edwards 	I 5
	Sanilac	5
190782: Deer Park sand, 6 to 18 percent slopes	 Deer Park 	 100
190783: Deer Park sand, 18 to 45 percent slopes	 Deer Park	 100
190784: Deer Park-Roscommon sands, 0 to 6 percent slopes	 Deer Park	 70
	 Roscommon	 25
	 Markey 	, 5
190786: Dune land	 Dune land 	 100

Table 1.-Soil Legend-Continued

	<u> </u>	Percent
Map unit symbol and map unit name	Components in map unit	of map unit
190787: East Lake loamy sand, 0 to 6 percent slopes	 East Lake	l I 90
hast lake roamy same, v to v percent stopes		1
	Kalkaska	J 5
	Mancelona	5
190788:	 	1
East Lake loamy sand, 6 to 12 percent slopes	East Lake	90
	 Iosco	2
	Kalkaska 	2
	Mancelona	2
	 Munuscong	2
	 Tonkey	 2
	l	-
190789: East Lake loamy sand, 12 to 18 percent slopes	 East Lake	l I 90
	I	i
	Kalkaska 	5
	Mancelona	5
190790:		
East Lake loamy sand, 18 to 25 percent slopes	East Lake	90
	 Kalkaska	5
	 Mancelona	l I 5
		i
190791: Eastport sand, 0 to 6 percent slopes	 Eastport	l I 93
	I	i
	Alpena 	7
190792:	177	. 70
Edwards muck-Marl beds complex	Edwards 	70
	Marl beds	20
	 Lupton	5
	 Markey	 5
		į
190794: Emmet-Leelanau complex, 2 to 6 percent slopes	 Emmet	I I 60
	1	İ
	Leelanau 	30
	East Lake	4
	 Alcona	3
	 Nester	l I 3
		i

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components	Percent of
map unit symbol and map unit name	in map unit	map unit
190795:	 	1
Emmet-Leelanau complex, 6 to 12 percent slopes	Emmet	60
	 Leelanau	30
	 East Lake 	5
	 Nester 	5
190796:	! 	1
Emmet-Leelanau complex, 12 to 18 percent slopes	Emmet 	50
	Leelanau 	30
	East Lake 	J 5
	Kalkaska 	5
	Nester	3
	 Wallace 	3
	 Alcona	2
	 Richter	2
190797:	I I	
Emmet-Leelanau complex, 18 to 25 percent slopes	I	50
	Leelanau 	30
	East Lake 	10
	Nester 	10
190799: Emmet-Leelanau complex, 25 to 50 percent slopes	 Emmet	 45
	 Leelanau	 30
	 East Lake	13
	 Nester	 12
190801:	 	i I
Emmet-Mancelona gravelly sandy loams, 4 to 12 percent slopes	 Emmet	, 70
225pc3	 Mancelona	70 25
	Ì	İ
	Nester] 3
	Kiva 	2

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	 Components in map unit	Percent of map unit
190803:	 	
Emmet-Mancelona gravelly sandy loams, 18 to 35 percent	 Emmet	 60
	 Mancelona	I I 30
	 Alpena	 2
	 Kiva 	 2
	 Lupton	 2
	 Markey 	 2
	 Nester	 2
190805: Emmet-Omena sandy loams, 2 to 6 percent slopes	 Emmet	 50
	 Omena	 45
	 Kiva	l 2
	 Leelanau	l 2
	 Nester	 1
190806: Emmet-Omena sandy loams, 6 to 12 percent slopes	 Emmet	 50
	Omena	 45
	 Hettinger	 1
	 Kiva 	 1
	 Leelanau 	, 1
	Nester	, 1
	 Tonkey 	, 1
190807: Emmet-Omena sandy loams, 12 to 18 percent slopes	 Emmet	 50
	 Omena	l 45
	 Kiva	 2
	 Leelanau	 2
	 Nester	 1
190808: Emmet-Omena sandy loams, 18 to 25 percent slopes	 Emmet	 50
	Omena	 45
	 Kiva	 2
	 Leelanau	 2
	 Nester 	 1

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components	Percent of map unit
190809:] 	I
Emmet-Omena sandy loams, 25 to 50 percent slopes	Emmet	50
	Omena	45
	 Kiva	1 2
	 Leelanau	1 2
	 Nester	1
190811:	 	
Hettinger-Muck complex	Hettinger 	45
	Muck 	30
	Kiva 	J 5
	Lupton	5
	Mancelona	5
	 Markey]] 3
	 Tonkey	l 3
	 Edwards	 2
	 Roscommon	 2
190812:	 	
Hettinger-Tonkey loams	Hettinger 	45
	Tonkey 	30
	Mancelona	5
	Markey	5
	Munuscong	5
	Roscommon	j j 5
	 Lupton]] 3
	 Epoufette	 2
190814: Kalkaska sand, 0 to 6 percent slopes	 Kalkacka	I 85
	I	ĺ
	Au Gres] 3
	East Lake] 3
	Iosco 	3
	Mancelona 	2
	Munuscong	2
	Tonkey 	, 2
	1	1

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components	Percent of map unit
190815: Kalkaska sand, 6 to 12 percent slopes	 Kalkaska 	
	 East Lake	, 5
	Emmet	I I 5
	 Leelanau	 3
	 Mancelona 	l 2
190816: Kalkaska sand, 12 to 18 percent slopes	 Kalkaska	 90
	 East Lake	 4
	 Alcona	 3
	 Mancelona	 3
	 Kalkaska 	 90
	 East Lake 	, 3
	 Leelanau 	, 3
	 Emmet	 2
	 Mancelona 	 2
190818: Kalkaska sand, 25 to 45 percent slopes	 Kalkaska	 90
	 East Lake	l 3
	 Mancelona 	l 3
	 Deer Park	 2
	 Wallace	 2
190819: Kalkaska-East Lake loamy sands, 0 to 6 percent slopes	 Kalkaska	 55
	 East Lake -	l 35
	 Alcona 	 2
	 Leelanau 	 2
	 Leelanau 	 2
	 Mancelona 	 2
	 Richter 	 2
190820: Kiva-Mancelona gravelly sandy loams, 2 to 6 percent slopes	 Kiva 	 65
	 Mancelona 	I 30
	 Alpena 	I 5

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
190821: Kiva-Mancelona gravelly sandy loams, 6 to 12 percent slopes		
stopes	· Kiva Mancelona	50 30
	 Alcona	 5
	 Alpena	 5
	 Emmet	 5
	 Richter	 5
190823: Kiva-Mancelona gravelly sandy loams, 18 to 25 percent		
slopes	Kiva 	50
	Mancelona Alpena	30 10
	 Leelanau	10 10
190824:		i
Lake beaches	Lake beaches	100
190825: Lake bluffs	 - Lake bluffs 	 100
190826: Leelanau-East Lake loamy sands, 0 to 6 percent slopes	 Leelanau	 60
	 East Lake	I I 30
	 Alcona 	1 4
	 Kalkaska	3
	 Mancelona 	, 3
190827: Leelanau-East Lake loamy sands, 6 to 12 percent slopes	 - Leelanau	 65
	 East Lake	l 25
	 Mancelona	 3
	 Alcona	2
	 Kalkaska	1 2
	 Nester	1 1
	 Richter 	1 1
	 Tonkey 	 1

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	 Components in map unit	Percent of map unit
190828:	1	
Leelanau-East Lake loamy sands, 12 to 18 percent slopes	Leelanau	65
	 East Lake 	25
	 Alcona	3
	 Kalkaska 	3
	 Mancelona	2
	 Nester	2
190829:	 	
Leelanau-East Lake loamy sands, 18 to 25 percent slopes	Leelanau 	50
	East Lake 	35
	Kalkaska	4
	Mancelona	4
	Nester	4
	Alcona	3
190830: Leelanau-East Lake loamy sands, 25 to 45 percent slopes	 	 50
neeranau nast nake roamy sanas, 25 to 45 percent stopes	 	35
) 3
	 Kalkaska	. 3
	 Mancelona	, 3 3
	İ	
	Nester	3
	Wind eroded land] 3
190831: Lupton-Markey mucks	 Lupton	60
	 Markey -	30
	 Edwards	5
	 Roscommon	5
190832:		
Mancelona sandy loam, 0 to 6 percent slopes	Mancelona 	90
	East Lake 	4
	Kiva] 3
	Nester 	3

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components	Percent of map unit
190833:	 	
Mancelona sandy loam, 6 to 12 percent slopes	Mancelona 	90
	East Lake 	4
	Kiva 	3
	Leelanau	3
190834: Mancelona-East Lake loamy sands, 0 to 6 percent slopes	 Mancelona	 60
	 East Lake	, 30
	Kalkaska]] 3
	 Kiva	I I 3
	 Leelanau	 2
	 Sanilac	 2
190835: Mancelona-East Lake loamy sands, 6 to 12 percent slopes	 Mancelona	 55
	 East Lake	I 35
	 Alpena	 3
	 Kalkaska	 3
	 Kiva	 3
	 Tonkey	 1
190836: Mancelona-East Lake loamy sands, 12 to 18 percent slopes	 Mancelona	 50
	 East Lake	I I 30
	 Kalkaska	 10
	 Kiva	 10
190837: Mancelona-East Lake loamy sands, 18 to 25 percent slopes	 Mancelona	 45
	 East Lake	I I 30
	 Kalkaska	 10
	 Kiva	 10
	 Adrian	 3
	 Houghton 	 2

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	Components	Percent of map unit
190838: Mancelona-East Lake loamy sands, 25 to 45 percent slopes	 Mancelona 	 50
	East Lake	30
	Emmet	5
	 Kalkaska 	5
	 Kiva	5
	 Leelanau 	 5
190839: Mancelona-Richter gravelly sandy loams, 0 to 6 percent slopes	 Mancelona	 70
	 Richter	 25
	 Epoufette	 2
	 Tonkey	 2
	 Wallace	 1
190840: Nester silt loam, 2 to 6 percent slopes	 Nester 	 90
	Emmet	4
	 Kalkaska 	, 3
	 Sanilac) 3
190841: Nester silt loam, 6 to 12 percent slopes	 Nester	 90
	Emmet	 4
	 Leelanau 	 3
	Omena 	, 3
190842: Nester silt loam, 12 to 18 percent slopes	 Nester	 90
	Emmet]] 3
	 Kalkaska	l 2
	 Leelanau	l 2
	 Omena	2
	 Wind eroded land 	 1
190843: Nester silt loam, 18 to 25 percent slopes	 Nester	90
	 Emmet	 4
	 Leelanau	 3
	 Omena 	 3

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	Components	Percent of map unit
190844: Nester silt loam, 25 to 50 percent slopes	 Nester	 90
,	 Emmet	 3
	 Leelanau	 3
	 Omena	 3
	 Kalkaska	 1
190846: Pits, gravel	 Pits, gravel	 100
190847: Richter-Alcona sandy loams, 0 to 2 percent slopes	 Richter 	 45
	Alcona	 40
	 Tonkey 	 15
190848: Richter-Alcona sandy loams, 2 to 6 percent slopes	 Richter	 45
	Alcona	 40
	 Tonkey 	, 10
	 Nester 	, 5
190849: Roscommon sand-Markey muck	 	 50
	 Markey	I I 30
	 Au Gres	 10
	 East Lake	 5
	 Kalkaska	 5
190850: Sanilac silt loam, 0 to 6 percent slopes	 Samilag	 90
	 Bach	90 4
	 Epoufette	 3
	 Hettinger	3 2
	 Edwards	. – ! ! 1
190851: Tonkey-Munuscong-Iosco sandy loams, 0 to 2 percent slopes-	 Tonkey	 40
	 Munuscong	 25
	 Iosco	 25
	 Au Gres	 4
	 Kalkaska	 3
	 Nester 	 3

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	Components	Percent of
Map unit symbol and map unit name	-	map unit
190852:	1	
Tonkey-Munuscong-Iosco sandy loams, 2 to 6 percent slopes-		35
	Munuscong	30
	 Iosco	20
	Au Gres	4
	Kalkaska	4
	Nester	4
	Hettinger	, 3
190853: Water	 Water	100
		100
190854: Wallace-Kalkaska sands, 2 to 12 percent slopes	 Wallace	50
	 Kalkaska	45
	 Eastport	 3
	Wind eroded land	2
190855: Wind eroded land, sloping	 Wind eroded land	100
190856: Wind eroded land, steep	 	 100
193236:	I	
Beaches	Beaches	100
193237: Thompsonville-Milnichol fine sands, 0 to 3 percent slopes-	 Thompsonville	 50
	 Milnichol	 40
	 Covert	l 5
	 Pipestone	l 5
193255:		<u> </u>
Spinks-Coloma sands, 0 to 6 percent slopes	Spinks	50 I
	Coloma	40
	Shavenaugh	4
	 Benona) 3
	Tekenink, sandy substratum	 3

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	 Components in map unit	Percent of map unit
193256: Spinks-Coloma sands, 6 to 12 percent slopes	 Spinks	 50
	 Coloma	 40
	 Shavenaugh	 4
	 Benona	l 3
	 Tekenink, sandy substratum 	 3
193257: Spinks-Coloma sands, 12 to 18 percent slopes	 Spinks	 55
	 Coloma 	 35
	 Shavenaugh 	 4
	 Benona 	, 3
	 Tekenink, sandy substratum 	' 3
193258: Spinks-Coloma sands, 18 to 35 percent slopes	 Spinks	 50
	 Coloma	 40
	 Benona -	l 5
	 Tekenink, sandy substratum 	 5
193260: Copemish sand, 3 to 12 percent slopes	 Copemish	 95
	 Covert 	 2
	 Grattan 	, 2
	 Saugatuck 	 1
193262: Kaleva sand, 0 to 6 percent slopes	 Kaleva	 95
	 Benzonia 	 2
	 Nessen 	 2
	 Grattan 	, 1
193263: Kaleva sand, 6 to 12 percent slopes		 95
	 Benzonia 	 2
	 Nessen 	 2
	 Grattan 	 1

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	Components	Percent of map unit
193265: Grattan sand, 0 to 6 percent slopes	 Grattan	
	 Kaleva	l 3
	 Shavenaugh 	 2
193266: Grattan sand, 6 to 12 percent slopes	 Grattan 	 95
	Kaleva	3
	 Shavenaugh 	 2
193267: Grattan sand, 12 to 18 percent slopes	 Grattan 	l 95
	Benona	3
	Shavenaugh 	, 2
193269: Grattan sand, 35 to 50 percent slopes	 Grattan	 95
	Benona	, 3
	Coloma 	 2
193270: Covert sand, 0 to 6 percent slopes	 Covert	 90
	 Grattan	, 3
	Pipestone	, 3
	 Saugatuck	l 2
	 Shavenaugh 	 2
193271: Pipestone sand, 0 to 4 percent slopes	 Pipestone	 90
	 Saugatuck	 4 -
	 Covert	I 3
	 Dair 	 3
193272: Dair muck	 Dair	 90
	 Adrian	I I 5
	 Pipestone 	l 5
193277: Benona sand, 0 to 6 percent slopes	 Benona	 90
	 Benzonia	l 3
	 Coloma	 3
	 Grattan	 2
	 Shavenaugh 	 2

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components	Percent of map unit
193278: Benona sand, 6 to 12 percent slopes	 Benona	
	 Benzonia	l 3
	 Coloma	l 3
	 Grattan	 2
	 Shavenaugh	 2
193279: Benona sand, 12 to 18 percent slopes	 Benona	 90
	 Coloma	 4
	İ	
	Fogg 	İ
100001	Shavenaugh] 3
193284: Udorthents-Udipsamments complex, very steep	 Udorthents	l 55
	 Udipsamments	 35
	 Coloma	l 5
	 Filer	l 5
193285: Lumley-Makinen complex	 Lumley	 55
	 Makinen	 40
	 Saugatuck	 5
193286:	I I	
Histosols and Aquents, ponded	I	55
	Aquents 	45
193287: Dune land-Quartzipsamments complex, hilly to very steep	 Dune land 	 55
	Quartzipsamments	40
	Nordhouse	, 5
193288: Udipsamments, nearly level and undulating	 Udipsamments 	
193342: Gorvan-Houghton-Glendora complex, frequently flooded	 Gorvan	 35
	 Houghton	l 30
	 Glendora	 20
	 Abscota	l 5
	 Adrian	 5
	 Dair	l 3
	 Aquents	 2
	I	I

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	Components	Percent of map unit
193349: Spinks-Coloma sands, 35 to 70 percent slopes	 Spinks	50
	 Coloma	 40
	 Benona	l 5
	 Tekenink, sandy substratum 	 5
193351: Benona sand, 18 to 35 percent slopes	 Benona	95
	 Coloma 	3
	 Fogg 	2
193354: Dune land-Quartzipsamments complex, undulating to hilly	 Dune land	50
	 Quartzipsamments	40
	 Nordhouse	4
	Goodharbor	3
	 Platteriver	3
193357: Shavenaugh sand, 18 to 35 percent slopes	 	85
	Nessen	5
	Boyer 	4
	Grattan	3
	Kaleva 	3
193359: Shavenaugh sand, 6 to 12 percent slopes	 Shavenaugh	85
	Nessen	5
	Boyer	4
	Grattan	3
	Kaleva 	3
193360: Shavenaugh sand, 0 to 6 percent slopes	 Shavenaugh 	 85
	 Nessen	5
	 Boyer 	4
	 Grattan	3
	 Kaleva 	3

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components	Percent of map unit
193362: Benzonia sand, 18 to 35 percent slopes	 Benzonia	 90
	Benona	3
	 Coloma	3
	 Fogg	2
	 Grattan	2
193363: Benzonia sand, 12 to 18 percent slopes	 Benzonia	 90
	 Benona	5
	 Coloma	l 3
	 Fogg	 2
193364:	 	
Benzonia sand, 6 to 12 percent slopes	Benzonia) 90
	Benona] 3
	Kaleva] 3
	Coloma] 2
	Nessen	2
193365: Benzonia sand, 0 to 6 percent slopes	 Benzonia 	90
	Benona	3
	Kaleva	3
	Coloma	2
	 Nessen 	2
193371: Dair-Pipestone complex, 0 to 2 percent slopes	 Dair 	 50
	Pipestone	40
	 Covert	5
	 Houghton 	 5
193372: Access Denied	 Access Denied 	 100
193423: Benona sand, 35 to 70 percent slopes	 Benona 	 95
	Coloma	3
	 Fogg	2
193484: Pits, sand and gravel	 Pits, sand and gravel 	 100

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	 Components in map unit	Percent of map unit
193494: Nordhouse sand, 18 to 70 percent slopes	 Nordhouse	
193496: Nordhouse sand, 6 to 18 percent slopes	 Nordhouse	 95
	 Platteriver	l I 3
	 Dair 	 2
193497: Nordhouse sand, 0 to 6 percent slopes	 Nordhouse	 95
	 Platteriver	l 3
	 Dair 	 2
193498: Nordhouse-Platteriver-Dair complex, 0 to 6 percent slopes-	 Nordhouse	 40
	 Platteriver	l 35
	 Dair 	 25
193503: Spinks-Shavenaugh sands, 0 to 6 percent slopes	 Spinks	 50
	 Shavenaugh	 40
	 Coloma	 4
	Boyer	l 3
	 Tekenink, sandy substratum 	 3
193504: Spinks-Shavenaugh sands, 6 to 12 percent slopes	 Spinks	 50
	Shavenaugh	 40
	Coloma	! 4
	 Boyer	I 3
	Tekenink, sandy substratum	 3
193505: Spinks-Shavenaugh sands, 12 to 18 percent slopes	 Spinks	 50
	 Shavenaugh	 40
 Coloma Boyer Tekenink, sandy substratum	 Coloma	 4
	 Boyer	 3
	 3 	

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components	Percent of map unit
193506: Spinks-Shavenaugh sands, 18 to 35 percent slopes	 Spinks	 50
	 Shavenaugh	 40
	 Coloma	l I 6
	 Tekenink, sandy substratum 	 4
193507: Spinks-Shavenaugh sands, 35 to 50 percent slopes	 Spinks	 50
	 Shavenaugh 	 40 -
	 Coloma	 4
	 Boyer	l 3
	 Tekenink, sandy substratum 	 3
193508: Madaus muck	 Madaus	 90
	 Dair -	l 5
	 Houghton	 5
193509: Boyer-Shavenaugh complex, 0 to 6 percent slopes	 Boyer	 50
	 Shavenaugh	I 40
	 Nessen	 4
	 Coloma	 3
	 Covert	l 3
193510: Boyer-Shavenaugh complex, 6 to 12 percent slopes	 Boyer 	 50
	 Shavenaugh	 40
	 Coloma	I 5
	 Nessen	l 5
193511: Boyer-Shavenaugh complex, 18 to 35 percent slopes	 Boyer	 50
	 Shavenaugh -	I 40
	 Coloma	l 5
	 Nessen 	 5
193513: Dair-Adrian mucks	 Dair	 50
	 Adrian	 45
	 Covert	 5
	I	i J

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	Components	Percent of
	in map unit	map unit
193514: Platteriver-Pipestone sands, 0 to 4 percent slopes	 Platteriver	l 55
	 Pipestone	I 40
	 Dair 	l 5
202010: Houghton-Adrian mucks	 Houghton	 55
	 Adrian	 40
	 Dair 	I 5
202016: Spinks-Tekenink, sandy substratum, complex, 0 to 6 percent slopes		 50
	 Tekenink, sandy substratum	 40
	 Coloma	 4
	 Remus	 3
	 Shavenaugh 	 3
631170: Fogg-Benzonia sands, 35 to 50 percent slopes	 Fogg	 50
	 Benzonia 	 40
	 Mollineaux 	 4
	 Coloma 	, 3
	 Grattan 	, 3
631171: Fogg-Benzonia sands, 18 to 35 percent slopes	 Fogg	l I 50
	 Benzonia	 40
	 Mollineaux	 4
	 Coloma	 3
	 Grattan 	I 3
631172: Fogg-Benzonia sands, 12 to 18 percent slopes	 Fogg	 50
	 Benzonia	 40
	 Benona	 4
	 Coloma	l 3
	 Mollineaux 	 3
	1	•

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components	Percent of map unit
631173:]
Fogg-Benzonia sands, 6 to 12 percent slopes	Fogg	50
	 Benzonia	 40
	 Tekenink, sandy substratum	 4
	 Benona	l 3
	 Kaleva 	 3
631174: Fogg-Benzonia sands, 0 to 6 percent slopes	' Fogg 	, 50
	Benzonia	40
	 Tekenink, sandy substratum	 4
	 Benona 	 3
	 Kaleva 	 3
680939: Fern-Spinks sands, 6 to 12 percent slopes	 Fern	, 50
	 Spinks	 40
	 Coloma	 5
	 Perrinton	, 5
680943: Milnichol fine sand, 0 to 4 percent slopes	 Milnichol 	 90
	Pipestone	4
	 Covert	 3
	 Thompsonville 	I 3
680945: Fern sand, 6 to 12 percent slopes	 Fern 	, 90
	 Marlette	, 4
	 Benzonia 	 3
	 Tekenink, sandy substratum 	 3
680946: Fern sand, 0 to 6 percent slopes	 Fern	 90
	 Marlette	 4
	 Benzonia	 3
	 Tekenink, sandy substratum 	 3

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	Components	Percent of map unit
680971: Nessen-Kaleva sands, 18 to 35 percent slopes	 Nessen	 50
	 Kaleva	 40
	 Shavenaugh	 5
	 Benzonia	l 3
	 Boyer	 2
680972: Nessen-Kaleva sands, 12 to 18 percent slopes	 Nessen	 50
	 Kaleva -	 40
	 Shavenaugh	l 5
	 Benzonia	l 3
	 Boyer	 2
680973: Nessen-Kaleva sands, 6 to 12 percent slopes	 Nessen	 50
	 Kaleva	 40
	 Shavenaugh	l 5
	 Benzonia	I 3
	 Boyer 	 2
680974: Nessen-Kaleva sands, 0 to 6 percent slopes	 Nessen	 50
	 Kaleva	 40
	 Shavenaugh	I I 5
	 Benzonia 	 3
	 Boyer 	 2
893251: Boyer-Shavenaugh complex, 12 to 18 percent slopes	 Boyer	 50
	 Shavenaugh	 40
	 Coloma	l 5
	 Nessen	l 5
894062: Remus-Spinks complex, 18 to 35 percent slopes	 Remus	 50
	 Spinks	 40
	 Coloma	 4
	 Benzonia	 3
	 Tekenink, sandy substratum	 3

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components	Percent of map unit
894063: Remus-Spinks complex, 12 to 18 percent slopes	 Remus	 50
	 Spinks	I 40
	 Coloma	 4
	 Benzonia	 3
	 Tekenink, sandy substratum 	 3
894064: Fern-Remus complex, 6 to 12 percent slopes	 Fern	 50
	 Remus	 40
	 Coloma	=0 5
	İ	İ
	Marlette 	5
894065: Fern-Remus complex, 0 to 6 percent slopes	 Fern	 50
	 Remus	 40
	 Coloma	l 5
	 Marlette	 5
894104: Mollineaux-Remus complex, 18 to 35 percent slopes	 Mollineaux	 50
	 Remus	 40
	 Coloma	l I 5
	 Benzonia	l 3
	 Onekama	l I 2
894105:	 	
Mollineaux-Remus complex, 12 to 18 percent slopes	Mollineaux 	50
	Remus	40
	Coloma	5
	 Benzonia 	, 3
	Onekama	 2
894165: Spinks-Tekenink, sandy substratum, complex, 35 to 50 percent slopes	 Spinks	I 50
	 Tekenink, sandy substratum	İ
	 Coloma	 4
	 Remus	 3
	 Shavenaugh 	 3

Table 1.-Soil Legend-Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
899682: Kaleva sand, 35 to 50 percent slopes	 	 90
and the state of t	 Benzonia	 5
	 Grattan	 5
899722: Goodharbor sand, 1 to 12 percent slopes	 Goodharbor	 90
	 Nordhouse	l 5
	 Platteriver 	I 5
899731: Covert-Pipestone sands, 0 to 6 percent slopes	 Covert	 50
	Pipestone	40
	 Dair 	, 5
	Saugatuck 	5
899733: Covert-Dair complex, 0 to 6 percent slopes	 Covert 	 50
	 Dair 	45
	Pipestone	, 3
	Houghton	, 2
899734: Benzonia sand, 35 to 50 percent slopes	 Benzonia 	 90
	Benona	, 3
	 Coloma	 3
	 Fogg	 2
	 Grattan 	 2

Table 2.-Land Capability Classification

(Land capability classification is a system of grouping soils primarily on the basis of their capability to produce common cultivated crops and pasture plants without deteriorating over a long period of time. Only the soils suitable for cultivation are listed. Capability is given for nonirrigated areas)

Map unit symbol and component name	Land capability
190775:	
Adrian	 6w
Houghton	 6w
190777:	i
Alcona	2s
Richter	 2w
190778:	i
Alcona	2e
Richter	 2e
190779:	! !
Alpena	6s
190780:	i
Au Gres	4w
Kalkaska	4s
190781:	i
Bach	5w
190782:	! !
Deer Park	7s
190783:	i
Deer Park	7s
190784:	i
Deer Park	7s
Roscommon	 6w
190787:	İ
East Lake	4s
190788:	i
East Lake	6s
190789:	i
East Lake	6s
190790:	i
East Lake	7s
190791:	i
Eastport	6s
190792:	i
Edwards	6w
Marl beds	 7w
	1

Table 2.—Land Capability Classification—Continued

	<u> </u>
Map unit symbol and component name	Land capability
190794:	
Emmet	2e
Leelanau	3s !
190795:	
	İ
Leelanau	3e
190796: Emmet	 4e
Leelanau	 4e
190797:	I
Emmet	 6e
Leelanau	 6e
190799:	!
Emmet	7e
Leelanau	7e
190801:	 3e
Mancelona	İ
190803: Emmet	1 7e
Mancelona	 7e
190805:	
Emmet	2e
Omena	2e
190806: Emmet	 3e
Omena	 3e
	Je
190807: Emmet	 4e
Omena	 4e
190808:	
Emmet	6e
Omena	6e
190809:	' 7e
	İ
Omena	7e
190811: Hettinger	 5w
Muck	 6w
	I

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	Land Land capability
190812:	
Hettinger	5w
Tonkey	5w
190814: Kalkaska	 4s
190815:	
Kalkaska	6s
190816:	
Kalkaska	6s
190817: Kalkaska	 7-
kalkaska	7s
190818: Kalkaska	 7s
Naixaska	75
190819: Kalkaska	 4s
	i
East Lake	4s
190820: Kiva	 3s
	İ
Mancelona	
190821:	İ
Kiva	4e
Mancelona	
190823:	
Kiva	6e
Mancelona	 6e
190826:	
Leelanau	3s
East Lake	4s
190827:	
Leelanau	3e
East Lake	 6s
190828:	
Leelanau	4e
East Lake	 6s
190829:	
Leelanau	6e
East Lake	 7s
190830:	i
Leelanau	7e
East Lake	l 7s

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	Land Land capability
190831:	
Lupton	6w
Markey	5w
190832: Mancelona	 3s
190833: Mancelona	 3e
190834: Mancelona	 3s
East Lake	 4s
190835: Mancelona	 3e
East Lake	 6s
190836: Mancelona	 4e
East Lake	 6s
190837: Mancelona	 6e
East Lake	 7s
190838: Mancelona	 7e
East Lake	 7s
190839: Mancelona	
Richter	 2e
190840: Nester	 2e
190841: Nester	 3e
190842: Nester	 4e
190843: Nester	 6e
190844: Nester	 7e
190847: Richter	 2w
Alcona	 2s

Table 2.—Land Capability Classification—Continued

	<u> </u>
Map unit symbol and component name	Land capability
190848:	1
Richter	 2e
Alcona	 2e
190849:	i
Roscommon	6w
Markey	5w
190850:	İ
Sanilac	2e
190851:	İ
Tonkey	5w
Munuscong	I
Iosco	3w
190852:	I
Tonkey	5w
Munuscong	5w
Iosco	3w
190854: Wallace	
wallace	6s
Kalkaska	 6s
193237:	
Thompsonville	4s
Milnichol	4w
193255:	i
Spinks	3s
Coloma	4s
193256:	i
Spinks	3e
Coloma	6s
193257:	i
Spinks	4e
Coloma	 6s
193258:	i
Spinks	6e
Coloma	, 7s
193260:	i
Copemish	6s
193262:	i
Kaleva	4s

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	 Land capability
193263: Kaleva	 6s
193265: Grattan	 4s
193266: Grattan	 6s
193267: Grattan	 6s
193269: Grattan	 7s
193270: Covert	 4s
193271: Pipestone	 4w
193272: Dair	 5w
193277: Benona	' 4s
193278: Benona	 6s
193279: Benona	 6s
193284: Udorthents	' 7e
Udipsamments	7s
193285: Lumley	I
Makinen	6w
Histosols	8w
Aquents	8w
Quartzipsamments 193288:	
Udipsamments	7s 7s
Gorvan	 6w
Houghton	5w

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	 Land capability
193349: Spinks	 7e
Coloma	1
193351: Benona	 7s
193354: Quartzipsamments	
193357: Shavenaugh	 7s
193359: Shavenaugh	 6s
193360: Shavenaugh	i I I
193362: Benzonia	
193363: Benzonia	i I
193364: Benzonia	 6s
193365: Benzonia	 4s
193371: Dair	 5w
Pipestone	İ
193423: Benona	 7s
193494: Nordhouse	 7s
193496: Nordhouse	 7s
193497: Nordhouse	 4s
193498: Nordhouse	 4s
Platteriver	 4s
Dair	 5w
193503: Spinks] 3s
Shavenaugh	 4s

Table 2.—Land Capability Classification—Continued

	1
Map unit symbol and component name	Land capability
193504: Spinks	 3e
Shavenaugh	İ
193505:	İ
Spinks	 4e
Shavenaugh	 6s
193506: Spinks	 6e
Shavenaugh	1
193507: Spinks	l 7e
Shavenaugh	1 7s
193508: Madaus	 5w
193509:	
Boyer	3s
Shavenaugh	 4s
193510: Boyer	 3e
Shavenaugh	I
193511:	
Boyer	7e
Shavenaugh	1 7s
193513: Dair	' 5w
Adrian	ĺ
193514:	İ
Platteriver	4s
Pipestone	4w
202010: Houghton	 5w
Adrian	1
202016:	
Spinks	1
Tekenink, sandy substratum	2e
631170: Fogg	 7s
Benzonia	i
	İ

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	Land
631171:	
Fogg	7s
Benzonia	l 7s !
631172:	i I
Fogg	7s
Benzonia	ı 6s ı
631173:	İ
Fogg	6s
Benzonia	' 6s
631174:	İ
Fogg	3s
Benzonia	' 4s
680939:	İ
Fern	3e
Spinks	' 3e
680943:	i İ
Milnichol	4w
680945: Fern	' 3e
680946:	
Fern	, 3s
680971:	
Nessen	7s
Kaleva	 7s
680972:	
Nessen	6s
Kaleva	l 7s
680973:	!
Nessen	6s
Kaleva	 6s
680974:	!
Nessen	4s
Kaleva	l 4s
893251:	'
Boyer	4e
Shavenaugh	 6s
	!
894062:	
894062: Remus	7e

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	 Land capability
204052	!
894063: Remus	 4e
Spinks	 4e
894064: Fern	
rern	3e
Remus	3e !
894065:	i
Fern	3s
Remus	 2e
894104:	i
Mollineaux	1 7e
Remus	1 7e
894105:	!
Mollineaux	4e
Remus	 4e
894165:	i I
Spinks	7e
Tekenink, sandy substratum	1 7e
899682:	
Kaleva	7s
899722:	!
Goodharbor	6s
899731:	
Covert	4s
Pipestone	 4w
899733:	
Covert	4s
Dair	l 5w
899734:	
Benzonia	7s

Table 3.-Prime and Other Important Farmland

(Only the soils considered prime or important farmland are listed. Urban or built-up areas of the soils listed are not considered prime or important farmland. If a soil is prime or important farmland only under certain conditions, the conditions are indicated in the column "Farmland Classification")

Map unit symbol	Map unit name 	Farmland classification
190777	 Alcona-Richter sandy loams, 0 to 2 percent slopes	 Prime farmland if drained
190778	Alcona-Richter sandy loams, 2 to 6 percent slopes	Prime farmland if drained
190781	Bach loam	Prime farmland if drained
190794	Emmet-Leelanau complex, 2 to 6 percent slopes	All areas are prime farmland
190795	Emmet-Leelanau complex, 6 to 12 percent slopes	Farmland of local importance
190796	Emmet-Leelanau complex, 12 to 18 percent slopes	Farmland of local importance
190801	Emmet-Mancelona gravelly sandy loams, 4 to 12 percent slopes	Farmland of local importance
190805	Emmet-Omena sandy loams, 2 to 6 percent slopes	All areas are prime farmland
L90806	Emmet-Omena sandy loams, 6 to 12 percent slopes	Farmland of local importance
190807	Emmet-Omena sandy loams, 12 to 18 percent slopes	Farmland of local importance
L90812	Hettinger-Tonkey loams	Prime farmland if drained
190820	Kiva-Mancelona gravelly sandy loams, 2 to 6 percent slopes	Farmland of local importance
L90821	Kiva-Mancelona gravelly sandy loams, 6 to 12 percent slopes	Farmland of local importance
L90826	Leelanau-East Lake loamy sands, 0 to 6 percent slopes	Farmland of local importance
L90827	Leelanau-East Lake loamy sands, 6 to 12 percent slopes	Farmland of local importance
190839	Mancelona-Richter gravelly sandy loams, 0 to 6 percent slopes	Farmland of local importance
.90840	Nester silt loam, 2 to 6 percent slopes	All areas are prime farmland
.90841	Nester silt loam, 6 to 12 percent slopes	Farmland of local importance
L90842	Nester silt loam, 12 to 18 percent slopes	Farmland of local importance
.90847	Richter-Alcona sandy loams, 0 to 2 percent slopes	Prime farmland if drained
.90848	Richter-Alcona sandy loams, 2 to 6 percent slopes	Prime farmland if drained
.90850	Sanilac silt loam, 0 to 6 percent slopes	Prime farmland if drained
190851	Tonkey-Munuscong-Iosco sandy loams, 0 to 2 percent slopes	Prime farmland if drained
.90852	Tonkey-Munuscong-Iosco sandy loams, 2 to 6 percent slopes	Prime farmland if drained

Table 4.—Hydric Soils

(This report lists only those map unit components that are rated as hydric. Definitions of hydric criteria codes are included at the end of the report)

	1	1			cic soils cr		
Map unit symbol and	Component	Percent		Hydric	Meets	Meets	
map unit name	I	of map		criteria	saturation	-	
	<u>!</u>	unit	<u> </u>	code	criteria	criteria	criteria
190775:	 		 	2 1	 	 	
Adrian-Houghton mucks	Adrian 		depressions on outwash	3, 1	No 	No 	Yes
	 		plains, depressions on moraines			 	
	 Houghton 	İ	 depressions on lake plains, depressions on outwash plains	3, 1	No 	 No 	Yes
190777:	i	i			i	! 	!
Alcona-Richter sandy loams, 0 to 2 percent slopes	Hettinger 	15 	depressions on lake plains 	3, 2B3	Yes 	No 	Yes
190780:	İ	i			i	i I	İ
Au Gres-Kalkaska sands, 0 to 4 percent slopes	Markey 	1	depressions on outwash plains, depressions on lake plains, depressions on moraines	1, 3	No 	No 	Yes
	 Roscommon 		 depressions on lake plains, depressions on outwash plains	2B1, 3	Yes 	 No 	 Yes
190781:	i I	i	! 		i	! 	!
Bach loam	Bach 		depressions, lake plains	2B3, 3	Yes	No 	Yes
	Edwards 	, 5 	depressions on moraines, depressions on outwash plains	3, 1	No 	No 	' Yes
190784:	i	i			i	! 	!
Deer Park-Roscommon sands, 0 to 6 percent slopes	Roscommon 	 	depressions on lake plains, depressions on outwash plains	2B1, 3	Yes	No 	Yes
	 Markey 	 	 depressions on	1, 3	No 	No 	 Yes

Table 4.-Hydric Soils-Continued

	Ī	1	I I	Hydr	ic soils cr	iteria	
Map unit symbol and	Component	Percent		Hydric	Meets	Meets	
map unit name	!	of map		criteria	saturation		-
	<u> </u>	unit	<u> </u>	code	criteria	criteria	criteria
190788:	i	i	' 		İ	' 	'
East Lake loamy sand,	Munuscong	2	depressions on	2B3, 3	Yes	l No	Yes
6 to 12 percent	1	1	lake plains,		1	I	l
slopes		!	depressions on			!	<u> </u>
	 		outwash plains 		! !	l I	
	Tonkey	, 2	outwash plains,	2B3, 3	Yes	No	Yes
	1	I	depressions on		I	I	l
	!	•	lake plains,		!	Į.	!
			depressions on		1	!	!
	 	i	glacial drainageways		! !	! 	!
	i	i			i	İ	İ
190792:	!	!	l		I	1	l
Edwards muck-Marl beds	Edwards		depressions on	1, 3	No	No	Yes
complex	1	1	moraines, depressions on		 	! !	
	i	i	outwash plains		i I	i	i I
	Ì	İ	I - I		Ì	ĺ	İ
	Marl beds	20	depressions	3, 2B3	Yes	No	Yes
	 Lupton	I I 5	 depressions on	3, 1	I No	I I No	ı I Yes
	İ		lake terraces,	•	İ	İ	İ
	1	I	moraines, till		I	I	l
		1	plains		!	I	l
	 Markey	I I 5	 depressions on	3, 1	I No	I No	 Yes
	į -		outwash plains,		İ	İ	ĺ
	!	1	depressions on		I	I	l
		!	lake plains,		1	!	
	I I	<u> </u>	depressions on moraines		i i	! 	!
	i	i	i i		i	i İ	I
190803:	 	1		2 1		77-	
Emmet-Mancelona gravelly sandy loams,	Lupton		depressions, lake terraces,	3, 1	l No	l No	Yes
18 to 35 percent	i		moraines, till		i	i	i I
slopes	Ì		plains		Ì	ĺ	İ
	 Mombos	l l 2		1 2	 No	 No	
	Markey	•	depressions on outwash	1, 3	l No	l No	Yes
	i		plains,		i	i	i I
	i	i	depressions on		i	i İ	İ
	1	1	lake plains,		I	I	l
		!	depressions on		1		<u> </u>
	1	1	moraines 		! 	! 	!
190806:	i	i	i i		İ	i I	I
Emmet-Omena sandy	Hettinger		depressions on	3, 2B3	Yes	l No	Yes
loams, 6 to 12	1	1	lake plains		1	<u> </u>	l
percent slopes	 Tonkey	1 1	 outwash plains,	2B3, 3	 Yes	l I No	l I Yes
			depressions on		. <u>-65</u>	, <u></u> 0	, <u>-</u> 55
	1		lake plains,		I	I	I
	!		depressions on		I	1	l
	1	1	glacial		1	<u> </u>	l
	1	I	drainageways		I	I	I

Table 4.-Hydric Soils-Continued

	1	I	l I	Hydr	ic soils cr	iteria	
Map unit symbol and	Component	Percent	Landform	Hydric	Meets	Meets	•
map unit name	1	of map		criteria	saturation		
	<u> </u>	unit	<u> </u>	code	criteria	criteria	criteria
190811:	1	1	 		 	 	
Hettinger-Muck complex	Hettinger 	45 	depressions on lake plains	2B3, 3	Yes	No No	Yes
	Muck	30	 depressions	1, 3	No	No	 Yes
	Lupton 	, 5 	depressions on lake terraces, moraines, till plains	3, 1	No 	No 	Yes
	 Markey 	3 	depressions on outwash plains, depressions on lake plains, depressions on moraines	3, 1	I No 	No 	Yes
	Tonkey 	3 	outwash plains, depressions on lake plains, depressions on glacial drainageways	2B3, 3	Yes	No 	Yes
	Edwards 	2 	depressions on moraines, depressions on outwash plains	1, 3	No 	No 	Yes
	 Roscommon 	2 	 depressions on lake plains, depressions on outwash plains	3, 2B1	Yes 	No No 	 Yes

Table 4.-Hydric Soils-Continued

	I	1		Hydr	ic soils cr	iteria	
Map unit symbol and map unit name	Component 	Percent of map	İ		Meets saturation		ponding
	<u> </u>	unit	<u> </u>	code	criteria	criteria	criteria
190812: Hettinger-Tonkey loams	 Hettinger 	 45 	 	3, 2B3	 Yes 	 No 	 Yes
	 Tonkey 	 	outwash plains, depressions on lake plains, depressions on glacial drainageways	2B3, 3	Yes 	No 	Yes
	 Markey 	 	depressions on outwash plains, depressions on lake plains, depressions on moraines	1, 3	No 	No No 	Yes
	 Munuscong 	1	 depressions on lake plains, depressions on outwash plains	2B3, 3	Yes 	 No 	 Yes
	 Roscommon 	1	 depressions on lake plains, depressions on outwash plains	2B1, 3	Yes 	No No 	 Yes
	 Lupton 	1	depressions, lake terraces, moraines, till plains	1, 3	No 	No No 	Yes
	 Epoufette 		 depressions on lake plains 	2B2, 3	 Yes 	No 	 Yes
190814: Kalkaska sand, 0 to 6 percent slopes	 Munuscong 	1	 depressions on lake plains, depressions on outwash plains	2в3, 3	 Yes 	 No 	 Yes
	 Tonkey 	 	outwash plains, depressions on lake plains, depressions on glacial drainageways	3, 2B3	Yes Yes 	No 	 Yes
190827: Leelanau-East Lake loamy sands, 6 to 12 percent slopes	 Tonkey 	 			 Yes 	No	 Yes

Table 4.-Hydric Soils-Continued

Management of the control of the con					ic soils cr		1 37
Map unit symbol and	Component	Percent		Hydric		Meets	
map unit name	1	of map unit		criteria code	saturation criteria	_	
	<u> </u>	1	<u>' </u>	Code	CIICCIIA	I	I
190831:	i	i	i i		i	İ	i
Lupton-Markey mucks	Lupton		depressions on	1, 3	l No	No No	Yes
	!		lake terraces,		!	 -	!
	1		moraines, till		!	 	l
	! !	1	plains 		1	l I	!
	 Markey	30	depressions on	3, 1	l No	No	Yes
	I -	1	outwash		1	I	I
	I		plains,		1	I	I
		!	depressions on		1	<u> </u>	<u> </u>
	! !	1	lake plains, depressions on		1	l I	! !
	i	i	moraines		i	' 	i I
	İ	i	i i		İ	I	İ
	Edwards		depressions on	3, 1	No	No	Yes
	!	!	moraines,		!	!	!
	1	1	depressions on outwash plains		1	l I	
	i	i			i	! 	i I
	Roscommon	5	depressions on	2B1, 3	Yes	No	Yes
	I		lake plains,		1	I	l
	!	!	depressions on		!	 -	!
	1		outwash plains		!	l i	
190835:	! 	i	' ' 		1	I 	!
Mancelona-East Lake	Tonkey	j 1	outwash plains,	3, 2B3	Yes	No	Yes
loamy sands, 6 to 12	I	1	depressions on		1	I	l
percent slopes	1		lake plains,		1	l	l
		!	depressions on		1	<u> </u>	<u> </u>
	! !	1	glacial drainageways		1	l I	! !
	i	i			i	' 	i I
190837:	İ	i	i i		İ	İ	İ
Mancelona-East Lake	Adrian	3	depressions on	3, 1	No	No	Yes
loamy sands, 18 to 25		!	moraines,		1	<u> </u>	<u> </u>
percent slopes	! !	1	depressions on outwash plains		1	l I	!
	i	i			i	I	i I
	Houghton	2	depressions on	1, 3	No	No	Yes
	1		outwash		1	l	l
	1		plains,		!	 	
	! !	1	depressions on lake plains		1	l I	!
	i	i			i	İ	i i
190839:	I	1	l I		1	l	I
Mancelona-Richter	Epoufette	2	depressions on	3, 2B2	Yes	No No	Yes
gravelly sandy loams,			lake plains		!	 	
0 to 6 percent slopes	 Tonkey	1 2	। outwash plains,	2B3, 3	 Yes	l I No	l Yes
		•	depressions on		163	140 	165
	İ		lake plains,		İ	İ	İ
	I		depressions on		1	l	l
	!		glacial		!	! :	! :
	1	1	drainageways		1	 	
190847:	i i	i	' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '		i	' 	'
Richter-Alcona sandy	Tonkey	1 15	' outwash plains,	3, 2B3	Yes	No	Yes
loams, 0 to 2 percent	_	1	depressions on		1	I	l
slopes	!		lake plains,		!	l	!
	I		depressions on		I	 	
	! !		glacial drainageways			! 	I I
	•	•	,		•	•	•

Table 4.-Hydric Soils-Continued

	I	1	l I		ric soils cr		
Map unit symbol and	Component	Percent		Hydric	Meets	Meets	
map unit name	!	of map		criteria	saturation		
	<u> </u>	unit	<u> </u>	code	criteria	criteria	criteria
190848:	! !	1				! 	l I
Richter-Alcona sandy	 Tonkey	1 10	' outwash plains,	3, 2B3	Yes	No	Yes
loams, 2 to 6 percent	i -	i	depressions on		İ	l	ĺ
slopes	I	1	lake plains,		1	I	I
	I	1	depressions on		1	l	l
	I	1	glacial		1	I	l
	!	1	drainageways		!	<u> </u>	<u> </u>
190849:	 	1				 	
Roscommon sand-Markey	l Roscommon	I 50	 depressions on	3, 2B1	l Yes	l No	ı I Yes
muck	1	•	lake plains,	3, 221	1	1	1
	i	i	depressions on		i	i i	i
	İ	i	outwash plains		İ	Ī	l
	I	1	l l		1	I	l
	Markey		depressions on	3, 1	l No	l No	Yes
	!	•	outwash		!	!	! :
	!	!	plains, depressions on		!	!	! !
	! !	1	depressions on lake plains,		1	! !	l I
	i	i	depressions on		i	<u> </u>	
	i	i	moraines		i	İ	İ
	I	1	l I		1	l	l
190850:	<u> </u>	!	! !			I	
•	Bach	4	lake plains,	2B3, 3	Yes	No	Yes
to 6 percent slopes	 	1	depressions			 	
	 Epoufette	1 3	 depressions on	2B2, 3	Yes	l No	ı I Yes
	İ	i	lake plains	•	i	İ	İ
	I	1	l l		1	I	l
	Hettinger		depressions on	2B3, 3	Yes	l No	Yes
	1		lake plains		1		 -
	 Edwards	1 1	 depressions on	1, 3	l No	I I No	l I Yes
	 	•	moraines,	1, 3	1	l No	l 163
	i	i	depressions on		i	i i	i
	I	1	outwash plains		1	I	I
	I	1	!		1	l	
190851:	 	l I 40	 	2 052	77	17-	 V
Tonkey-Munuscong-Iosco sandy loams, 0 to 2	Tonkey	•	outwash plains, depressions on	3, 2B3	Yes	l No	Yes
percent slopes	! !	i	depressions on lake plains,		1	! !	! !
percent bropes	i	i	depressions on		i	i	i i
	i	i	glacial		i	i I	I
	I	1	drainageways		1	I	I
				2 072	1		l
	Munuscong		depressions on	3, 2B3	Yes	l No	Yes
	! !		lake plains, depressions on			I I	I I
		i	depressions on outwash plains			I	'
	i	i	,		i	i	i i

Table 4.-Hydric Soils-Continued

	!	ļ			ic soils cr		
Map unit symbol and	Component	Percent		Hydric		Meets	
map unit name	!	of map		criteria	saturation	_	
	<u> </u>	unit	<u> </u>	code	criteria	Criteria	Criteria
190852:	 		! 		! 	 	
Tonkey-Munuscong-Iosco	Tonkey	35	outwash plains,	2B3, 3	Yes	No	Yes
sandy loams, 2 to 6	1	1	depressions on		I	l	l
percent slopes	1	1	lake plains,		I	l	l
	!	1	depressions on		1		l
	!	!	glacial		!	!	l
	!	-	drainageways		1	!	
	 Munuscong	I I 30	 depressions on	2B3, 3	 Yes	l No	ı I Yes
	i	i	lake plains,	-, -	i	İ	İ
	1	1	depressions on		I	I	I
	1	I	outwash plains		I	l	I
	177-111			072 2			
	Hettinger] 3	depressions on	2B3, 3	Yes	No	Yes
	1	¦	lake plains		! !	! !	l I
193271:	i	i	i '		i	I	I
Pipestone sand, 0 to 4	Dair		depressions on	3, 2B3	Yes	l No	Yes
percent slopes	!		outwash		1		l
	!		plains,		!	!	l
	!	-	depressions on lake plains,		1	!	
	1	-	depressions on		1	! !	l I
	i	i	beach ridges		i	i I	i
	i	i	i i		i	İ	i
193272:	!	1	! !		I		l
Dair muck	Dair		depressions on	2B3, 3	Yes	l No	Yes
	!		lake plains,		1	!	
	:	-	drainageways on lake		1	! !	
	i	i .	plains,		i	<u> </u>	<u>'</u>
	i	i	drainageways		i	i	i
	İ	İ	on outwash		ĺ	l	l
	1	1	plains,		I	l	l
	!	1	depressions on		1	l	l
	l I	1	outwash plains 		 	 	
	 Adrian	5	' drainageways on	3, 1	l No	l No	 Yes
	I	1	lake plains,		I	I	I
	1	1	depressions on		I	l	l
	!	1	lake plains,		1		l
	!	!	drainageways		!	!	ļ
	!	-	on outwash		1	!	
	1	1	plains, depressions on		! !	! !	l I
	i	i	outwash plains		i	i I	i
	i	i	i - i		i	İ	i
193285:	17			1 0			l
Lumley-Makinen complex	I ramteλ	55	depressions on lake plains,	1, 3	No	l No	Yes
		1	lake plains, depressions on		! !	! 	!
	i	i	moraines,		i	i	i
	i	i	depressions on		i	i i	i
	I	1	outwash plains		I	I	I
	 Malaine			2 4			
	Makinen		depressions on lake plains,	3, 1	No	l No	Yes
	i	i	depressions on		i	' 	'
	i	i	moraines,		i	i	I
	I	1	depressions on		I	l	l
	1	1	outwash plains		I	I	l

Table 4.-Hydric Soils-Continued

1						
 Commanda	 Democont	 Tamalesson				l Masts
		•	_			
l I					_	_
<u>'</u>	i unit	<u> </u> 	l code	CIICEIIA	ı	ı
 Historols	 55	 	 3 1	l No	I No	ı Yes
I	İ	j	l	i	İ	İ
Aquents -	45		263, 3 	l ies	l	Yes
 Gorvan 	 35 	 flood plains 	 3,2B3,4 	 Yes 	 Yes 	 Yes
' Houghton 	, 30	flood plains	3, 4, 1	, No 	' Yes	' Yes
 Glendora 	20	flood plains	4, 2B2, 3	Yes	' Yes	' Yes
 Adrian 	, 5	 flood plains 	3, 1	l No	I No	' Yes
' Dair 	, 3	 flood plains 	3, 2B3	Yes	I No	' Yes
 Aquents 	2	 flood plains 	3, 2B3	Yes	l No	' Yes
! 	<u> </u>	! !		! 	! !	!
 Dair 	 	lake plains, depressions on		Yes	No No	Yes
 		outwasn piains		 	! !	
 Houghton 	I	lake plains,	3, 1	No 	 No 	Yes
l I	1	 		 	! !	l I
 Dair 	İ	dunes,	3, 2B3	Yes 	No 	Yes Yes
l I	1	 		 	! !	l I
 Dair 	1	beach ridges, depressions on	2B3, 3	Yes	No 	Yes
1	1	[l	 	l
 Dair 	 	lake plains, depressions on dunes, depressions on	2B3, 3	 Yes 	No 	 Yes
	Histosols	of map unit	of map unit	Component	Component	Of map

Table 4.-Hydric Soils-Continued

	I	1			ic soils cr		
Map unit symbol and	Component	Percent		Hydric	,	Meets	
map unit name	!	of map		criteria	saturation	_	
	<u> </u>	unit	<u> </u>	code	criteria	criteria	criteria
193508:	1	1	! !		1	! !	l I
Madaus muck	Madaus 	1	 depressions on outwash plains, depressions on lake plains	2B3, 3	Yes 	No 	Yes
	 Dair 	1	 depressions on outwash plains, depressions on lake plains	2B3, 3	Yes 	 No 	 Yes
	 Houghton 	1	 depressions on outwash plains, depressions on lake plains 	3, 1	 No 	 No 	 Yes
193513: Dair-Adrian mucks	 Dair 	 		2B3, 3	Yes 	No No	Yes
	 Adrian 	 45 	on outwash plains, depressions on outwash plains depressions on lake plains, depressions on outwash plains,	3, 1	 No 	 	 Yes
193514: Platteriver-Pipestone		 	drainageways on lake	3, 2B3	 Yes	 	 Yes
sands, 0 to 4 percent slopes	: 	! 	dunes, depressions on beach ridges 		 	 	

Table 4.-Hydric Soils-Continued

	l	I		Hydric soils criteria			
Map unit symbol and	Component	Percent	Landform	Hydric	Meets	Meets	Meets
map unit name	I	of map	l I	criteria	saturation	flooding	ponding
	<u> </u>	unit	l	code	criteria	criteria	criteria
202010:	 	 			 	 	
Houghton-Adrian mucks	Houghton 		depressions on lake plains, depressions on moraines, depressions on outwash plains, flood	3, 1	No 	No 	Yes
	Adrian 	40 	depressions on lake plains, depressions on moraines, depressions on outwash plains, flood plains	1, 3	No 	No 	Yes
	 Dair 	5 	depressions on lake plains, depressions on moraines, depressions on outwash plains, flood plains	2В3, 3	Yes	No 	Yes
899731: Covert-Pipestone sands, 0 to 6 percent slopes	 Dair 	 5 	 depressions on lake plains, depressions on outwash plains	3, 2B3	Yes	 No 	 Yes
899733: Covert-Dair complex, 0 to 6 percent slopes	 Dair 	 45 	 depressions on outwash plains	3, 2B3	 Yes	 	 Yes
	 Houghton 	 2 	 depressions on outwash plains 	3, 1	No No 	 No 	 Yes

Explanation of hydric criteria codes

- All Histels (except for Folistels), and Histosols (except for Folists), which are, by definition, saturated.
- 2. Soils in Aquic suborders, great groups, or subgroups, Albolls suborder, Historthels great group, Histoturbels great group, Pachic subgroups, or Cumulic subgroups that:
 - A. are somewhat poorly drained and have a water table at the surface (0.0 feet) during the growing season, or
 - B. are poorly drained or very poorly drained and have either:
 - 1.) a water table at the surface (0.0 feet) during the growing season if textures are coarse sand, sand, or fine sand in all layers within a depth of 20 inches, or
 - 2.) a water table at a depth of 0.5 foot or less during the growing season if permeability is equal to or greater than 6.0 in/hr in all layers within a depth of 20 inches, or
 - 3.) a water table at a depth of 1.0 foot or less during the growing season if permeability is less than 6.0 in/hr in any layer within a depth of 20 inches.
- Soils that are frequently ponded for periods of long or very long duration during the growing season.
- Soils that are frequently flooded for periods of long or very long duration during the growing season.

Table 5.-Landform and Parent Material

(Miscellaneous nonsoil components are not displayed in this report. Component percents may not add up to 100. MAP is the mean annual precipitation)

	 Percent of map unit	_	 Elevation 	 MAP 	 Landform 	 Parent material
	Pct	Pct	l Ft	l In	<u> </u>	<u> </u>
190775: Adrian	<u> </u>	0-2	<u>FC</u>	25-35	on lake plain	 - 16 to 51 inches of organic material over sandy glaciofluvial deposits
Houghton	 45 	0-2	 600-1401 	 27-34 	· -	 More than 51 inches of organic material
190777: Alcona	55 55 	0-2	 600-1601 	28-34 	 	 Stratified sandy and loamy glaciofluvial deposits and/or glaciolacustrine deposits
Richter	30 30 	0-2	 600-1401 	27-33 - - -	•	
190778: Alcona		2-6	 600-1601 	28-34 	 Lake plain 	 Stratified sandy and loamy glaciofluvial deposits and/or glaciolacustrine deposits
Richter	25 25 1 	2-6	 600-1401 	27-33	į	
190779: Alpena		0-12	 600-699 	 28-31 	 Glacial lake beache 	 4 to 10 inches of sandy and loamy material over calcareous sandy and gravelly glaciofluvial deposits

Table 5.-Landform and Parent Material-Continued

	 Percent of map unit	_	 Elevation 	MAP	 Landform 	 Parent material
	Pct	Pct	Ft	In	İ	Ī
190780: Au Gres	 45	0-4	 	 27-34 	_	 Sandy glaciofluvial deposits
Kalkaska		0-4	 600-1900 	27-34	•	 Sandy glaciofluvial deposits
190781: Bach		0-2	 	 27-33 	_	 - Calcareous silty lacustrine deposits
190782: Deer Park	 100 	6-18	 600-699 	27-34		 Sandy eolian deposits and/or lacustrine deposits
190783: Deer Park	 100 101	18-45	 600-699 	27-34		 Sandy eolian deposits and/or lacustrine deposits
190784: Deer Park	 70 	0-6	 600-699 	27-34 	_	 Sandy eolian deposits and/or lacustrine deposits
Roscommon	25 25	0-2	 600-1499 	22-34	Depression on lake plain	 Sandy glaciofluvial deposits
190787: East Lake		0-6	 600-1001 	27-32	 	 20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190788: East Lake	90 90 	6-12	 600-1001 	27-32	 	 20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190789: East Lake		12-18	600-1001	27-32	 	 20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190790: East Lake		18-25	600-1001	27-32	 	 20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits

Table 5.-Landform and Parent Material-Continued

	 Percent of map unit	-	 Elevation 	MAP	 Landform 	Parent material
	Pct	Pct	l <u>Ft</u>	In	i	İ
190791: Eastport	 93 	0-6	 	27-31	 Dunes 	 Sandy eolian deposits
190792: Edwards	 	0-2	 669-1401 	19-33	 Depression 	
Marl beds		0-1	 600-1001 	27-32	 Depression 	
190794: Emmet		2-6	 600-1201 	28-32	 Ice-margin complex 	 24 to 50 inches of loamy material over calcareous loamy till
Leelanau	30 30 	2-6	 600-1401 	27-32	Ice-margin complex 	
190795: Emmet	 60 	6-12		28-32	 Ice-margin complex 	 24 to 50 inches of loamy material over calcareous loamy till
Leelanau	30 30 	6-12	 600-1401 	27-32	Ice-margin complex 	
190796: Emmet		12-18	 600-1201 	28-32	 Ice-margin complex 	 24 to 50 inches of loamy material over calcareous loamy till
Leelanau	30 30 	12-18	 600-1401 	27-32	Ice-margin complex 	
190797: Emmet	 50 	18-25	 600-1201 	28-32	 Ice-margin complex 	 24 to 50 inches of loamy material over calcareous loamy till
Leelanau	30 30 	18-25	 600-1401 	27-32	Ice-margin complex 	

Table 5.-Landform and Parent Material-Continued

	 Percent of map unit	-	 Elevation 	 MAP 	 Landform 	Parent material
	Pct	Pct	Ft	In	!	<u> </u>
190799: Emmet		25-50	 	 28-32 	 Ice-margin complex 	 24 to 50 inches of loamy material over calcareous loamy till
Leelanau		25-50	 600-1401	27-32	 Ice-margin complex 	 20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits
190801: Emmet		4-12	 600-1201 	28-32	 Ice-margin complex 	 24 to 50 inches of loamy material over calcareous loamy till
Mancelona	25 25 	4-12	 600-1001 	27-32	 Ice-margin complex 	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190803: Emmet		18-35		28-32	 Ice-margin complex 	 24 to 50 inches of loamy material over calcareous loamy till
Mancelona	30 	18-35	600-1001 	27-32	Ice-margin complex 	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190805: Emmet		2-6	 600-1201 	28-32	 Moraine 	 24 to 50 inches of loamy material over calcareous loamy till
Omena	45 45 	2-6	 600-801 	28-30	 Moraine 	 Loamy till
190806: Emmet		6-12	 600-1201 	28-32	 Moraine 	 24 to 50 inches of loamy material over calcareous loamy till
Omena	 45 	6-12	 600-801 	28-30	 Moraine 	 Loamy till

Table 5.-Landform and Parent Material-Continued

	 Percent of map unit	_	 Elevation 	 MAP 	 Landform 	 Parent material
	Pct	Pct	Ft	l In	i	i
190807: Emmet	 50 	12-18	 600-1201 	 28-32 	 Moraine 	 24 to 50 inches of loamy material over calcareous loamy till
Omena	 45 	 12-18 	I 600-801 	I 28-30 	 Moraine 	 Loamy till
190808: Emmet	 50 	 18-25 	 600-1201 	 28-32 	 Moraine 	 24 to 50 inches of loamy material over calcareous loamy till
Omena	 45 	 18-25 	 600-801 	 28-30 	 Moraine 	 Loamy till
190809: Emmet	 50 	25-50 	 600-1201 	 28-32 	 Moraine 	
Omena	 45 	25-50	 600-801 	 28-30 	 Moraine 	Loamy till
190811: Hettinger	45 45 	0-2	 600-1401 	 28-33 	 Depression on lake plain 	 12 to 36 inches of fine-loamy material over stratified, calcareous silty and clayey glaciolacustrine deposits
Muck	30 	0-2 	 600-1401 	 25-43 	Depression on lake plain	Organic material
190812: Hettinger	45 45 	0-2	 600-1401 	28-33 	 Depression on lake plain 	 12 to 36 inches of fine-loamy material over stratified, calcareous silty and clayey glaciolacustrine deposits
Tonkey	 30 	 0-2 	 600-1601 	 27-34 	 Depression on lake plain 	 Stratified loamy and sandy glaciofluvial deposits
190814: Kalkaska	 85 	0-6	 600-1900 	 27-34 	 Outwash plain 	 Sandy glaciofluvial deposits
190815: Kalkaska	 85 	 6-12 	 600-1900 	 27-34 	 Outwash plain 	 - Sandy glaciofluvial deposits
		,	•	•	•	•

Table 5.-Landform and Parent Material-Continued

	 Percent of map unit	_	 Elevation 	MAP	 Landform 	 Parent material
	Pct	Pct	l Ft	 In	<u> </u>	<u> </u>
190816: Kalkaska	 	12-18		 		 Sandy glaciofluvial deposits over till
190817: Kalkaska	 90 	18-25	 	 27-34 		 Sandy glaciofluvial deposits over till
190818: Kalkaska	 90 	25-45	 600-1900 	 27-34 		 Sandy glaciofluvial deposits over till
190819: Kalkaska	 55 	0-6	 600-1900 	27-34		 Sandy glaciofluvial deposits over till
East Lake	35 35 	0-6	 600-1001 	27-32		 20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
190820: Kiva	65 65 	2-6	 600-1001 	27-32	 	 10 to 24 inches of loamy material over sandy and gravelly glaciofluvial deposits
Mancelona	30 	2-6	600-1001	27-32	 	 18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190821: Kiva	50 50 	6-12	 600-1001 	27-32	complex 	 10 to 24 inches of loamy material over sandy and gravelly glaciofluvial deposits
Mancelona	30	6-12	 600-1001 	27-32 - 	complex 	 18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190823: Kiva	50 50 	18-25	 600-1001 	27-32 	 	 10 to 24 inches of loamy material over sandy and gravelly glaciofluvial deposits and till

Table 5.-Landform and Parent Material-Continued

	,					
	 Percent of map unit	-	 Elevation 	 MAP 	 Landform 	 Parent material
	Pct	Pct	Ft	In	Ī	<u> </u>
190823: Mancelona	 	18-25	— 	 27-32 	 Moraine 	 18 to 40 inches of sandy and/or
					 	gravelly material over calcareous sandy and gravelly glaciofluvial deposits and till
190826: Leelanau	60 60 	0-6	600-1401 	27-32 -	 Beach ridge 	20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits
East Lake	30 30 	0-6	600-1001 	27-32	Beach ridge 	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190827: Leelanau		6-12	600-1401 600-1401 	 27-32 	 Moraine 	 20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits and till
East Lake	25 25 	6-12	600-1001 600-1001 	27-32	Moraine 	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
190828: Leelanau	65 65 	12-18	 600-1401 	27-32 - -	 Moraine 	20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits and till
East Lake 190829:	25 25 	12-18	600-1001 	27-32	Moraine 	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
Leelanau	50 50 	18-25	600-1401 	27-32	 Moraine 	20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits and till

Table 5.-Landform and Parent Material-Continued

Map unit symbol and soil name	 Percent of map unit	_	 Elevation 	MAP	 Landform 	 Parent material
	Pct		Ft	In	i	i i
190829: East Lake	—	18-25		 27-32	 	 20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
190830: Leelanau		25-45	 600-1401	27-32	 	
East Lake	35 35 	25-45	600-1001 	27-32	 	 20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
190831: Lupton		0-2	 600-1401 	 27-34 	•	 More than 51 inches of organic material
Markey	30 30 	0-2	600-1401 	22-44	on lake plain and moraine	 16 to 51 inches of organic material over sandy glaciofluvial deposits and till
190832: Mancelona		0-6	 600-1001 	27-32		 18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190833: Mancelona	90 90 1	6-12	 600-1001	27-32		18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190834: Mancelona		0-6	 600-1001 	27-32	- 	 18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits

Table 5.-Landform and Parent Material-Continued

	 Percent of map	_	 Elevation	MAP	 Landform	 Parent material
	unit Pct	Pct	 Ft	l In	<u> </u>	<u> </u>
	===				i	'
190834: East Lake	30 30 	0-6	600-1001	27-32	outwash plain 	 20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190835: Mancelona	55 1 1 1 1	6-12	600-1001	27-32	 	 18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
East Lake	35 35 	6-12	600-1001	27-32	i I I	
Mancelona	50 	12-18	600-1001	27-32	 	 18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
East Lake	30 30 	12-18	600-1001	27-32	 	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190837: Mancelona		18-25	600-1001	27-32	 	 18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
East Lake	30 30 	18-25	600-1001	27-32 	i I I	 20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits

Table 5.-Landform and Parent Material-Continued

						
	 Percent of map unit		 Elevation 	 MAP 	 Landform 	 Parent material
	Pct	Pct	Ft	In	1	1
190838: Mancelona	I I I 50	 25-45	 600-1001	— 27-32	 Outwash plain	
Adicerola				27 32 		sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
East Lake	30 	25-45	600-1001 	27-32	Outwash plain 	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
Mancelona	70 	0-6	600-1001 	27-32	 Moraine 	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits and till
Richter	25 	0-6	600-1401 	27-33 - - -	Moraine 	25 to 40 inches of sandy and/or loamy material over stratified, calcareous sandy and silty glaciofluvial deposits and till
190840: Nester	90 90 	2-6	 600-1401 	27-32 	 Moraine 	 20 to 36 inches of loamy and clayey material over calcareous loamy and clayey till
190841: Nester	90 90 	6-12	 600-1401 	 27-32 	 Moraine 	 20 to 36 inches of loamy and clayey material over calcareous loamy and clayey till
190842: Nester	90 90 	12-18	 600-1401 	 27-32 	 Moraine 	 20 to 36 inches of loamy and clayey material over calcareous loamy and clayey till
190843: Nester	90 90 	18-25	 600-1401 	27-32 -	•	 20 to 36 inches of loamy and clayey material over calcareous loamy and clayey till

Table 5.-Landform and Parent Material-Continued

	 Percent of map unit		 Elevation 	 MAP 	 Landform 	 Parent material
	Pct	Pct	Ft	In	1	
190844: Nester		25-50	600-1401		 Moraine 	 20 to 36 inches of loamy and clayey material over calcareous loamy and clayey till
190847: Richter	45 45 	0-2	 600-1401 	27-33	 Ice-margin complex 	
Alcona	40 	0-2	600-1601 	28-34	Ice-margin complex 	 Stratified sandy and loamy glaciofluvial deposits and/or glaciolacustrine deposits
190848: Richter	45 45 	2-6	 600-1401 	27-33	 Ice-margin complex 	
Alcona	40 10 	2-6	600-1601 	28-3 4	Ice-margin complex 	 Stratified sandy and loamy glaciofluvial deposits and/or glaciolacustrine deposits
190849: Roscommon	50 50	0-2 	 600-1499 	 22-34 	 Depression on lake plain	 Sandy glaciofluvial deposits
Markey	30 30 	0-2 	 600-1401 	22-44 - 		 16 to 51 inches of organic material over sandy glaciofluvial deposits
190850: Sanilac	90 90 	0-6	 600-1401 	28-34 	 Lake plain 	 Calcareous silty lacustrine deposits and/or eolian deposits

Table 5.-Landform and Parent Material-Continued

Map unit symbol and soil name	 Percent of map unit	Ī	 Elevation 	 MAP 	 Landform 	 Parent material
	l Pct	l Pct	l Ft	l In	<u> </u>	-
190851: Tonkey	 40 	 0-2	 600-1601 	 27-34	 Depression on moraine	 Stratified loamy and sandy glaciofluvial
Iosco	 25 1 1 1	0-2 	 600-1401 	 28-32 	 Moraine 	deposits 20 to 40 inches of sandy glaciofluvial deposits over loamy till or glacialacustrine deposits
Munuscong	 25 	 0-2 	 600-801 	 28-34 	 Depression on moraine 	legosits 20 to 40 inches of loamy material over clayey lacustrine deposits
190852: Tonkey	 35 	 0-2 	 600-1601 	 27-34 	 Depression 	 Stratified loamy and sandy glaciofluvial deposits
Munuscong	30 30 	 0-2 	 600-801 	 28-34 	 Depression on moraine 	20 to 40 inches of loamy material over clayey lacustrine deposits
Iosco	20 	0-6 	600-1401 	28-32 	Moraine 	20 to 40 inches of sandy glaciofluvial deposits over loamy till or glacialacustrine deposits
190854: Wallace	 50 	 2-12 	 600-1601 	 27-34 	 Lake plain 	Sandy deposits with ortstein on glaciofluvial, eolian and/or glaciolacustrine deposits
Kalkaska	45 	2-12 	600-1900 	27-34 	Lake plain 	Sandy glaciofluvial deposits
193237: Thompsonville	50	 0-3 	 577-1119 	 28-38 	 Lake plain 	 40 to 60 inches of sandy glaciofluvial deposits over stratified loamy and silty materials
Milnichol	40 	0-3 	 577-1119 	 28-38 	 Lake plain 	40 to 60 inches of sandy glaciofluvial deposits over loamy alluvium

Table 5.-Landform and Parent Material-Continued

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Table 5.-Landform and Parent Material-Continued

Map unit symbol and soil name	 Percent of map unit	-	 Elevation 	MAP	Landform 	Parent material
	Pct	Pct	Ft	In	T	I
193270: Covert	 90 1	0-6	 577-1119 	28-38	 Lake plain 	 Sandy glaciofluvial deposits
193271: Pipestone	90 90 	0-4	 577-1119 	28-38	 Glacial drainage channel	 Sandy glaciofluvial deposits
193272: Dair		0-2	577-1119 	28-38	 Depression on outwash plain 	 4 to 8 inches of organic material over sandy glaciofluvial deposits
193277: Benona	 90 1	0-6	577-1119 577-1119	28-38	 Moraine 	 Sandy glaciofluvial deposits or till
193278: Benona	 90 1	6-12	 577-1119 	28-38	 Moraine 	 Sandy glaciofluvial deposits or till
193279: Benona	 90 	12-18	 577-1119 	28-38	 Moraine 	 Sandy glaciofluvial deposits or till
193284: Udorthents		35-70	 577-1119 	28-38	 	 Loamy and/or clayey material
Udipsamments	 35	35-70	 577-1119	28-38		 Sandy material
193285: Lumley		0-2	 577-1119 	28-38		 - More than 51 inches of acid organic material
Makinen	40 40 	0-2		28-38	•	 16 to 51 inches of organic material over sandy glaciofluvial deposits
193286: Histosols		0-2	 577-1119 	28-38	 Marsh 	 16 to more than 51 inches of organic material
Aquents		0-2	 577-1119	28-38	 Marsh 	 Wet glaciofluvial deposits and/or glaciolacustrine deposits
193287: Quartzipsamments	40	35-70	577-1119	28-38	 Dunes 	 Sandy eolian deposits and/or glaciofluvial deposits

Table 5.-Landform and Parent Material-Continued

Map unit symbol and soil name	 Percent of map unit	_	 Elevation 	 MAP 	 Landform 	 Parent material
	Pct	Pct	Ft	In	i	T
193288: Udipsamments	 	0-6	 577-1119	 28-38	 Lake plain	 Sandy material
193342: Gorvan	 35 	0-2	 577-1119 	28-38 	 Flood plain 	 Silty and clayey alluvium over sandy glaciofluvial deposits
Houghton	30 30	0-2	577-1119 577-1119	 28-38 	 Flood plain 	More than 51 inches of organic material
Glendora	20 20	0-2	 577-1119 	28-38 	 Flood plain 	Sandy alluvium
193349: Spinks	 50 	35-70	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits, till, or eolian deposits
Coloma	40 40 	35-70	577-1119 577-1119 	 28-38 	 Moraine 	Sandy glaciofluvial deposits or till
193351: Benona	 95 1	18-35	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits or till
193354: Quartzipsamments	40 40 	6-18	 577-1119 	28-38 	 Dunes 	 Sandy eolian deposits and/or glaciofluvial deposits
193357: Shavenaugh	85 85 	18-35	 577-1119 	28-38 	 Moraine 	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits or till
193359: Shavenaugh	85 85 	6-12	 577-1119	28-38 	 Moraine 	
193360: Shavenaugh	 85 85 	0-6	 577-1119 	28-38 	 Moraine 	
193362: Benzonia	 90 	18-35	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits or till

Table 5.-Landform and Parent Material-Continued

	 Percent of map unit		 Elevation	MAP	 Landform 	 Parent material
	Pct	Pct	l Ft	l In	<u> </u>	<u> </u>
	i ====		<u> </u>		İ	i I
193363: Benzonia	 90 	12-18	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits or till
193364: Benzonia	 90 	6-12	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits or till
193365: Benzonia	 90 	0-6	577-1119	28-38	 Moraine 	 Sandy glaciofluvial deposits or till
193371: Dair	 50 	0-2	577-1119 	28-38 	on lake plain	 4 to 8 inches of organic material over sandy glaciofluvial deposits
Pipestone	40 40 	0-2	 577-1119 	 28-38 	 Lake plain 	 Sandy glaciofluvial deposits
193423: Benona	 95 	35-70	 577-1119 	28-38	 Moraine 	 Sandy glaciofluvial deposits or till
193494: Nordhouse	 	18-70	 577-1119	 28-38 	 Dunes 	 Sandy eolian deposits
193496: Nordhouse	 95	6-18	577-1119	 28-38	 Dunes 	 Sandy eolian deposits
193497: Nordhouse		0-6	 577-1119 	 28-38 	 Dunes 	 Sandy eolian deposits
193498: Nordhouse	 40 	0-6	577-1119	28-38		 Sandy eolian deposits
Platteriver		0-6	 577-1119 	 28-38 	 Dunes 	 Sandy glaciofluvial deposits
Dair	25 25 	0-2	577-1119	28-38 	on lake plain	 4 to 8 inches of organic material over sandy glaciofluvial deposits
193503: Spinks	50 50	0-6	577-1119 	28-38 	1	 Sandy glaciofluvial deposits, till, or eolian deposits
Shavenaugh	40 40 	0-6	577-1119	28-38	 	 30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits or till

Table 5.-Landform and Parent Material-Continued

Map unit symbol and soil name	 Percent of map unit	-	 Elevation 	 MAP 	 Landform 	Parent material
	Pct	Pct	· Ft	l In	i	<u></u>
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193504: Spinks	50 	6-12	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits, till, or eolian deposits
Shavenaugh	40 	6-12	 577-1119 	 28-38 	 Moraine 	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits or till
193505: Spinks		12-18	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits, till, or eolian deposits
Shavenaugh	40 	12-18	 577-1119 	 28-38 	Moraine 	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits or till
193506:	i i		i İ	İ	i	i
Spinks	50 	18-35	577-1119 	28-38 	Moraine 	Sandy glaciofluvial deposits, till, or eolian deposits
Shavenaugh	40 	18-35	577-1119 	28-38 	Moraine 	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits or till
193507:	i i		I	i i	i	İ
Spinks	50 	35-50	577-1119 	28-38 	Moraine 	Sandy glaciofluvial deposits, till, and eolian deposits
Shavenaugh	40 40 	35-50	 577-1119 	28-38 	Moraine Moraine 	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits or till
193508: Madaus		0-2	 577-1119 	 28-38 	 Depression on lake plain 	Less 16 inches of organic material over silty marl over sandy glaciofluvial deposits over clayey lacustrine deposits

Table 5.-Landform and Parent Material-Continued

Map unit symbol and soil name	 Percent of map unit	-	 Elevation 	MAP	 Landform 	 Parent material
	Pct		Ft	In	:	<u>'</u> I
193509: Boyer	50 50 1 1 1 1	0-6	577-1119 577-1119 	28-38	1	 20 to 40 inches of loamy and sandy material over calcareous sandy and gravelly glaciofluvial deposits
Shavenaugh	40 	0-6	577-1119	28-38	- 	 30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
193510: Boyer	50 50 	6-12	577-1119 	28-38	- 	 20 to 40 inches of loamy and sandy material over calcareous sandy and gravelly glaciofluvial deposits
Shavenaugh	40 40 	6-12	577-1119	28-38	1	
193511: Boyer		18-35	577-1119 	28-38	- 	
Shavenaugh	40 10 	18-35	577-1119 	28-38	_	
193513: Dair		0-2	 577-1119	28-38	 Depression on lake plain 	 4 to 8 inches of organic material over sandy glaciofluvial deposits
Adrian	45 45 	0-2	577-1119 	28-38	· •	 16 to 51 inches of organic material over sandy glaciofluvial deposits

Table 5.-Landform and Parent Material-Continued

	 Percent of map	_	 Elevation 	 MAP 	 Landform 	 Parent material
	unit	<u>' </u>	<u>!</u>	<u>!</u>	<u> </u>	<u> </u>
	Pct	Pct	l <u>Ft</u>	I In	!	!
193514:			<u> </u>	!	!	1
Platteriver	55 51	0-4	 577-1119 	 28-38 	Lake plain	 Sandy glaciofluvial deposits
Pipestone	40 40	0-4	 577-1119 	 28-38 	 Lake plain 	 Sandy glaciofluvial deposits
202010:	 		l I	 	l I	I I
Houghton	55 55	0-2	 577-1119 	 28-38 	Depression on lake plain	More than 51 inches of organic material
Adrian	40	0-2	 577-1119 	 28-38 	•	 16 to 51 inches of organic material over sandy glaciofluvial deposits
202016: Spinks	 50 	0-6	 577-1119 	 28-38 	 Glacial drainage channels	 - Sandy glaciofluvial deposits and/or eolian deposits
	l I		I	I	1	I
Tekenink, sandy substratum	40 40 	0-6	 577-1119 	 28-38 	 Glacial drainage channels 	 60 to 80 inches of loamy and/or sandy till over sandy glaciofluvial deposits
631170: Fogg		35-50	 577-1119 	 28-38 	 Moraine 	
Benzonia	40 40	35-50	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits or till
631171: Fogg	 50 1 1 1 1 1	18-35	 577-1119 	 28-38 	1	 40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial deposits
Benzonia	40 40 	18-35	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits or till

Table 5.-Landform and Parent Material-Continued

			 			- <u>.</u>
Map unit symbol and soil name	 Percent of map unit	-	 Elevation 	MAP	 Landform 	 Parent material
	Pct	Pct	Ft	In	I	T
631172: Fogg		12-18		 28-38	 Moraine 	 40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial
						deposits
Benzonia	40 40 	12-18	 577-1119 	28-38	 Moraine 	 Sandy glaciofluvial deposits or till
631173: Fogg	50 50 	6-12	577-1119 577-1119 	28-38	 Moraine 	40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial deposits
Benzonia	40 40 	6-12	 577-1119 	28-38	 Moraine 	 Sandy glaciofluvial deposits
631174: Fogg		0-6		28-38	 Moraine 	40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial deposits
Benzonia	40 40 	0-6	 577-1119 	28-38	 Moraine 	 Sandy glaciofluvial deposits or till
680939: Fern		6-12	 577-1119	28-38	 Moraine 	
Spinks	40 40 	6-12		28-38	 Moraine 	 Sandy glaciofluvial deposits, till, or eolian deposits
680943: Milnichol	90 90 	0-4	 577-1119	28-38	 Lake plain 	40 to 60 inches of sandy glaciofluvial deposits or till over loamy alluvium

Table 5.-Landform and Parent Material-Continued

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Map unit symbol and soil name	 Percent of map	_	 Elevation 	 MAP 	 Landform 	Parent material
	unit		<u> </u>	<u> </u>	<u>.</u>	<u>!</u>
	Pct	Pct	l <u>Ft</u>	I In		1
680945: Fern	 90 	 6-12 	 577-1119 	 28-38 	 Moraine 	 20 to 40 inches of sandy glaciofluvial deposits over
680946: Fern	 	0-6 	 577-1119 	 28-38 	 Moraine 	loamy till 20 to 40 inches of sandy glaciofluvial deposits over loamy till
680971: Nessen		 18-35 	 577-1119 	 28-38 	 Outwash plain 	 40 to 55 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
Kaleva	40 1	18-35 	 577-1119 	 28-38 	Outwash plain 	Sandy glaciofluvial deposits
680972: Nessen	50 50 	12-18 	 577-1119 	 28-38 	 Outwash plain 	 40 to 55 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
Kaleva	40 40 	 12-18 	 577-1119 	 28-38 	 Outwash plain 	 Sandy glaciofluvial deposits
680973: Nessen	50 50 	6-12 	 577-1119 	 28-38 	 Outwash plain 	
Kaleva	40 40 	 6-12 	 577-1119 	 28-38 	 Outwash plain 	 Sandy glaciofluvial deposits
680974: Nessen	50 50 	0-6 	 577-1119 	 28-38 	 Outwash plain 	
Kaleva	40 40 	 0-6 	 577-1119 	 28-38 	 Outwash plain 	 Sandy glaciofluvial deposits

Table 5.-Landform and Parent Material-Continued

Map unit symbol and soil name	 Percent of map unit		 Elevation 	MAP	 Landform 	 Parent material
	Pct	Pct	Ft	In	1	<u> </u>
893251: Boyer		12-18	 577-1119 	28-38	 	 20 to 40 inches of loamy and sandy material over calcareous sandy and gravelly glaciofluvial deposits
Shavenaugh		12-18	577-1119 577-1119 	28-38	i I	 30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
894062: Remus		18-35	577-1119 577-1119 	28-38		 40 to more than 60 inches of loamy material over calcareous loamy till
Spinks	40 40 	18-35	577-1119 	28-38	 Moraine 	 Sandy glaciofluvial deposits, till, or eolian deposits
894063: Remus		12-18	577-1119 	28-38		 40 to more than 60 inches of loamy material over calcareous loamy till
Spinks	40 40 	12-18	577-1119 	28-38	 Moraine 	 Sandy glaciofluvial deposits, till, or eolian deposits
894064: Fern	50 50 	6-12	577-1119 577-1119 	28-38	 	 20 to 40 inches of sandy glaciofluvial deposits over loamy till
Remus	40 	6-12	577-1119 	28-38	 	 40 to more than 60 inches of loamy material over calcareous loamy till
894065: Fern	 50 	0-6	577-1119 577-1119 	28-38	 	 20 to 40 inches of sandy glaciofluvial deposits over loamy till

Table 5.-Landform and Parent Material-Continued

	I		<u> </u>		<u> </u>	
	Percent of map	_	Elevation	MAP	Landform	Parent material
	unit	Pct	l Ft	l In	<u> </u>	<u> </u>
	1 ==== 1		<u> </u>	<u> </u>	<u>'</u>	!
894065: Remus	40 40 1	0-6	577-1119	28-38	 Moraine 	
894104: Mollineaux	50 50 	18-35	577-1119 	28-38 	 Moraine 	 Sandy glaciofluvial deposits over loamy till
Remus	40 40 	18-35	577-1119	28-38 	 Moraine 	40 to more than 60 inches of loamy material over calcareous loamy till
894105: Mollineaux	 50 	12-18	 577-1119 	 28-38 	 Moraine 	 Sandy glaciofluvial deposits over loamy till
Remus	40 40 	12-18	577-1119	28-38 	 Moraine 	40 to more than 60 inches of loamy material over calcareous loamy till
894165: Spinks		35-50	 577-1119 	28-38 	 Glacial drainage channel	 Sandy glaciofluvial deposits and/or eolian deposits
Tekenink, sandy substratum	40 40 1	35-50	577-1119	28-38 	 Glacial drainage channel 	 60 to 80 inches of loamy and/or sandy till over sandy glaciofluvial deposits
899682: Kaleva	 90 	35-50	577-1119	28-38	 Outwash plain 	 Sandy glaciofluvial deposits
899722: Goodharbor		1-12	 577-1119 	 28-38 	 Dunes on lake plain	 Sandy eolian deposits
899731: Covert		0-6	577-1119	 28-38	 Lake plain 	 Sandy glaciofluvial deposits
Pipestone		0-3	 577-1119 	 28-38 	 Lake plain 	 Sandy glaciofluvial deposits

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Table 5.-Landform and Parent Material-Continued

Map unit symbol	 Percent	Slope	 Elevation	l I MAP	 Landform	Parent material
		STOPE	Lievacion	l mere	Danatoim	Farenc maceriar
and soil name	of map			I	I	I
	unit			l	I	<u> </u>
	Pct	Pct	Ft	In	1	1
			. —		1	1
899733:	i i			İ	i	
Covert	- 50 	0-6	577-1119 	28-38 	Lake plain 	Sandy glaciofluvial deposits
	1 1			I	1	1
Dair	- 45	0-2	577-1119	28-38	Depression	4 to 8 inches of
	i i	i	1	İ	on lake plain	organic material
	i i		i i	I	i	over sandy
	: :		! i			glaciofluvial
	!!			!	!	
	1 1			I	I	deposits
	1 1			l	1	1
899734:	1 1			l	1	1
Benzonia	-I 90 I	35-50	577-1119	1 28-38	Moraine	Sandy glaciofluvial
	i i		1	I	i	deposits and/or
	; ;		! 		;	till
	!!!		<u> </u>	!	!	CTTT
	1			I	I	1

Table 6.-Land Management, Part I (Planting)

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

	 Pct. of	 Suitability fo hand planting		 Suitability fo mechanical plant		 Soil rutting haz 	ard
	-	Rating class and		-		·	
	lunit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	
190775: Adrian	 55 	 Well suited 	 	 Well suited 	 	 Severe Low strength	 1.00
Houghton	 45 	 Well suited 	 	 Well suited 	 	 Severe Low strength	1 1.00
190777: Alcona	 55 	 Well suited 	 	 Well suited 	 	 Moderate Low strength	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Richter	 30 	 Well suited 	 	 Well suited 	 	 Moderate Low strength	 0.50
190778: Alcona	 65 	 Well suited 	 	 Well suited 	•	 Moderate Low strength	 0.50
Richter	25	 Well suited 	, 	 Well suited 	 	 Moderate Low strength	 0.50
190779: Alpena	 90 	 Well suited 	 	-		 Moderate Low strength 	 0.50
190780: Au Gres	 45 	 Moderately suited Sandiness		 Moderately suited Sandiness		 Moderate Low strength	 0.50
Kalkaska	35 	 Moderately suited Sandiness		Moderately suited Sandiness		 Moderate Low strength	 0.50
190781: Bach	 90 	 Well suited 	 	 Well suited 	 	 Severe Low strength	 1.00
190782: Deer Park	 100 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	 0.50
190783: Deer Park	 100 	 Well suited 	 	 Unsuited Slope		 Moderate Low strength	 0.50
190784: Deer Park	 70 	 Well suited 	 	 Well suited 	 	 Moderate Low strength	1 1 1 1 1 1 1 1 1 1
Roscommon	 25 		 0.50	 Moderately suited Sandiness	•	 Moderate Low strength	 0.50
190786: Dune land	 100 	 Not rated 	 	 Not rated 	! 	 Not rated 	

Table 6.—Land Management, Part I (Planting)—Continued

	 Pct. of	•		 Suitability fo: mechanical plant		 Soil rutting haz 	ard
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190787: East Lake	 90 	 Well suited 	 	 Well suited 	 	 Moderate Low strength 	 0.50
190788: East Lake	 90 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	 0.50
190789: East Lake	 90 	 Well suited 	 	 - Moderately suited Slope 		 Moderate Low strength 	 0.50
190790: East Lake	 90 	 Well suited 	 	•	•	 Moderate Low strength 	 0.50
190791: Eastport	 93 			 Moderately suited Sandiness 			 0.50
190792: Edwards				•	•	 Severe Low strength Wetness	 1.00 0.50
Marl beds	 20 	_		_	 0.75 	 Severe Low strength Wetness	 1.00 0.50
190794: Emmet	 60 	 Well suited 	 	 Well suited 	 	 Moderate Low strength	 0.50
Leelanau	1 30 	 Well suited 	! 	 Well suited 	! ! !	 Moderate Low strength	1 10.50
190795: Emmet	 60 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	 0.50
Leelanau	 30 	 Well suited 	! 	 Moderately suited Slope		 Moderate Low strength	 0.50
190796: Emmet	 50 	 Well suited 	 	 Moderately suited Slope	 0.50	 Moderate Low strength	 0.50
Leelanau	 30 	 Well suited 	! 	•	•	 Moderate Low strength	1 10.50
190797: Emmet	 50 	 Well suited 	 	 Poorly suited Slope	•	 Moderate Low strength	 0.50
Leelanau	 30 	 Well suited 	 	 Poorly suited Slope 	•	 Moderate Low strength 	 0.50

Table 6.-Land Management, Part I (Planting)-Continued

Map unit symbol and soil name		Suitability for hand planting		Suitability for mechanical plant	ing	Soil rutting haz 	
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190799: Emmet		 - Moderately suited	 	 - -	 	 Moderate	
Entitle C		· -			•	•	10.50
Leelanau				Unsuited Slope		Moderate Low strength	 0.50
190801:		 	į	 		 	į
Emmet	70 	Well suited 	! !	Moderately suited Slope		Moderate Low strength	10.50
Mancelona	 25 	 Well suited 	! 	 Moderately suited Slope 		 Moderate Low strength 	 0.50
190803: Emmet	 60	' Well suited	 	' Unsuited	 	 Moderate	
	i I	 	 	Slope	•	Low strength	0.50
Mancelona	30 	Well suited 	•	•	•	Moderate Low strength	 0.50
190805: Emmet	 50 	 Well suited 	; 	 Well suited 	•	 Moderate Low strength	 0.50
Omena	 45 	 Well suited 	! 	 Well suited 	•	 Moderate Low strength	1 10.50
190806: Emmet	 50	 Well suited 	 	 Moderately suited Slope			 0.50
Omena	 45 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	1 10.50
190807: Emmet	 50	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	 0.50
Omena	45 45	 Well suited 	! 	 Moderately suited Slope			10.50
190808: Emmet	 50	 Well suited 	 	_		 Moderate Low strength	 0.50
Omena	 45 	 Well suited 	! ! !	 Poorly suited Slope		 Moderate Low strength	10.50
190809: Emmet	 50 			 Unsuited Slope	•	 Moderate Low strength	 0.50
Omena			 0.50	 Unsuited Slope		 Moderate Low strength	 0.50
190811: Hettinger	 45 	 Well suited 	 	 Well suited 	 	 Severe Low strength	 1.00
Muck	30	 Well suited 	! 	 Well suited 	! 	 Severe Low strength	1 1.00

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. Of	·		 Suitability fo: mechanical plant:		 Soil rutting haz 	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190812: Hettinger	 45 	 Well suited 	 	 Well suited 	 	 Severe Low strength	 1.00
Tonkey	 30 	 Well suited 	 	 Well suited 	 	 Severe Low strength	 1.00
190814: Kalkaska	 85 			 Moderately suited Sandiness		 Moderate Low strength	 0.50
190815: Kalkaska	 85 	 Moderately suited Sandiness 		•		Low strength	1 10.50
190816: Kalkaska	90	 Moderately suited Sandiness		Slope		Low strength	10.50
190817: Kalkaska	 90 	 Moderately suited Sandiness 		Slope	•	 Moderate Low strength 	1 10.50
190818: Kalkaska	 90 	Sandiness	 0.50 0.50	Slope	 1.00 0.50		 0.50
190819: Kalkaska	 55 	' Well suited 	: 	' Well suited 	 	 Moderate Low strength	 0.50
East Lake	 35 	 Well suited 	 	 Well suited 	•	 Moderate Low strength	 0.50
190820: Kiva	 65 	 Well suited 	! 	 Well suited 	! 	 Moderate Low strength	 0.50
Mancelona	 30 	 Well suited 	 	 Well suited 	 	 Moderate Low strength 	 0.50
190821: Kiva	 50 	 Well suited 	 	 Moderately suited Slope	•	 Moderate Low strength	 0.50
Mancelona	 30 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	 0.50
190823: Kiva	 50 	 Well suited 	 	 Poorly suited Slope		 Moderate Low strength	 0.50
Mancelona	30	 Well suited 	 	•	•	 Moderate Low strength	 0.50
190824: Lake beaches	1 100	 Not rated	 	 Not rated	 	 Not rated 	

Table 6.-Land Management, Part I (Planting)-Continued

		 Suitability fo hand planting		 Suitability fo mechanical plant		 Soil rutting haz 	ard
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
	I		<u> </u>		'		i
190825: Lake bluffs	 100 	 Not rated 	 	 Not rated 	 	 Not rated 	
190826: Leelanau	 60 	 Well suited 	 	 Well suited 	•	 Moderate Low strength	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
East Lake	 30 	 Well suited 	 	 Well suited 	•	 Moderate Low strength 	 0.50
190827: Leelanau	 65 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	10.50
East Lake	 25 	 Well suited 	 	 Moderately suited Slope 		 Moderate Low strength 	 0.50
190828: Leelanau	 65 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	 0.50
East Lake	 25 	 Well suited 	 	 Moderately suited Slope 	•	 Moderate Low strength 	 0.50
190829: Leelanau	 50 	 Well suited 	 	 Poorly suited Slope	•	 Moderate Low strength	 0.50
East Lake	 35 	 Well suited 	 	 Poorly suited Slope 		 Moderate Low strength 	 0.50
190830: Leelanau		- <u>-</u>		 Unsuited Slope	•	 Moderate Low strength	10.50
East Lake		- <u>-</u>			•	 Moderate Low strength 	 0.50
190831: Lupton	 60 	 Well suited 	 	 Well suited 	•	 Severe Low strength	 1.00
Markey	 30 	 Well suited 	 	 Well suited 	 	 Severe Low strength 	 1.00
190832: Mancelona	 90 	 Well suited 	 	 Well suited 	 	 Moderate Low strength	 0.50
190833: Mancelona	 90 	 Well suited 	 	 Moderately suited Slope 	•	 Moderate Low strength 	 0.50
190834: Mancelona	 60 	 Well suited 	 	 Well suited 	 	 Moderate Low strength	10.50
East Lake	 30 	 Well suited 	 	 Well suited 	 	 Moderate Low strength	1 10.50

Table 6.—Land Management, Part I (Planting)—Continued

	 Pct. of	·	r 	 Suitability fo: mechanical plant		 Soil rutting haz 	zard
		Rating class and limiting features	•	Rating class and limiting features		Rating class and limiting features	
190835: Mancelona	 55 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	 0.50
East Lake	 35 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	 0.50
190836: Mancelona	 50 	 Well suited 	 	 Moderately suited Slope		 Moderate Low strength	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
East Lake	 30 	 Well suited 	 	 Moderately suited Slope 		 Moderate Low strength 	1 10.50
190837: Mancelona	 45 	 Well suited 	 	 Poorly suited Slope		 Moderate Low strength 	 0.50
East Lake	30 	Well suited 	, 	-	•	Moderate Low strength	10.50
190838: Mancelona	 50 				•	 Moderate Low strength	10.50
East Lake						 Moderate Low strength	1 10.50
190839: Mancelona	 70 	 Well suited 	 	 Well suited 	•	 Moderate Low strength	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Richter	 25 	 Well suited 	 	 Well suited 	! 	 Moderate Low strength	1 10.50
190840: Nester	 90 	 Moderately suited Stickiness; high plasticity index	0.50	 Moderately suited Stickiness; high plasticity index	0.50	 Severe Low strength 	 1.00
190841: Nester	 90 	 Moderately suited Stickiness; high plasticity index 	0.50		0.50 0.50	Low strength	 1.00
190842: Nester	 90 	 Moderately suited Stickiness; high plasticity index 	0.50	 Moderately suited Slope Stickiness; high plasticity index	0.50 0.50	 Severe Low strength 	 1.00
190843: Nester	 90 	 Moderately suited Stickiness; high plasticity index 	0.50	 - Poorly suited Slope Stickiness; high plasticity index	0.75 0.50	 - Severe Low strength 	 1.00

Table 6.-Land Management, Part I (Planting)-Continued

	 Pct. of	•	r	Suitability fo: mechanical plant		 Soil rutting haz 	ard
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	<u> </u>
190844: Nester	 90 	-	0.50	•	1.00 0.50	•	 1.00
190846:	i	i İ	i	i	İ	i	i
Pits, gravel	100	Not rated	l	Not rated	I	Not rated	1
190847: Richter	 45 	 Well suited 	 	 Well suited 	 	 Moderate Low strength	 0.50
Alcona	 40 	 Well suited 	 	 Well suited 	•	 Moderate Low strength 	 0.50
190848: Richter	 45 	 Well suited 	 	 Well suited 	•	 Moderate Low strength 	 0.50
Alcona	 40 	 Well suited 	 	 Well suited 	 	 Moderate Low strength 	 0.50
190849: Roscommon	 50 		 0.50	 Moderately suited Sandiness	•	 Moderate Low strength	 0.50
Markey	 30 	 Well suited 	 	 Well suited 	•	 Severe Low strength 	 1.00
190850: Sanilac	 90 	 Well suited 	 	 Well suited 	•	 Severe Low strength 	 1.00
190851: Tonkey	 40 	 Well suited 	 	 Well suited 	•	 Moderate Low strength	 0.50
Munuscong	 25 	 Well suited 	 	 Well suited 	! 	 Moderate Low strength	10.50
Iosco	 25 	 Well suited 	 	 Well suited 	•	 Moderate Low strength	 0.50
190852: Tonkey	 35 	 Well suited 	 	 Well suited 	•	 Moderate Low strength	 0.50
Munuscong	1 30 	 Well suited 	 	 Well suited 	 	 Moderate Low strength	 0.50
Iosco	 20 	 Well suited 		 Well suited 	 	 Moderate Low strength	 0.50
190853: Water	 100 	 Not rated 	 	 Not rated 	 	 Not rated 	

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of	hand planting		Suitability for mechanical plant	ing	Soil rutting haz 	
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190854: Wallace	 50 	 Moderately suited Sandiness 		Sandiness		Low strength	 0.50
Kalkaska	 45 	 Moderately suited Sandiness 		Sandiness		Low strength	 0.50
190855: Wind eroded land		-	 0.50 	•		 Moderate Low strength 	 0.50
190856: Wind eroded land	•		 0.50 	•	•	 Moderate Low strength 	 0.50
193236: Beaches	 100 	 Not rated 	 	 Not rated 	 	 Not rated 	i I I
193237: Thompsonville	 50 	 Well suited 	 -	 Well suited 	•	 Moderate Low strength	 0.50
Milnichol	 40 	 Well suited 	 	 Well suited 	•	 Moderate Low strength	 0.50
193255: Spinks	 50	· -		 Moderately suited Sandiness		 Moderate Low strength	 0.50
Coloma	40			 Moderately suited Sandiness			10.50
193256: Spinks	 50 	 Moderately suited Sandiness 		Slope		Low strength	 0.50
Coloma	 40 			Slope		Low strength	 0.50
193257: Spinks	 55 	-	 0.50	-	•	 Moderate Low strength 	 0.50
Coloma	 35 		 0.50 	Slope	•	 Moderate Low strength 	 0.50
193258: Spinks	 50 		 0.50 	-	•	 Moderate Low strength 	 0.50
Coloma	1 40	-	 0.50 	Slope Sandiness	1.00 0.50	 Moderate Low strength 	 0.50

Table 6.-Land Management, Part I (Planting)-Continued

	Pct.	, Suitability fo: hand planting		, Suitability fo mechanical plant		, Soil rutting haz 	ard
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	1	limiting features	1
193260: Copemish		Sandiness	0.50	Sandiness	0.50	Low strength	 0.50
	:	Restrictive layer	10.50 I	l stobe	10.50	 	
193262: Kaleva		 Moderately suited Sandiness					10.50
193263:	i i	! 	! !	! 	<u> </u>	! 	;
Kaleva		Moderately suited Sandiness 		-	0.50	Low strength	 0.50
193265:	i i	! 	! !	! 	<u> </u>	! 	;
Grattan		·	•	 Moderately suited Sandiness 	•	 Moderate Low strength 	 0.50
193266: Grattan	•	 Moderately suited Sandiness 	•	-	•	Low strength	 0.50
	i	i İ	i	j	İ	İ	i
193267: Grattan		·		-		Low strength	 0.50
193269:	1	 	 	 	1	 	1
Grattan	95 	Slope	0.50	Slope		 Moderate Low strength 	 0.50
193270: Covert		 Moderately suited Sandiness					10.50
193271: Pipestone	•	 Moderately suited Sandiness	•	•	•	•	10.50
193272: Dair	 90 	·		 Moderately suited Wetness 		 Severe Low strength Wetness	 1.00 0.50
193277: Benona	 90 		 0.50	 Moderately suited Sandiness		 Moderate Low strength	 0.50
193278: Benona	 90 		 0.50 	-		Low strength	 0.50
193279: Benona			 0.50	Slope	0.50 0.50	Low strength	 0.50

Table 6.—Land Management, Part I (Planting)—Continued

	Pct.	Suitability fo hand planting		Suitability fo mechanical plant		Soil rutting haz 	zard
		Rating class and				Rating class and	
	-	limiting features		limiting features		limiting features	
	<u> </u>	!	I	!	1	!	1
193284:	==	 Madamata] aitad	!	 Thereited		 Madamata	1
Udorthents	1 22				•	Moderate Low strength	10.50
	i	l Siope	1	l Siope	1	How Strength	1
Udipsamments	35	Moderately suited	i	Unsuited	İ	Moderate	i
	I	-		•	1.00	Low strength	10.50
	!	Sandiness	10.50	Sandiness	10.50	! :	1
193285:		 	1	 	1	 	1
Lumley	i i 55	 Moderately suited	i	 Moderately suited	i	Severe	i
-		_		Wetness		Low strength	11.00
	I	I	I	l	I	Wetness	10.50
			!		ļ	1	1
Makinen	1 40					Severe Low strength	11 00
	!	Wetness	10.50	wethess	10.50	Wetness	1.00 0.50
	i	! 	i	! 	i	We chess	1
193286:	i	İ	i	İ	İ	İ	i
Histosols	55	-		Poorly suited		Severe	1
	!	Wetness	10.75	Wetness	10.75	Low strength	11.00
	!	 	!	 	1	Wetness	10.50
Aquents	1 45	l Poorly suited	i	 Poorly suited	i	 Moderate	<u> </u>
	•	•	0.75	•		Wetness	10.50
	İ	Sandiness	10.50	Sandiness	0.50	Low strength	10.50
	I	l	I	l	I	l	1
193287:			!		!	137.1	!
Dune land	1 22	NOT rated 	1	Not rated	!	Not rated	!
Quartzipsamments	1 40	' Moderately suited	i	' Unsuited	i	 Moderate	i
-	İ	Slope	10.50	Slope	11.00	Low strength	10.50
	I	Sandiness	10.50	Sandiness	10.50	l	1
193288:			!		!		1
Udipsamments	1 100	 Moderately suited	i	 Moderately suited	<u> </u>	 Moderate	<u> </u>
	i			Sandiness			0.50
	I	I	I	l	I	I	1
193342:		<u> </u>	1	<u> </u>	!		1
Gorvan	35					Severe Low strength	11.00
	!	wethess	10.50	wethess	10.50 I	Wetness	10.50
	i	i I	i	i I	i		1
Houghton	30	Moderately suited	I	Moderately suited	I	Severe	1
	1	Wetness	10.50	Wetness	10.50	Low strength	1.00
	!	 -	!]	!	Wetness	10.50
Glendora	1 20	 Moderatelv suited	1	 Moderately suited		 Moderate	1
0_000_0	i	_		-	0.50	•	0.50
	I	Wetness	10.50	Wetness	0.50	Low strength	10.50
100040	!	! :	!	<u> </u>	!	!	!
193349: Spinks	 E0	 Moderately suited	I	 Uneuited	I I	 Moderate	1
PPTIIKS	1 30	Slope	1 0.50	Unsuited Slope	 1.00	Moderate Low strength	10.50
	i	=	10.50	-	10.50	•	1
	I	l	Ì	I	I	I	1
Coloma	40	-		Unsuited		Moderate	1
	1	Slope	10.50	_	11.00	•	10.50
	1	Sandiness	10.50	Sandiness	0.50	I	1

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	 Pct. of	hand planting		mechanical plant	ing	Soil rutting haz	
		Rating class and limiting features	•	Rating class and limiting features	•	Rating class and limiting features	•
193351: Benona		- <u>-</u>	 0.50 	Slope	•	 Moderate Low strength 	 0.50
193354: Dune land	 50	 Not rated	 	 Not rated	 	 Not rated	 -
Quartzipsamments		 Moderately suited Sandiness 		Slope		Low strength	 0.50
193357: Shavenaugh		 Moderately suited Sandiness 		Slope	•	 Moderate Low strength 	 0.50
193359: Shavenaugh		 Moderately suited Sandiness 		•	•	Low strength	 0.50
193360: Shavenaugh	•	•	•	 - Moderately suited Sandiness	•	 Moderate Low strength	 0.50
193362: Benzonia		- <u>-</u>	 0.50	Slope	•	 Moderate Low strength 	 0.50
193363: Benzonia	 90 	 Moderately suited Sandiness 		•		Low strength	 0.50
193364: Benzonia			 0.50 	Slope		Low strength	 0.50
193365: Benzonia	 90 		 0.50	 Moderately suited Sandiness		 Moderate Low strength	10.50
193371: Dair	 50 			_	 0.50 		 1.00 0.50
Pipestone	 40 	 Moderately suited Sandiness		 Moderately suited Sandiness		 Moderate Low strength	 0.50
193372: Access Denied	1 100	 Not rated 	 	 Not rated 	 	 Not rated 	
193423: Benona	 95 	Slope		-	1.00 0.50	 Moderate Low strength 	 0.50

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of	hand planting		Suitability fo mechanical plant	ing	Soil rutting haz 	
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193484: Pits, sand and gravel	•	 Not rated	 	 Not rated	 	 Not rated	
193494: Nordhouse	 100 	Sandiness		Slope	•	 Moderate Low strength 	 0.50
193496: Nordhouse		 Moderately suited Sandiness 		Slope		Low strength	 0.50
193497: Nordhouse		- <u>-</u>		 Moderately suited Sandiness			 0.50
193498: Nordhouse		 Moderately suited Sandiness		· <u>-</u>		 Moderate Low strength	10.50
Platteriver		 Moderately suited Sandiness				 Moderate Low strength	 0.50
Dair	 25 	- <u>-</u>		•	0.50		 1.00 0.50
193503: Spinks	 50 	- <u>-</u>		 Moderately suited Sandiness			 0.50
Shavenaugh		- <u>-</u>		 Moderately suited Sandiness			 0.50
193504: Spinks		 Moderately suited Sandiness 		Slope		Low strength	 0.50
Shavenaugh				Slope		Low strength	 0.50
193505: Spinks	 50 		 0.50		•	 Moderate Low strength 	 0.50
Shavenaugh	 40 		 0.50 	Slope		 Moderate Low strength 	 0.50
193506: Spinks	 50 		 0.50	•	•	 Moderate Low strength 	 0.50
Shavenaugh	 40 		 0.50 	Sandiness	1.00 0.50	 Moderate Low strength 	 0.50

Table 6.-Land Management, Part I (Planting)-Continued

Map unit symbol and soil name	Pct. of	 Suitability fo hand planting		 Suitability fo: mechanical plant		<u> </u>	Soil rutting hazard		
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features			
193507:	1	 	 	 	 	 	1		
Spinks		Moderately suited				Moderate	1		
	!	-		-		Low strength	10.50		
	!	Sandiness	U.5U	Sandiness	0.50 	 	1		
Shavenaugh	40	 Moderately suited	i	 Unsuited	i	 Moderate	i		
					11.00	Low strength	10.50		
	1	Sandiness	10.50	Sandiness	10.50	<u> </u>	1		
193508:	!	 					1		
Madaus	ı ∙I 90	 Moderatelv suited	<u> </u>	 Poorly suited	! !	 Severe	<u> </u>		
					•	Low strength	11.00		
	1	I	l	I	I	Wetness	10.50		
102500	!	<u> </u>	1	<u> </u>	!	<u> </u>	!		
193509: Boyer	I I 50	 Wall suited	1	 Moderately suited	 	 Moderate			
Doyer	1	 	i			Low strength	10.50		
	i	i İ	i	İ	İ	İ	İ		
Shavenaugh				Moderately suited		Moderate	1		
	!	Sandiness	10.50	Sandiness	10.50	Low strength	10.50		
193510:	1	! 	 	! 	! !	! 	I I		
Boyer	· 50	 Well suited	i	 Moderately suited	i	 Moderate	i		
_	İ	İ	Ì			Low strength	10.50		
	1	<u> </u>	1	Rock fragments	10.50	<u> </u>	1		
Sharranaugh	. 1 40	 Moderately suited		 Moderately systed		 Moderate	1		
Snavenaugn		- <u>-</u>	1 10.50	Moderately suited Slope		Low strength	10.50		
	i			•	0.50	•			
	1	I	l	I	I	I	1		
193511:			1	177	Į.	126.3	!		
Boyer	· [50	Well suited		•	•	Moderate Low strength	I 10.50		
	i	! 	i	•	10.50	•	10.50		
	i	İ	i	İ	İ	İ	i		
Shavenaugh	40	Moderately suited		•	•	Moderate	1		
	!	Sandiness	10.50	•		Low strength	10.50		
	!	 	 	Sandiness	0.50 	 	1		
193513:	i	' 	i		i		i		
Dair	· 50	Moderately suited	I	Moderately suited	I	Severe	I		
	1	Wetness	10.50	Wetness		Low strength	1.00		
	!	 		 	1	Wetness	10.50		
Adrian	ı ·I 45	 Moderatelv suited	<u> </u>	 Moderately suited	! !	 Severe	<u> </u>		
	i	-		=		Low strength	11.00		
	I	l	I	l	I	Wetness	10.50		
102514.	!		!		!		!		
193514:	 55	 Moderately suited	1	 Moderately suited	 	 Moderate			
11400011101		-				Low strength	0.50		
	İ	İ	Ì	İ	ĺ	ĺ	Ì		
Pipestone		- <u>-</u>		Moderately suited		Moderate	1		
	!	Sandiness	10.50	Sandiness	10.50	Low strength	10.50		
202010:		! 	<u> </u>	! 		! 			
	. 55	Moderately suited	i	 Moderately suited	i	Severe	i		
		-		=		Low strength	11.00		
	!	<u> </u>	!	<u> </u>	Į.	Wetness	0.50		
Adri an	I . I 40	 Moderately suited	I I	 Moderately suited	 	 Severe	I I		
14414411		-		=	•	Low strength	11.00		
	i					Wetness	10.50		
	1	I	l	I	I	I	İ		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of	 Suitability fo hand planting		 Suitability fo mechanical plant		 Soil rutting haz 	zard
		Rating class and				Rating class and	Value
	lunit	limiting features	<u>i</u>	limiting features	İ	limiting features	<u>i</u>
	1	!	!	!	!	<u> </u>	1
202016:			!		!	196. 3	!
Spinks	-1 20	Moderately suited		Moderately suited			10 50
	1	Sandiness	10.50	Sandiness	10.50	Low strength	10.50
Tekenink, sandy	i	i I	i	i I	i	! 	i
substratum	- 40	Well suited	i	Well suited	i	Moderate	i
	İ	İ	İ	İ	Ì	Low strength	10.50
	1	I	1	I	I	l	1
631170:		 	!	177	!	134. 3	!
Fogg	-1 50				•	Moderate	I 10.50
	-	-		•	10.50	Low strength	10.50
	<u> </u>	l Sandiness	10.50	Sandiness	10.50	! 	i .
Benzonia	- 40	' Moderately suited	i	' Unsuited	i	' Moderate	i
					11.00	Low strength	10.50
	1	Sandiness	10.50	Sandiness	0.50	I	1
	1	I	1	I	I	l	1
631171:		<u> </u>	!	<u> </u>	!	<u> </u>	!
Fogg	•			•	•	Moderate	10 50
	!	Sandiness	•	•	10.50	Low strength	10.50
	1	! !	!	Sandiness	10.50	l I	!
Benzonia	-I 40	 Moderatelv suited	i	 Unsuited	i	 Moderate	i
		Sandiness			•	Low strength	10.50
	i	İ	i	-	0.50	· =	i
	1	I	I	I	I	I	1
631172:	1	I	1	I	I	I	I
Fogg	- 50			Moderately suited			
	!	Sandiness	10.50	•		Low strength	10.50
		 	!	Sandiness	10.50	 	!
Benzonia	-I 40	 Moderately suited	i	 Moderately suited	<u> </u>	ı Moderate	i .
	i			-		Low strength	0.50
	İ	İ	İ	Sandiness	0.50	ĺ	İ
	1	I	1	I	I	l	1
631173:		<u> </u>	!	<u> </u>	!	<u> </u>	!
Fogg				Moderately suited			10 50
	1	Sandiness	10.50	-	10.50	Low strength	10.50
	<u> </u>	! !	i	Sandiness	10.50	! 	<u> </u>
Benzonia	- i 40	Moderately suited	i	 Moderately suited	i	Moderate	i
		_		Slope	0.50	Low strength	10.50
	1	I	1	Sandiness	0.50	l	1
C21174	1	<u> </u>	!	<u> </u>	1	<u> </u>	1
631174:			!	 Madawatalo andtad	!		!
Fogg				Moderately suited Sandiness		Moderate Low strength	10.50
	<u> </u>	l Sandiness	10.50	Sandiness	10.50	l now screngen	10.50
Benzonia	- 40	' Moderately suited	i	 Moderately suited	i	' Moderate	i
		Sandiness		-		Low strength	0.50
	1	I	I	I	I	l	1
680939:		<u> </u>	!	<u> </u>	!	<u> </u>	1
Fern	-1 50	_		-		Moderate	10 50
	1	Sandiness	10.50	•	•	Low strength	10.50
	1	 	1	sanginess	0.50 	 	1
Spinks	- I 40	 Moderatelv suited	i	 Moderately suited	i	Moderate	i
<u>-</u>		_		-		Low strength	0.50
	1	I	I	•	0.50	•	1

Table 6.-Land Management, Part I (Planting)-Continued

Map unit symbol and soil name	Pct.	·		Suitability fo mechanical plant		Soil rutting haz 	ard
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
680943: Milnichol	 - 90 	 Well suited 	 	 Well suited 	•	 Moderate Low strength 	 0.50
680945: Fern	 - 90 			-		Low strength	 0.50
680946: Fern		 Moderately suited Sandiness	 0.50	 Moderately suited Sandiness		 Moderate Low strength	 0.50
680971: Nessen		 Moderately suited Sandiness 		Slope	•	 Moderate Low strength 	 0.50
Kaleva		 Moderately suited Sandiness 		Slope	•	 Moderate Low strength 	 0.50
680972: Nessen		 Moderately suited Sandiness 		•		Low strength	 0.50
Kaleva		 Moderately suited Sandiness 		•		Low strength	 0.50
680973: Nessen		 Moderately suited Sandiness 		•		Low strength	 0.50
Kaleva		 Moderately suited Sandiness 		-	•	Low strength	 0.50
				 Moderately suited Sandiness			10.50
Kaleva	- 40 	 Moderately suited Sandiness	 0.50	Moderately suited Sandiness		 Moderate Low strength	i 0.50
893251: Boyer	 - 50 	 Well suited 	 	 Moderately suited Slope Rock fragments	0.50 0.50	 Moderate Low strength 	 0.50
Shavenaugh	 - 40 	_	 0.50 	•	•	 Moderate Low strength 	 0.50
894062: Remus	 - 50 	 Well suited 	 	 Unsuited Slope 	•	 Moderate Low strength 	 0.50
Spinks	- 40 		 0.50	 Unsuited Slope Sandiness	11.00	 Moderate Low strength 	 0.50

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. Of	Suitability fo hand planting		Suitability fo mechanical plant		Soil rutting haz 	zard
		Rating class and				Rating class and	Value
	-	limiting features		limiting features		limiting features	
894063:		 -	!	 -	1		1
Remus	1 50	l Well suited	<u> </u>	 Moderately suited	1	 Moderate	
Remas	1	l	i	-		Low strength	10.50
	i	i	i		1		1
Spinks	40	Moderately suited	I	Moderately suited	1	Moderate	1
	1	Sandiness	10.50	Slope		•	10.50
	!	<u> </u>	!	Sandiness	10.50		!
894064:	!	 		 	1	 	1
Fern	50	' Moderately suited	i	 Moderately suited	i	 Moderate	i
	i	Sandiness		-		Low strength	0.50
	I	I	I	Sandiness	10.50	I	1
_	1	<u> </u>	!	<u> </u>	1	<u> </u>	ļ
Remus	1 40	Well suited	!	Moderately suited		Moderate	I 10.50
	!	 		Slope	10.50	Low strength	10.50
894065:	i	! 	i	! 	i	! 	i
Fern	50	Moderately suited	İ	Moderately suited	İ	Moderate	Ì
	I	Sandiness	10.50	Sandiness	10.50	Low strength	10.50
D	1		!		!	134. 3	!
Remus	1 40	Well suited	!	Well suited	•	Moderate Low strength	I 10.50
	i	! 	<u> </u>	! 	i	How strength	10.50
894104:	i	i İ	i	i İ	i	İ	i
Mollineaux	50	· -	•	Unsuited	1	Moderate	1
	I	Sandiness	10.50	•		Low strength	10.50
	!		!	Sandiness	10.50		!
Remus	I I 40	l Well suited		 Unsuited	1	 Moderate	1
Remas	1 40	l	i	•	•	Low strength	10.50
	i	İ	i	i -	i	İ	i
894105:	I	l	I	l	1	l	1
Mollineaux				Moderately suited			
	!	Sandiness	10.50	•	10.50	Low strength	10.50
	i .	! 	<u> </u>	Sandiness	10.50	! 	<u> </u>
Remus	40	Well suited	i	Moderately suited	i	 Moderate	i
	I	I	I	Slope	10.50	Low strength	10.50
	1	<u> </u>	!	<u> </u>	1	!	ļ
894165:	I =0	 Madamatalii awitad	!	 Thereited	1	 Moderate	
Spinks		_		•	•	Low strength	10.50
	i	-			0.50		1
	I	I	I	l	1	I	1
Tekenink, sandy	1	l	I	l	1	I	I
substratum	40	Moderately suited		Unsuited		Moderate	
	!	Slope	10.50	Slope	11.00	Low strength	10.50
899682:	i	! 	i	! 	i	! 	i
Kaleva	90	Moderately suited	i	Unsuited	i	Moderate	i
	I	-	10.50	•	1.00	•	10.50
	!	Sandiness	10.50	Sandiness	10.50	<u> </u>	1
899722:	1	 	I I] 	I	 	1
899722: Goodharbor	90	 Moderately suited	<u> </u>	 Moderately suited		 Moderate	
				Sandiness	•	Low strength	0.50
	I	I	I	Slope	10.50	-	1
	I	l	I	l	1	I	1

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Table 6.-Land Management, Part I (Planting)-Continued

	1	!		1		1	_
Map unit symbol	Pct.	•		Suitability fo		Soil rutting haz	ard
and soil name	of	` 		mechanical plant	ing	<u> </u>	
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	1	limiting features	1	limiting features	1
	1	I	1	I		1	1
899731:	1	I	1	I	1	I	1
Covert	- 50	Moderately suited	1	Moderately suited	1	Moderate	1
	1	Sandiness	10.50	Sandiness	10.50	Low strength	10.50
	1	I	1	I	1	I	1
Pipestone	- 40	Moderately suited	1	Moderately suited	1	Moderate	1
	1	Sandiness	10.50	Sandiness	10.50	Low strength	10.50
	1	I	1	I	1	I	1
899733:	1	I	1	I	1	I	1
Covert	- 50	Moderately suited	1	Moderately suited		Moderate	1
	1	Sandiness	10.50	Sandiness	0.50	Low strength	10.50
	1	I	1	I	1	I	1
Dair	- 45	Moderately suited	1	Moderately suited	1	Severe	1
	1	Wetness	10.50	Wetness	10.50	Low strength	1.00
	1	I	1	I	1	Wetness	10.50
	1	I	1	I	1	I	1
899734:	1	I	1	I	1	I	1
Benzonia	- 90	Moderately suited	1	Unsuited	1	Moderate	1
	1	Slope	10.50	Slope	1.00	Low strength	10.50
	1	Sandiness	10.50	Sandiness	10.50	I	1
	1	l	1	I	1	I	1

Table 6.-Land Management, Part II (Hazard of Erosion and Suitability for Roads)

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

	 Pct. of	•	on	 Hazard of erosion roads and trai		 Suitability for roads (natural surface)	
	lmap	Rating class and	Value	Rating class and	Value	`	
		limiting features		limiting features		limiting features	•
190775: Adrian	 55 	 Slight 	 	 Slight 	 	 Poorly suited Low strength Ponding	 1.00 1.00
Houghton	 45 	 Slight 	 	 Slight 	 	Wetness Dusty Poorly suited Low strength Ponding	1.00 0.01 1.00 1.00
190777: Alcona	 55	 Slight	 	 Slight	 	Wetness Dusty Well suited	1.00 0.01
Richter	 30 	 Slight 	 	 Slight 	 	 Moderately suited Wetness Dusty	 0.50 0.01
190778: Alcona	 65 	 Slight 	 	 Moderate Slope/erodibility 	•	 Well suited 	
Richter	25 		 	 Moderate Slope/erodibility 		 Moderately suited Wetness Dusty 	 0.50 0.01
190779: Alpena	 90 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope 	 0.50
190780: Au Gres	 45 	 Slight 	 	 Slight 	 	 Moderately suited Wetness Sandiness	 0.50 0.50
Kalkaska	 35 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness 	 0.50
190781: Bach	 90 	 Slight 	 	 Slight 	 	 Poorly suited Ponding Wetness Low strength Dusty	 1.00 1.00 0.50 0.01
190782: Deer Park	 100 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope 	 0.50
190783: Deer Park	 100 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope 	 1.00

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

	 Pct. of		on	 Hazard of erosion roads and trai		 Suitability for r (natural surfac	
	-	Rating class and		-		-	•
	unit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	<u> </u>
190784:							1
Deer Park	 70	 Slight 	! !	 Slight 	 	 Well suited 	
Roscommon	 25 	 Slight 	 	 Slight 		 Poorly suited Ponding Wetness Sandiness	 1.00 1.00 0.50
190786:	i	i i	i	i	i	i	i
Dune land	100	Not rated	 	Not rated	I	Not rated	į
190787:	 	! 	! !	! 	! !	! 	1
East Lake	90	Slight	İ	Slight	į	Well suited	į
190788:		 	 	 	1	 	1
East Lake	90 	 Slight 	! ! !	 Moderate Slope/erodibility		 Moderately suited Slope	 0.50
190789:		 	 	 	1	 	1
East Lake	90 		•	 Moderate Slope/erodibility	•	 Poorly suited Slope	11.00
190790:	i	! 	i i	! 	i	! 	i
East Lake	90 	Moderate Slope/erodibility 	•	Severe Slope/erodibility 	•	Poorly suited Slope 	 1.00
190791:	i	i	i	i İ	i	i i	i
Eastport	93 	Slight 	 	Slight 	 	Moderately suited Sandiness	 0.50
190792:			ļ .		I		1
Edwards	I I 70	ι Sliαht	! !	 Slight	! !	 Poorly suited	
	į i	İ	i	İ		Low strength	11.00
	I	l	I	l	I	Ponding	11.00
	!		!		!	•	1.00
		! 	 	! 	 		1.00 0.01
		1	I	<u> </u>	I	<u> </u>	I
Marl beds	20	Slight		Slight		Poorly suited Low strength	 1.00
	i	 	! 	! 	! 	Dusty	10.03
190794:					I		I
Emmet	I I 60	 Slight	! 	 Moderate	! 	 Well suited	
	!	!	ļ .	Slope/erodibility	0.50	Dusty	0.01
Leelanau	 30	 Slight	 	 Slight	! 	 Well suited	
100705.					I		I
190795: Emmet	I 60	ı Slight	! 	 Severe	! 	 Moderately suited	
	ļ.	!	ļ.	Slope/erodibility		Slope	0.50
		 	 	 -	I	Dusty	0.01
Leelanau	30	 Slight	! 	 Moderate	! 	 Moderately suited	
		ļ.	l	Slope/erodibility		-	0.50
	I	I	I	I	I	I	I

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	 Pct. of	•	on	 Hazard of erosion roads and trai		 Suitability for r (natural surfac	
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	•
190796:	I I	 	<u> </u>	 	<u> </u>		
Emmet	50 	•	•	Severe Slope/erodibility 		Poorly suited Slope Dusty	 1.00 0.01
Leelanau	 30 	•	•	 Moderate Slope/erodibility 		 Poorly suited Slope 	 1.00
190797: Emmet	 50 	•	•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01
Leelanau	 30 		•	 Severe Slope/erodibility 		 Poorly suited Slope 	 1.00
190799: Emmet	 45 	•	•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01
Leelanau	 30 		•	 Severe Slope/erodibility		 Poorly suited Slope	 1.00
190801: Emmet	 70 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Dusty	 0.50 0.01
Mancelona	 25 	 Slight 	 	 Moderate Slope/erodibility		 Moderately suited Slope	 0.50
190803: Emmet	 60 	•	•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01
Mancelona	 30 	•	•	 Severe Slope/erodibility		 Poorly suited Slope	1 1 00
190805: Emmet	 50 	 Slight 	 	 Moderate Slope/erodibility	•	 Well suited Dusty	 0.01
Omena	 45 	 Slight 	 	 Moderate Slope/erodibility	•	 Well suited Dusty	 0.01
190806: Emmet	 50 	 Slight 	 	 Severe Slope/erodibility 		 Moderately suited Slope Dusty	 0.50 0.01
Omena	 45 	 Slight 	 	 Severe Slope/erodibility 		Moderately suited Slope Dusty	 0.50 0.01

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of	i		Hazard of erosion roads and trai	ls	(natural surface)		
		Rating class and limiting features	•	Rating class and limiting features	•	Rating class and limiting features	•	
190807: Emmet	•	•	•	 Severe Slope/erodibility 	•	 Poorly suited Slope Dusty	 1.00 0.01	
Omena	 45 		•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01	
190808:		 	 	 	 	 		
Emmet	50 		•	Severe Slope/erodibility 		Poorly suited Slope Dusty	 1.00 0.01	
Omena	 45 		•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01	
190809: Emmet	 50 		•	 Severe Slope/erodibility 	•	 Poorly suited Slope Dusty	 1.00 0.01	
Omena	 45 		•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01	
190811: Hettinger	 - 45 	 Slight 	 	 Slight 	I	 Poorly suited Ponding Wetness Low strength	 1.00 1.00 0.50	
Muck	 30 	 Slight 	 	 Slight 	 	Dusty Poorly suited Low strength Ponding Wetness Dusty	0.02 1.00 1.00 1.00	
190812: Hettinger	 45 	 Slight 	 	 Slight 	•	 - Poorly suited Ponding Wetness Low strength	 1.00 1.00 0.50	
Tonkey	 30 	 Slight 	 	 Slight 	 	Dusty Poorly suited Ponding Wetness Low strength Dusty	0.02 1.00 1.00 0.50 0.01	
190814: Kalkaska	 85 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50	
190815: Kalkaska	 85 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness 	 0.50 0.50	

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

	 Pct. of	•	on	 Hazard of erosion roads and trai		 Suitability for r (natural surfac	
		Rating class and limiting features		Rating class and limiting features	•	Rating class and limiting features	•
190816: Kalkaska	 90 	 Moderate Slope/erodibility 		 - Moderate Slope/erodibility -		 - Poorly suited Slope Sandiness	 1.00 0.50
190817: Kalkaska	 90 	 Moderate Slope/erodibility		 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
190818: Kalkaska	 90 	 Moderate Slope/erodibility 		 - Severe Slope/erodibility - 		 - Poorly suited Slope Sandiness 	 1.00 0.50
190819: Kalkaska	 55	 Slight		 Slight	 	 Well suited	İ İ
East Lake	I 35 	 Slight 	 	 Slight 	 	 Well suited 	
190820: Kiva	 65 	 Slight 	 	 Slight 	' 	 Well suited 	i
Mancelona	30 	Slight] 	Slight 	 	Well suited 	
190821: Kiva	 50 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Dusty	 0.50 0.01
Mancelona	 30 	 Slight 	 	 Moderate Slope/erodibility		 Moderately suited Slope	 0.50
190823: Kiva	 50 	 Moderate Slope/erodibility 		 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01
Mancelona	 30 	•		 Severe Slope/erodibility		 Poorly suited Slope	 1.00
190824: Lake beaches	 100 	 Not rated 		 Not rated 	 	 Not rated 	
190825: Lake bluffs	1 100	 Not rated		 Not rated	 	 Not rated	
190826: Leelanau	 60	 Slight		 Slight	 	 Well suited	
East Lake	1 30 	 Slight 	 	 Slight 	! 	 Well suited 	
190827: Leelanau	 65 	 Slight 		 Moderate Slope/erodibility		 Moderately suited Slope	10.50
East Lake	 25 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope 	 0.50

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

and soil name	Pct. Of			Hazard of erosion roads and trai	ls	(natural surfac	e)
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190828: Leelanau	 65 	•	•	 Moderate Slope/erodibility		 Poorly suited Slope	 1.00
East Lake	25 	•	•	 Moderate Slope/erodibility	•	Poorly suited Slope	1.00
190829: Leelanau	 50	•	•	 Severe Slope/erodibility		 Poorly suited Slope	1 1 1 00
East Lake	 35 	•	•	 Severe Slope/erodibility		 Poorly suited Slope	1 1 . 00
190830: Leelanau	 50 	•	•	 - Severe Slope/erodibility 		 Poorly suited Slope 	 1.00
East Lake	35 	•	•	 Severe Slope/erodibility 		Poorly suited Slope 	11.00
190831: Lupton	 60 	 Slight 		 Slight 	 	Ponding Wetness	 1.00 1.00 1.00 0.01
Markey	 30 	 Slight 	 	 Slight 	ĺ	Ponding Wetness	 1.00 1.00 1.00 0.01
190832: Mancelona	 90 	 Slight 	 	 Moderate Slope/erodibility 	•	 Well suited 	
190833: Mancelona	 90 	 Slight 	 	 - Severe Slope/erodibility		 Moderately suited Slope 	 0.50
190834: Mancelona	 60	 Slight 	 	 Slight 	 	 Well suited 	
East Lake	30	 Slight 		 Slight 		 Well suited	
190835: Mancelona	 55 	 Slight 	 	 Moderate Slope/erodibility		 Moderately suited Slope	1 1 1 1 1 1 1 1 1 1
East Lake	 35 	 Slight 	 	 Moderate Slope/erodibility		 Moderately suited Slope	 0.50
190836: Mancelona	 50 	 Moderate Slope/erodibility	•	 Moderate Slope/erodibility		 Poorly suited Slope	1 1 1 1 1 1 1 1 1 1
East Lake	1 30 	 Moderate Slope/erodibility 	•	 Moderate Slope/erodibility 		 Poorly suited Slope 	 1.00

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	 Pct. of		on	 Hazard of erosion roads and trai		 Suitability for r (natural surfac	
	map	· 			Value	`	Value
190837: Mancelona	 45 	•		 - Severe Slope/erodibility	 	 - Poorly suited Slope	1 1 . 00
East Lake	 30 		•	 Severe Slope/erodibility 	•	 Poorly suited Slope 	 1.00
190838: Mancelona	 50 	•	•	 Severe Slope/erodibility		 Poorly suited Slope	 1.00
East Lake	 30 	•	•	 Severe Slope/erodibility 		 Poorly suited Slope 	 1.00
190839: Mancelona	 70 	 Slight 	 	' Slight 	 	, Well suited 	;
Richter	25 	Slight 	 	Moderate Slope/erodibility 		 Moderately suited Wetness Dusty	 0.50 0.01
190840: Nester	 90 	 Slight 	 	 Moderate Slope/erodibility 		 - Moderately suited Low strength Dusty 	 0.50 0.03
190841: Nester	 90 	 Slight 	 	 Severe Slope/erodibility 		 Moderately suited Slope Low strength Dusty	 0.50 0.50 0.03
190842: Nester	 90 	•		 - Severe Slope/erodibility 		 - Poorly suited Slope Low strength Dusty	 1.00 0.50 0.03
190843: Nester	 90 	 Moderate Slope/erodibility 		 Severe Slope/erodibility 		 Poorly suited Slope Low strength Dusty	 1.00 0.50 0.03
190844: Nester	 90 	 Severe Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Low strength Dusty	 1.00 0.50 0.03
190846: Pits, gravel	 100 	 Not rated 	 	 Not rated 	 	 Not rated 	
190847: Richter	 45 	 Slight 	 	 Slight 	 	 Moderately suited Wetness Dusty	 0.50 0.01
Alcona	 40 	 Slight 	 	 Slight 	 	 Well suited 	

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

	 Pct. of	•	on	 Hazard of erosion roads and trai		•	(natural surface)		
	map unit	Rating class and limiting features	•	Rating class and limiting features		Rating class and limiting features			
190848: Richter	 45 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Wetness Dusty	 0.50 0.01		
Alcona	 40 	 Slight 	 	 Moderate Slope/erodibility	•	 Well suited 	 		
190849: Roscommon	 50 	 Slight 	 	 Slight 	 	 Poorly suited Ponding Wetness Sandiness	 1.00 1.00 0.50		
Markey	 30 	 Slight 	 	 Slight 		Dusty	 1.00 1.00 1.00		
190850: Sanilac	 90 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited	 0.50 0.50 0.50		
190851: Tonkey	 40 	 Slight 	 	 Slight 	 	 Poorly suited Ponding Wetness Dusty	 1.00 1.00 0.01		
Munuscong	25 	 Slight 	 	 Slight 		 Poorly suited Ponding Wetness Dusty	 1.00 1.00 0.01		
Iosco	 25 	 Slight 	 	 Slight 	 	 Moderately suited Wetness	 0.50		
190852: Tonkey	 35 	 Slight 	 	 Slight 	 	 Poorly suited Ponding Wetness Dusty	 1.00 1.00 0.01		
Munuscong	 30 	 Slight 	 	 Slight 		 Poorly suited Ponding	 1.00 1.00 0.01		
Iosco	 20 	 Slight 	 	 Slight 	 	 Moderately suited Wetness	 0.50		
190853: Water		 Not rated 	 	 Not rated 	 	 Not rated 	 		

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

	 Pct. of	: ii_		Hazard of erosion roads and trai		Suitability for roads (natural surface)		
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features		
190854: Wallace	 	 	 	 	 	 Moderately suited	 0.50	
Kalkaska	 45 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Sandiness Slope	 0.50 0.50	
190855: Wind eroded land	 100 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Sandiness Slope 	 0.50 0.50	
190856: Wind eroded land	 100 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50	
193236: Beaches	 100	 Not rated 	! 	 Not rated 	! 	 Not rated 		
193237: Thompsonville	 50	 Slight 	 	' Slight 	 	 Well suited 	 	
Milnichol	40 	Slight 	 	Slight 	 	Moderately suited Wetness	 0.50	
193255: Spinks	 50 	 Slight 	 	 Slight 	: 	 Moderately suited Sandiness	10.50	
Coloma	 40 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50	
193256: Spinks	 50 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness	 0.50 0.50	
Coloma	 40 	 Slight 	 	 Moderate Slope/erodibility 	 0.50 	 Moderately suited Slope Sandiness	 0.50 0.50	
193257: Spinks	 55 	 Moderate Slope/erodibility 		 Moderate Slope/erodibility 	 0.50	 Poorly suited Slope Sandiness	 1.00 0.50	
Coloma	 35 	 Moderate Slope/erodibility 		 Moderate Slope/erodibility 		 Poorly suited Slope Sandiness 	 1.00 0.50	
193258: Spinks	 50 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50	
Coloma	 40 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness 	 1.00 0.50	

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	 Pct. of	i		 Hazard of erosion roads and trai	ls	 Suitability for r (natural surfac	e)
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193260: Copemish	 95 	 Slight 	 	 - Moderate Slope/erodibility 			 0.50 0.50
193262: Kaleva	 95 	 Slight 	 	 Slight 	: 	 Moderately suited Sandiness	 0.50
193263: Kaleva	 95 	 Slight 	 	 Moderate Slope/erodibility 		-	 0.50 0.50
193265: Grattan	 95 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness 	 0.50
193266: Grattan	 95 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness	 0.50 0.50
193267: Grattan	 95 	 Moderate Slope/erodibility 	•	 Moderate Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
193269: Grattan	 95 	 Severe Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
193270: Covert	 90 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	1 1 1 1 1 1 1 1 1 1
193271: Pipestone	 90 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness Wetness	 0.50 0.50
193272: Dair	 90 	 Slight 	 	 Slight 	 	 Poorly suited Low strength Ponding	 1.00 1.00
193277: Benona	 90 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50
193278: Benona	 90 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness	 0.50 0.50
193279: Benona	 90 	 - Moderate Slope/erodibility - 		 - Moderate Slope/erodibility - 		 Poorly suited Slope Sandiness 	 1.00 0.50

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. Of		on	Hazard of erosion roads and trai		Suitability for roads (natural surface)		
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features		
102204	Ī	<u> </u>	l !	<u> </u>	ļ ,	!	Ī	
193284: Udorthents	 EE	 	!	l Sorromo	1	 Decamber continued	!	
Udorthents	1 22	•	•	Severe		Poorly suited	11 00	
	 	Slope/erodibility	U . 75 	Slope/erodibility 	0.95 	Slope Dusty	1.00 0.01	
Udipsamments	 35	 Severe	 	 Severe	 	 Poorly suited	1	
odipsammen cs	1 33	Slope/erodibility	•	•		-	11.00	
	i	blope, elocibility	l	blope/eloaibility	1	Sandiness	10.50	
193285:	 	 	 	 	 	 		
Lumley	55	Slight	İ	Slight	İ	Poorly suited	İ	
-	İ	İ	İ	i	İ	Low strength	11.00	
	ĺ	i I	İ	Ì	İ	Ponding	11.00	
	İ	i I	İ	İ	İ	Wetness	11.00	
	!	 -	l	<u> </u>	!	Dusty	10.03	
Makinen	 40	 Slight	 	 Slight	! 	 Poorly suited		
	1	I	I	I	I	Low strength	11.00	
	I	I	I	I	1	Ponding	11.00	
	I	I	I	I	I	Wetness	11.00	
] !	 	 	 	Dusty	10.03	
193286:	i	! 	i	! 	İ	! 	i	
Histosols	55	Slight	l	Slight	I	Poorly suited	1	
	l	I	l	I	I	Low strength	1.00	
	1	<u> </u>	!	!	1	Ponding	11.00	
	1	<u> </u>		!		Wetness	11.00	
	 	 	 	 	 	Dusty 	0.03 	
Aquents	45	 Slight	İ	 Slight	i	Poorly suited	i	
_	I	l -	I	I -	I	Ponding	11.00	
	I	I	I	I	I	Wetness	1.00	
		 -	 	 -		Sandiness	0.50	
193287:	i	! 		 	İ	! 		
Dune land	55 	Not rated	 	Not rated	 	Not rated	1	
Quartzipsamments	40	_	•	Severe		Poorly suited	i	
	!	Slope/erodibility	0.95	Slope/erodibility	0.95	_	11.00	
	l I	 	 	 	 	Sandiness	0.50 	
193288:	1 100		!		ļ .	186.4	!	
Udipsamments	1 100	leridur	l I	Slight 	! !	Moderately suited Sandiness	10.50	
	i	İ	i	İ	i	1	i	
193342: Gorvan	l I 35	 Slight	 	 Slight	 	 Poorly suited	l I	
	i	İ	İ	İ	İ	Ponding	11.00	
	I	I	I	I	I	Flooding	11.00	
	I	I	I	I	I	Wetness	11.00	
	I	I	I	I	I	Low strength	10.50	
	 	 -	l I	 	 	Dusty	0.03 	
Houghton	30	' Slight	İ	 Slight		 Poorly suited	İ	
	I	I	I	I	I	Low strength	1.00	
	I	I	I	I	I	Ponding	1.00	
	I	I	l	I	I	Flooding	11.00	
	I	I	l	I	I	Wetness	1.00	
						Dusty	[0.03	

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

	 Pct. of	i		 Hazard of erosion roads and trai	ls	 Suitability for r (natural surfac	e)
	map	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193342: Glendora	 	I I	<u>' </u>		l I	 - Poorly suited Ponding Flooding Wetness	 1.00 1.00 1.00
193349: Spinks	 50 	 Very severe Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited	 1.00 0.50
Coloma	 40 	 Very severe Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
193351: Benona	 95 	•	•	 Severe Slope/erodibility 	•	 Poorly suited Slope Sandiness 	 1.00 0.50
193354: Dune land	 50	 Not rated	 	 Not rated	 	 Not rated	
Quartzipsamments	 40 	 Slight 	 	 Moderate Slope/erodibility 			 0.50 0.50
193357: Shavenaugh	 85 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 			 1.00 0.50
193359: Shavenaugh	 85 	 Slight 	 	 Moderate Slope/erodibility 			 0.50 0.50
193360: Shavenaugh	 85 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness 	 0.50
193362: Benzonia	 90 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness 	 1.00 0.50
193363: Benzonia	90 	 Moderate Slope/erodibility 		 Moderate Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
193364: Benzonia	 90 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness 	 0.50 0.50
193365: Benzonia	 90 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness 	 0.50

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of	ii		Hazard of erosion		Suitability for roads (natural surface)		
	map	-		=		•		
	lunit	limiting features	<u> </u>	limiting features	<u> </u> 	limiting features	 	
193371: Dair	 50 	 Slight 	 	 Slight 	 	 Poorly suited Low strength Ponding	 1.00 1.00	
Pipestone	 40 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness Wetness	 0.50 0.50	
193372:	i	' 	i		i		i	
Access Denied	100	Not rated	I	Not rated	I	Not rated	I	
193423:		 	1		 	1	1	
Benona	95 	 Very severe Slope/erodibility 		 Severe Slope/erodibility 		 Poorly suited Slope Sandiness 	 1.00 0.50	
193484:	i	' 	i		i		i	
Pits, sand and gravel	 100 	 Not rated 	 	 Not rated 	 	 Not rated 	 	
193494: Nordhouse	 100 	 Very severe Slope/erodibility 		 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50	
193496: Nordhouse	 95 	 Slight 	 	 Moderate Slope/erodibility 	 0.50 	 Moderately suited Slope Sandiness	 0.50 0.50	
193497: Nordhouse	 95 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50	
193498: Nordhouse	 40 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50	
Platteriver	 35 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50	
Dair	 25 	 Slight 	 	 Slight 	 	 Poorly suited Low strength Ponding	 1.00 1.00	
193503: Spinks	 50 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50	
Shavenaugh	 40 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50	
193504: Spinks	 50 	 Slight 	 	 Moderate Slope/erodibility 	 0.50	 Moderately suited Slope Sandiness	 0.50 0.50	
Shavenaugh	 40 	 Slight 	 	 Moderate Slope/erodibility 	 0.50 	 Moderately suited Slope Sandiness 	 0.50 0.50	

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

	 Pct. of		on	 Hazard of erosion roads and trai		 Suitability for r (natural surfac	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193505: Spinks	 50 	 Moderate Slope/erodibility 		 Moderate Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
Shavenaugh	 40 	 Moderate Slope/erodibility 	•	 Moderate Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
193506: Spinks	 50 		•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
Shavenaugh	 40 		•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness 	 1.00 0.50
193507: Spinks	 50 	•	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
Shavenaugh	 40 	 Severe Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness 	 1.00 0.50
193508: Madaus	 90 	 Slight 	; 	 Slight 	 	 Poorly suited Low strength Ponding Dusty	 1.00 1.00 0.03
193509: Boyer	 50 	 Slight 	 	 Slight 	 	 Well suited Dusty	 0.01
Shavenaugh	 40 	 Slight 	! 	 Slight 	 	 Moderately suited Sandiness 	 0.50
193510: Boyer	 50 	 Slight 	 	 Moderate Slope/erodibility 	0.50	-	 0.50 0.01
Shavenaugh	 40 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness 	 0.50 0.50
193511: Boyer	 50 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01
Shavenaugh	40 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness 	 1.00 0.50
193513: Dair	 50 	 Slight 	 	 Slight 	 	 Poorly suited Low strength Ponding 	 1.00 1.00

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

	Pct. of	•	on	 Hazard of erosion roads and trai		Suitability for roads (natural surface)		
	map	-		_		•		
	unit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	!	
193513:		' 	i	! 	İ	' 	i	
Adrian	45	Slight	I	Slight	I	Poorly suited	1	
1		l	I	I	l	Low strength	1.00	
I		l	I	I	I	Ponding	11.00	
I		l	I	I	I	Wetness	1.00	
I		I	I	I	I	Dusty	10.03	
I		I	I	I	l	I	1	
193514:		I	I	I	l	I	1	
Platteriver	55	Slight	I	Slight	l	Moderately suited	1	
I		I	I	I	l	Sandiness	10.50	
		1	1	1	l	<u> </u>	1	
Pipestone	40	Slight	I	Slight	l	Moderately suited	1	
l		I	l	I	l	Sandiness	10.50	
I		I	I	I	l	Wetness	0.50	
I		I	I	I	l	I	1	
202010:		I	I	1	l	<u> </u>	1	
Houghton	55	Slight	I	Slight	l	Poorly suited	1	
I		I	l	I	l	Low strength	1.00	
I		I	l	I	l	Ponding	1.00	
I		I	I	I	l	Wetness	1.00	
I		I	I	I	l	Dusty	10.03	
		<u> </u>	!	1		!	1	
Adrian	40	Slight	I	Slight	l	Poorly suited	1	
I		I	I	I	l	Low strength	11.00	
I		I	l	I	l	Ponding	1.00	
I		I	l	I	l	Wetness	1.00	
I		I	I	I	l	Dusty	10.03	
I		I	I	I	l	I	1	
202016:		<u> </u>	!	1		!	1	
Spinks	50	Slight	!	Slight	ļ	Moderately suited		
		!	!	!	ļ	Sandiness	10.50	
mularial and		<u> </u>	!	!	!	!	!	
Tekenink, sandy	40		!		!		!	
substratum	40	Slight	!	Slight	!	Well suited	!	
631170: I		! !	! !	! !	! !	! !	!	
Fogg	50	l Isavere	! !	 Severe	! !	 Poorly suited		
1099	30		•	Slope/erodibility			11.00	
<u> </u>		Slope/elodibility	10.75	Slope/elodibility	10.95	Sandiness	10.50	
<u> </u>		! !	! !	! !	! !	Sandiness	10.50	
Benzonia	40	 Severe	<u>.</u>	Severe	' !	 Poorly suited	i	
1		Slope/erodibility	•	•		=	11.00	
i		510pc/c10d12111cy	1	510pc, 610d151110;	1	Sandiness	10.50	
		! 	<u>.</u>	I	' !	l Sandiness	1	
631171:		i i	i	i	i	i	i	
Fogg	50	Moderate	i	 Severe	i	Poorly suited	i	
99		Slope/erodibility	•	•		=	11.00	
i			1		1	Sandiness	10.50	
i		i	i	i	i	I	1	
Benzonia	40	Moderate	i	Severe	i i	Poorly suited	i	
i		Slope/erodibility	•	•			11.00	
i			i	1	i	Sandiness	0.50	
i			İ	I	I		ĺ	
631172: I		I	I	I	I	I	I	
T	50	Moderate	I	Moderate	I	Poorly suited	I	
Fogg		Slope/erodibility				=	11.00	
rogg						_		
Fogg I		l	I	1	l	Sandiness	10.50	
Fogg 		 	 	 	 	Sandiness	TU.50	
rogg 	40	 Moderate	 	 Moderate	 	Sandiness Poorly suited		
 	40		•	•		 Poorly suited	0.30 1 1.00	
 	40	 Moderate Slope/erodibility 	•	•		 Poorly suited	1	

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

and soil name	 Pct. of	!		 Hazard of erosion roads and trai		(natural surfac	:e)
		Rating class and limiting features	•	Rating class and limiting features		Rating class and limiting features	•
631173: Fogg	 50 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness	 0.50
Benzonia	 40 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness	 0.50 0.50
631174: Fogg	 50 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50
Benzonia	 40 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50
680939: Fern	 50 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness	 0.50 0.50
Spinks	 40 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness 	 0.50 0.50
680943: Milnichol	 90 	 Slight 	 	 Slight 	 	 Moderately suited Wetness	 0.50
680945: Fern	 90 	 Slight 	 	 - Moderate Slope/erodibility -		 	 0.50 0.50
680946: Fern	 90 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50
680971: Nessen	 50 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
Kaleva	 40 			 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
680972: Nessen	 50 	 Moderate Slope/erodibility 	•	 Moderate Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
Kaleva	 40 	 Moderate Slope/erodibility 	•	 Moderate Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
680973: Nessen	 50 	 Slight 	 	 - Moderate Slope/erodibility - 		 Moderately suited Slope Sandiness 	 0.50 0.50

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. Of			Hazard of erosion	ls	(natural surfac	Suitability for roads (natural surface)		
	map unit	· -		Rating class and limiting features		Rating class and limiting features	•		
680973: Kaleva	 40 	 Slight 	 	 Moderate Slope/erodibility 	 0.50 	 Moderately suited Slope Sandiness	 0.50 0.50		
680974: Nessen	 50 	 Slight 	; 	 Slight 	 	 Moderately suited Sandiness	 0.50		
Kaleva	 40 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50		
893251: Boyer	 50 	 Moderate Slope/erodibility 	•	 Moderate Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01		
Shavenaugh	 40 	 Moderate Slope/erodibility 	•	 Moderate Slope/erodibility 	•	 - Poorly suited	 1.00 0.50		
894062: Remus	 50 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01		
Spinks	 40 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited	 1.00 0.50		
894063: Remus	 50 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01		
Spinks	 40 	 Moderate Slope/erodibility 	•	 Moderate Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50		
894064: Fern	 50 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Slope Sandiness	 0.50		
Remus	 40 	 Slight 	 	 Severe Slope/erodibility 	 0.95 	 Moderately suited Slope Dusty	 0.50 0.01		
894065: Fern	 50 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50		
Remus	 40 	 Slight 	 	 Moderate Slope/erodibility	•	 Well suited Dusty	 0.01		
894104: Mollineaux	 50 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50		
Remus	 40 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Dusty	 1.00 0.01		

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

	Pct.	•	on	Hazard of erosion		Suitability for	
and soil name	of	·		roads and trai		(natural surfac	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
894105: Mollineaux	 50 		•	 Moderate Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
Remus	 40 	 Moderate Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited	 1.00 0.01
894165: Spinks	 50 		•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
Tekenink, sandy substratum	 40 	 Severe Slope/erodibility 		 Severe Slope/erodibility 		 Poorly suited Slope 	1 1 1 1 1 1 1 1 1 1
899682: Kaleva	 90 		•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50
899722: Goodharbor	 90 	 Slight 	 	 Moderate Slope/erodibility 		 Moderately suited Sandiness Slope	 0.50 0.50
899731: Covert	 50 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50
Pipestone	 40 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness Wetness	 0.50 0.50
899733: Covert	 50 	 Slight 	 	 Slight 	 	 Moderately suited Sandiness	 0.50
Dair	 45 	 Slight 	 	 Slight 	 	 Poorly suited Low strength Ponding	 1.00 1.00
899734: Benzonia	 90 	 Severe Slope/erodibility 	•	 Severe Slope/erodibility 		 Poorly suited Slope Sandiness	 1.00 0.50

Table 6.-Land Management, Part III (Site Preparation)

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

	•	Suitability for mechanical site	r	Suitability fo	
	Pct.				
		preparation (de			
		Rating class and		_	
	lunit	limiting features	<u>!</u>	limiting features	<u>!</u>
100775	!	!	!	l	!
190775:		 	!		!
Adrian	1 22	Well suited	1	Well suited	
Houghton	 45	 Well suited 	! 	 Well suited 	
190777:	i	i I	i	' I	i
Alcona	I 55	Well suited	i	Well suited	i
	İ	İ	İ		İ
Richter	30 	Well suited 	 	Well suited 	
190778:	I	l	I	l	I
Alcona	65	Well suited		Well suited	I
Richter	1 25	l Well suited	 	 Well suited	1
142011001	1 23	l	i	l	i
190779:	i	i İ	i	i I	i
Alpena	90	Well suited	I	Well suited	1
	I	I	I	I	l
190780:	I	I	I	I	l
Au Gres	45	Well suited	1	Well suited	1
Walles also	1 25	 Wall soited	!	 Wall and bad	
Kalkaska	1 35	Well suited	1	Well suited	!
190781:	:	! !	! !	I I	
Bach	1 90	' Well suited	i	 Well suited	i
	i	I	i	I	i
190782:	i	İ	i	i I	i
Deer Park	100	Well suited	I	Well suited	l
	I	I	I	I	l
190783:		!	!	<u> </u>	!
Deer Park	1 100	=		Poorly suited	10 50
	!	Slope	10.50	Slope	10.50
190784:	:	! !	! !	I I	
Deer Park	i 70	' Well suited	i	' Well suited	i
	i	İ	i	i I	į
Roscommon	25	Well suited	I	Well suited	I
	I	I	1	I	l
190786:		1	1	<u> </u>	1
Dune land	100	Not rated	!	Not rated	!
100707	!	! !	1	 	
190787: East Lake	1 90	 Well suited	1	 Well suited	
East lake	1 30	Well Suited	<u> </u>	l	<u> </u>
190788:	i	i i	i	i İ	i
East Lake	90	Well suited	i	Well suited	i
	I	I	I	l	I
190789:	1	l	I	l	I
East Lake	90	· -		Poorly suited	
	1	Slope	10.50	Slope	10.50
190790:	1	 	I] 	1
East Lake	1 90	l Poorly suited	1	 Poorly suited	1
		=		Slope	0.50
	İ	İ	i	. <u>.</u> 	i

Table 6.-Land Management, Part III (Site Preparation)-Continued

		Suitability fo		Suitability fo	
and soil name	lof	mechanical site preparation (de	ep)	preparation (surf	ace)
		Rating class and			
	-	limiting features		limiting features	
190791:	 	 	I I	 	<u>:</u>
Eastport	93 	Well suited 	 	Well suited 	
190792: Edwards	 70 	•		 Poorly suited Wetness 	 0.75
Marl beds				Poorly suited Wetness 	 0.50
190794: Emmet	 60 	 Well suited 	 	 Well suited 	
Leelanau	30 	Well suited 	i I I	Well suited 	i I
190795: Emmet	 60 	 Well suited 	 	 Well suited 	
Leelanau	, 30 	 Well suited 	 	 Well suited 	
190796: Emmet				 Poorly suited Slope	 0.50
Leelanau	 30 	•		 Poorly suited Slope 	 0.50
190797: Emmet	 50 	•		 Poorly suited Slope	 0.50
Leelanau				 Poorly suited Slope 	 0.50
190799: Emmet	:	•		 Unsuited Slope 	 1.00
Leelanau	30 		•	Unsuited Slope 	 1.00
190801: Emmet	 70 	 Well suited 	 	 Well suited 	
Mancelona	25 	Well suited 	 	Well suited 	
190803: Emmet				 Poorly suited Slope	 0.50
Mancelona	30 	-		 Poorly suited Slope 	 0.50
190805: Emmet	 50 	 Well suited 	 	 Well suited 	
Omena		Well suited 	 	Well suited 	

Table 6.-Land Management, Part III (Site Preparation)-Continued

Man unit cumbal	 Dot	Suitability for mechanical site	r	Suitability fo	r
		mechanical site			
		Rating class and			
	-	limiting features		limiting features	
	Ī	I	Ī	l	ī
190806:	I	I	I	I	I
Emmet	50	Well suited	!	Well suited	1
Omena	I 45 	 Well suited 	! 	 Well suited 	
190807:	i	i I	i	' 	i
Emmet		·		Poorly suited Slope 	 0.50
Omena	 45 	_		Poorly suited Slope	10.50
190808:	! 	! 	! !	 	<u> </u>
Emmet	50 	· =		Poorly suited Slope	 0.50
Omena		· =		 Poorly suited Slope	 0.50
190809:	İ	 	i	 	i
Emmet		•		Unsuited Slope -	 1.00
Omena	 45 			 Unsuited Slope 	 1.00
190811: Hettinger	' 45 	' Well suited 	 	' Well suited 	
Muck	30	Well suited	I	Well suited	į
190812: Hettinger	 45	 Well suited	! 	 Well suited	
Tonkey	 30	 Well suited	 	 Well suited	
190814: Kalkaska	 85 	 Well suited 	! 	 Well suited 	
190815: Kalkaska	 85 	' Well suited 	 	' Well suited 	
190816: Kalkaska	 90 	_	 0.50	·	 0.50
190817: Kalkaska	 90 		 0.50	 Poorly suited Slope	 0.50
190818: Kalkaska	 90 			 Poorly suited Slope	 0.50
190819: Kalkaska	 55	 Well suited	! ! !	 Well suited	! !
East Lake	I 35 	 Well suited 	 	 Well suited 	

Table 6.-Land Management, Part III (Site Preparation)-Continued

Map unit symbol	Pct.	Suitability for mechanical site preparation (dec	е	Suitability fo	e
		Rating class and			
	_	limiting features		limiting features	
190820: Kiva	 65 	 Well suited 	 	 Well suited 	
Mancelona	30 	Well suited 	 	Well suited 	i I
190821: Kiva	 50 	 Well suited 	 	 Well suited 	
Mancelona	30 	Well suited 	I I	Well suited 	i I
190823:	I	I	I	I	I
Kiva		-		Poorly suited Slope 	 0.50
Mancelona		=		Poorly suited Slope 	 0.50
190824: Lake beaches	 100	 Not rated 	 	 Not rated 	i
190825: Lake bluffs	 100 	 Not rated 	 	 Not rated 	i
190826: Leelanau	 60	, Well suited 	 	' Well suited 	
East Lake	 30 	 Well suited 	! !	 Well suited 	į
190827: Leelanau	 65 	 Well suited 	 	 Well suited 	
East Lake	25 	Well suited 	 	Well suited 	i I
190828: Leelanau	 65 	=		 Poorly suited Slope 	 0.50
East Lake	25 	=		Poorly suited Slope 	 0.50
190829: Leelanau	:	•		 Poorly suited Slope	 0.50
East Lake		=	 0.50	 Poorly suited Slope	10.50
190830: Leelanau		=		 - Poorly suited Slope	 0.50
East Lake		=	 0.50	 Poorly suited Slope	10.50
190831: Lupton	 60	' Well suited 	' 	 Well suited 	
Markey	1 30 	 Well suited 	' 	 Well suited 	į
190832: Mancelona		 Well suited 	 	 Well suited 	

Table 6.-Land Management, Part III (Site Preparation)-Continued

	 Pct.	·		Suitability fo	
and soil name	l of	preparation (de	en)	preparation (surf	ace)
		Rating class and			
	_	limiting features		_	
190833: Mancelona	 90	 Well suited 	 	 Well suited	
190834: Mancelona	 60 	' Well suited 	 	' Well suited 	
East Lake	30 	Well suited	 	Well suited	
190835: Mancelona	, 55	 Well suited	 	 Well suited	
East Lake	35	 Well suited	!	 Well suited	! !
190836: Mancelona	 50 			 Poorly suited Slope	 0.50
East Lake					 0.50
190837: Mancelona		•		 - Poorly suited Slope	 0.50
East Lake	 30 	=		 Poorly suited Slope 	 0.50
190838: Mancelona	 50 			 Poorly suited Slope	 0.50
East Lake				 Poorly suited Slope	 0.50
190839: Mancelona	 70	 Well suited 	! 	 Well suited 	!
Richter	25	Well suited	į	Well suited	į
190840: Nester	 90 	 Well suited 	 	 Well suited 	!
190841: Nester	 90 	 Well suited 	 	 Well suited 	
190842: Nester	 90 	=	 0.50	 Poorly suited Slope 	 0.50
190843: Nester	 90 	=		 Poorly suited Slope	 0.50
190844: Nester	 90 	•	 1.00	 Unsuited Slope	 1.00
190846: Pits, gravel	 100 	 Not rated 	 	 Not rated 	

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol	Pct.	mechanical site	е	Suitability for mechanical site	9
				preparation (surf	
	_	Rating class and limiting features		Rating class and limiting features	Value
190847:	l I		<u>'</u> 		<u>'</u>
Richter	45	Well suited	Į.	Well suited	!
Alcona	I 40 	 Well suited 	 	 Well suited 	
190848: Richter	 45 	 Well suited 	 	 Well suited 	
Alcona	 40 	 Well suited 	 	 Well suited 	
190849: Roscommon	 50	 Well suited	 	 Well suited	
Markey	I 30 	 Well suited 	! ! !	 Well suited 	
190850: Sanilac	 90 	 Well suited 	 	' Well suited 	
190851: Tonkey	 40 	 Well suited 	 	 Well suited 	
Munuscong	25 	 Well suited 	 	 Well suited 	
Iosco	25 	Well suited 	 	Well suited 	I I
190852: Tonkey	 35 	 Well suited 	 	 Well suited 	
Munuscong	30 	Well suited 	 	Well suited 	i I
Iosco	20 I	Well suited 	I I	Well suited 	l I
190853: Water	 100 	 Not rated 	 	 Not rated 	
190854: Wallace	 50 	 Well suited 	 	 Well suited 	
Kalkaska	45 	 Well suited 	 	 Well suited 	
190855: Wind eroded land	 100	 Well suited 	 	 Well suited	
190856: Wind eroded land	 100 	_	 0.50	 Poorly suited Slope 	 0.50
193236: Beaches	 100	 Not rated 	 	 Not rated 	
193237: Thompsonville			 1.00	 Well suited 	
Milnichol	 40 	•	 1.00	 Well suited 	
193255: Spinks	 50	 Well suited 	 	 Well suited 	
Coloma	 40 	 Well suited 	 	 Well suited 	

Table 6.-Land Management, Part III (Site Preparation)-Continued

		Suitability fo	r	Suitability fo	r
Map unit symbol and soil name	Pct.	mechanical site	90) 9	mechanical sit	e e
		Rating class and			
	_	limiting features		limiting features	
193256:	 	 	 	 	
Spinks	50	Well suited	ļ	Well suited	1
Coloma	 40 	 Well suited 	 	 Well suited 	
193257:	ĺ	l	İ	l	İ
Spinks		-		Poorly suited Slope 	 0.50
Coloma		-		 Poorly suited Slope 	 0.50
193258:	i .	i	İ	i	i
Spinks		-		Poorly suited Slope 	 0.50
Coloma	40 	_		 Poorly suited Slope 	 0.50
193260:	į	!	İ	!	į
Copemish	95 	Well suited 	 	Well suited 	
193262: Kaleva	 0E	 Wall swited	l	 Wall swited	
naieva	95	 	! 	Well suited 	
193263: Kaleva	 95	 Well suited	 	 Well suited	1
	1		i		İ
193265: Grattan	 95	 Well suited	 	 Well suited	
193266:	i	! 		I 	İ
Grattan	95 	Well suited 	 	Well suited 	
193267:	1		İ		İ
Grattan		-		Poorly suited Slope 	 0.50
193269:	į	İ	į	İ	į
Grattan	95 	•	•	Unsuited Slope	11.00
193270:		I 	! 	I 	
Covert	90 	Well suited 	 	Well suited 	
193271: Pipestone	 90		 1.00	 Well suited	
	i	We the ss	1		İ
193272: Dair	 90 	•		 Poorly suited Wetness	 0.50
193277:	I I	 	l I	 	
Benona	90	Well suited	ļ	Well suited	ļ
193278:		I 	! 	I 	
Benona	90 	Well suited	 	Well suited	
193279:	i	 	İ	 	İ
Benona	90 	Slope	0.50	Poorly suited Slope 	 0.50
	1	ı	I	I	ı

Table 6.-Land Management, Part III (Site Preparation)-Continued

	<u> </u>	Suitability fo	r	Suitability fo	
Map unit symbol	Pct.	mechanical sit	e	mechanical sit	e
and soil name	of	preparation (de	ep)	preparation (surf	ace)
	_	Rating class and		-	
· · · · · · · · · · · · · · · · · · ·	unit	limiting features	<u> </u>	limiting features	<u> </u>
	I	!	1	!	!
193284:	l 	1	!	1	!
Udorthents	55			Unsuited	
	!	Slope	11.00	Slope	11.00
11d:	l . 25	 	!	 	!
Udipsamments				Unsuited	11 00
	1	Slope	11.00	Slope	1.00
193285:	! !	! !	<u> </u>	! !	
Lumley	I 55	Unsuited	i	Poorly suited	i
	•	•		_	0.50
	i	1	1	1	1
Makinen	I 40	Unsuited	i	Poorly suited	i
				Wetness	10.50
	İ	İ	İ	i İ	İ
193286:	I	I	I	I	I
Histosols	55	Unsuited	I	Poorly suited	1
	I	Wetness	1.00	Wetness	0.75
	I	I	1	I	1
Aquents	•	•		Poorly suited	I
	I	Wetness	1.00	Wetness	0.75
	l	!	!	!	!
193287:		I	!	I	!
Dune land	55	Not rated	1	Not rated	!
Quartzipsamments	I I 40	 Thoustod		 Unsuited	1
	1 0				11.00
	! !	l Siobe	11.00	l Siobe	1
193288:	i	I	i	i I	i
Udipsamments	I 100	' Well suited	i	' Well suited	i
	i	İ	i	İ	i
193342:	ĺ	İ	ĺ	İ	İ
Gorvan	35	Unsuited	I	Poorly suited	I
	I	Wetness	1.00	Wetness	0.50
	I	I	I	I	I
Houghton				Poorly suited	1
	I	Wetness	1.00	Wetness	10.50
		<u> </u>	!	l	!
Glendora	20			Poorly suited	10 50
	l	Wetness	11.00	Wetness	10.50
193349:	1	! !	1	 	!
Spinks	I 50	I Ilineui ted	<u> </u>	 Unsuited	
OPTIKS	30 		1.00		1.00
	i	l Siope		510pc	1
Coloma	•	Unsuited		Unsuited	i
	i		11.00		11.00
	İ	i	İ	i -	İ
193351:	I	I	I	I	I
Benona	95	Poorly suited	I	Poorly suited	1
	I	Slope	0.50	Slope	10.50
		<u> </u>	1	<u> </u>	1
193354:	I	!	I .	<u>.</u>	1
Dune land	1 50	Not rated	!	Not rated	!
0112244	I 40	 Woll arited	I	 Woll arited	I
Quartzipsamments	4±0 	weil Sulted	1	Well suited	1
193357:	I I	! 	1	! !	-
Shavenaugh	I 85	ı IPoorly suited	i	 Poorly suited	i
	. 55 I	_	0.50	_	0.50
	i		1	. 3-0F0 I	1
		•		•	

Table 6.-Land Management, Part III (Site Preparation)-Continued

		Cuitabilitu fa		Cuitabilitu fa	
	•	Suitability for		Suitability fo mechanical sit	
and soil name	l of	mechanical site preparation (de			
		Rating class and			
	-	limiting features		limiting features	
193359:	 	 	 	 	
Shavenaugh	85	 Well suited	į	 Well suited	į
193360:	 	 	 	 	
Shavenaugh	85 	Well suited	 	Well suited 	
193362:	<u>.</u>	<u>. </u>	į		į
Benzonia	90 	-		Poorly suited Slope	 0.50
193363:	 	 	 	 	
Benzonia	90 	•		Poorly suited Slope	 0.50
193364: Benzonia	 90	' Well suited	 	' Well suited	! ! !
193365:	 	 	 	 	
Benzonia	, 90 	 Well suited 	 	 Well suited 	
193371:	 E0	 	İ	 -	İ
Dair	50 	•		Poorly suited Wetness	10.50
Pipestone	 40 		 1.00	 Well suited 	,
193372: Access Denied	 100	 Not rated 	 	 Not rated	
193423: Benona	 95 	•	•	 Unsuited Slope	 1.00
193484: Pits, sand and gravel	 100	 Not rated 	 	 Not rated 	
193494: Nordhouse	 100 	•	 1.00	 Unsuited Slope 	 1.00
193496: Nordhouse	 95	 Well suited	I I	 Well suited	i I
193497:	 	 	 	 	
Nordhouse) 95 	 Well suited 	! 	 Well suited 	!
193498: Nordhouse	 40	 Well suited	 	' Well suited	I
	İ	İ	İ	I	
Platteriver	35 		 1.00	Well suited -	
Dair	 25 	•		 Poorly suited Wetness	 0.50
193503: Spinks	 50	 Well suited	 	 Well suited	!
Shavenaugh	 40	 Well suited	 	 Well suited	
-		I		l	İ

Table 6.-Land Management, Part III (Site Preparation)-Continued

		l Geritabilii C		l Gritabilii C	
Map unit symbol	 Dat	Suitability for mechanical site	r	Suitability fo	r
		preparation (de			
		Rating class and			
		limiting features		limiting features	
	ı	I	ī	l	ī
193504:			!		!
Spinks	50	Well suited	1	Well suited	1
Shavenaugh	I I 40	l Well suited	! 	 Well suited	! !
	-0	I	i		i
193505:	I	I	I	I	I
Spinks				Poorly suited	1
	l	Slope	10.50	Slope	10.50
Shavenaugh	I I 40	l Poorly suited	! 	 Poorly suited	! !
	-0	=		=	0.50
	i	i -	İ	i -	i
193506:	l	l	I	l	I
Spinks	50	=		Poorly suited	I
	1	Slope	10.50	Slope	10.50
Shavenaugh	I 40	 Poorly suited	! !	 Poorly suited	i
		=		=	0.50
	I	I -	I	I -	I
193507:	1	1	1	1	1
Spinks				Unsuited	11 00
	 	Slope	11.00	Slope	11.00
Shavenaugh	40	 Unsuited	i	 Unsuited	i
-	ĺ		11.00	Slope	11.00
	l	l	I	l	I
193508: Madaus	1 00	 	1	 	!
Madaus	1 90 1	•		Poorly suited Wetness	1 10.50
	i		1		1
193509:	ĺ	İ	ĺ	I	ĺ
Boyer	50	Well suited	1	Well suited	1
Shavenaugh	1 40	 Well emited		 Wall amitad	
Snavenaugn	4±0 	weil Suited	 	Well suited 	! !
193510:	i	! 	i	! 	i
Boyer	50	Well suited	ĺ	Well suited	ĺ
		<u> </u>	1	<u> </u>	1
Shavenaugh	40	Well suited	1	Well suited	!
193511:	 	 	! !	 	1
Boyer	50	Poorly suited	i	Poorly suited	i
	l	Slope	0.50	Slope	0.50
		<u> </u>	•	<u> </u>	1
Shavenaugh		=		Poorly suited	10 50
	 	Slope	10.50 I	Slope 	0.50
193513:	i	i I	i		i
Dair	50	Unsuited	I	Poorly suited	I
		Wetness	11.00	Wetness	10.50
Admi an	 45	 Image: tod	1	 Boomly quited	1
Adrian	1 43 			Poorly suited Wetness	I 0.50
	I	,	. = 	,	
193514:	I	I	I	I	I
Platteriver	55			Well suited	!
	 	Wetness	1.00	 	I
Pipestone	I I 40	 Unsuited	! 	 Well suited	i I
•			11.00		i
	I	I	I	l	I

Table 6.-Land Management, Part III (Site Preparation)-Continued

Man unit armhal	 Dot	Suitability fo mechanical sit	r	Suitability fo	r
		mechanical sit			
		Rating class and			
		limiting features			
	Ī	<u> </u>	ī	<u> </u>	ī
202010:	I	I	I	I	1
Houghton				Poorly suited	1
	!	Wetness	11.00	Wetness	10.50
Adrian	I I 40	 Inquited	<u> </u>	 Poorly suited	1
Adlian	•	•		_	0.50
	i				I
202016:	I	I	I	I	1
Spinks			!	Well suited	1
Tekenink, sandy	l I		1] :	1
substratum	•	ı Well suited	i	 Well suited	i
	i	1	i	I	i
631170:	l	I	I	I	1
Fogg				Unsuited	1
		Slope	11.00	Slope	1.00
Benzonia	I I 40	l Unsuited	! !	 Unsuited	1
		•	•	•	11.00
	l	I	I	I	1
631171:		<u> </u>	!	<u> </u>	1
Fogg	50	-		Poorly suited Slope	I 10.50
	 	Slope 	10.50 I	l stobe	10.50
Benzonia	40	Poorly suited	i	Poorly suited	i
			10.50	Slope	10.50
	!	!	!	!	1
631172: Fogg	I 50	 Doomly quited	1	 Poorly suited	1
				_	10.50
	ĺ	l -	İ	İ	İ
Benzonia	40			Poorly suited	1
		Slope	10.50	Slope	10.50
631173:	 	 		 	1
Fogg	50	 Well suited	i	 Well suited	i
	l	I	I	I	1
Benzonia	40	Well suited	1	Well suited	1
631174:		 	!	 	1
Fogg	I 50	 Well suited	<u> </u>	 Well suited	i
	i	İ	i		i
Benzonia	40	Well suited	1	Well suited	1
		<u> </u>	!	<u> </u>	!
680939: Fern	l 1 50	 Well suited	!	 Well suited	1
rein	1	Surceu	i	 	i
Spinks	40	Well suited	i	Well suited	i
	I	ļ	I	ļ	1
680943: Milnichol			!	 Wall amikad	!
WITHICHOT	l ∌0	•	 1.00	Well suited	1
	i		1		i
680945:	I	I	I	I	I
Fern	90	Well suited	!	Well suited	!
690046.	1	 -	1	 -	I
680946: Fern	I I 90	 Well suited		 Well suited	1
	 		i		i

Table 6.-Land Management, Part III (Site Preparation)-Continued

Map unit symbol and soil name	 Pct. of	Suitability fo: mechanical site preparation (de	r e ep)	Suitability fo mechanical sit preparation (surf	r e ace)
and boll name	map	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	<u> </u>
680971: Nessen				 Poorly suited	
Kalema	İ	Ī	ĺ	Slope Poorly suited	0.50
Kaleva		-		·	 0.50
680972:		!	I	!	I
Nessen	•			Poorly suited Slope 	 0.50
Kaleva		-		Poorly suited Slope 	 0.50
680973:	i	i İ	i	İ	i
Nessen	50 	Well suited 	 	Well suited 	
Kaleva	40 	Well suited 	l I	Well suited 	
680974: Nessen		 Wall amited	 	 Well swited	I
Nessell	30 	 	! 	Well suited 	
Kaleva	40 	Well suited 	I I	Well suited 	i I
893251:		<u> </u>	ļ .	<u> </u>	I
Boyer				Poorly suited Slope 	I 0.50
Shavenaugh		-		Poorly suited Slope 	 0.50
894062: Remus		-		 Poorly suited Slope	 0.50
Spinks				 Poorly suited Slope	 0.50
894063:	<u>'</u>	! 	! 	 	i I
Remus	50 			Poorly suited Slope	 0.50
Spinks	 40 	=		 Poorly suited Slope 	 0.50
894064: Fern	 50	 Well suited	 	 Well suited	
Remus	 40	 Well suited 	 	 Well suited 	
894065: Fern	 50	 Woll quited		 Well suited	! !
Remus	İ	İ	ĺ	l	
velling	, 40 	lueit sairea	! 	Well suited 	
894104: Mollineaux		-		 Poorly suited Slope	 0.50
Remus		-	10.50	 Poorly suited Slope 	 0.50

Table 6.-Land Management, Part III (Site Preparation)-Continued

Man and the combal		Suitability fo		Suitability fo mechanical sit	
1 2	Pct.			preparation (surface)	
	map		•	Rating class and	•
	lunit	limiting features	!	limiting features	<u>!</u>
004105	!] i	!] i	!
894105: Mollineaux	I E0	l IDaamir arritad	!	l IDoomles assitad	!
MOIIINeaux	1 30	-		Poorly suited	10.50
	!	Slope	10.50	Slope	10.50
Remus	1 40	l Poorly suited		 Poorly suited	:
Remus	1 -20	-		Slope	10.50
	:	l probe	10.50	l probe	10.50
894165:	i	! 	i	! 	i
	i i 50	 Unsuited	i	 Unsuited	i
SFS	1		•	Slope	11.00
	i	,	i		i
Tekenink, sandy	i	I	i	I	i
substratum	40	Unsuited	i	Unsuited	i
	Ì	Slope	11.00	Slope	11.00
	Ì	- 	ĺ	<u>-</u> 	İ
899682:	I	l	I	I	I
Kaleva	90	Unsuited	I	Unsuited	I
	I	Slope	1.00	Slope	1.00
	I	l	1	l	I
899722:	I	l	1	l	I
Goodharbor	90	Well suited	1	Well suited	I
	I	l	I	l	I
899731:		<u> </u>	1	!	!
Covert	50	Well suited	!	Well suited	!
		<u> </u>	!	<u> </u>	!
Pipestone	1 40	•	•	Well suited	!
	!	Wetness	1.00] i	!
899733:	!	<u> </u>	!	<u> </u>	!
Covert	1 50	l Woll quited	!	 Well suited	:
COVELC	1 20	Well Sulted		Well Sulted	:
Dair	1 45	ı Nusuited	i	 Poorly suited	i
	i		11.00	-	10.50
	i	I	i	I	1
899734:	i		i		i
Benzonia	I 90	Unsuited	i	 Unsuited	i
	i	•	•	Slope	11.00
	i	 	1		1

Table 6.-Land Management, Part IV (Site Restoration)

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

	Pct.		-	Potential for seed mortality	ling
	map			Rating class and	Value
	unit	limiting features	1	limiting features	<u> </u>
	1		1		I
190775:		125-1	!		!
Adrian				High Wetness	 1.00
	•	fragments	10.50	Wechess	11.00
	i	l ====================================	i		i
Houghton	45	Low	İ	High	ĺ
	I	I	I	Wetness	1.00
	!	<u> </u>	!	<u> </u>	1
190777: Alcona	==		!		1
AICONA	1 22	I TOW	!	Low	
Richter	I 30	ı Low	i	 High	i
	i	i İ		=	11.00
	I	l	I	l	I
190778:	1	<u> </u>	1	<u> </u>	1
Alcona	65	LOW	!	Low	1
Richter	I I 25	l I T.ow	!	 High	1
112011001	1 23	12011	i		1.00
	i	i	i	I	İ
190779:	I	l	I	l	I
Alpena	90	Low	1	Moderate	I
	!		!	Carbonate content	0.50
190780:	 	 	!	 	1
Au Gres	•	' Moderate	i	' High	i
	i	Texture/rock		_	11.00
	I	fragments	I	I	I
		<u> </u>	!	<u> </u>	1
Kalkaska	•	•	I 10.50	Low	1
	!	fragments	10.50	I I	
	i	l III III III III III III III III III I	i		i
190781:	i	i İ	i	i İ	i
Bach	90	Low	I	High	I
	1	<u> </u>	1	Wetness	11.00
190782:	!	 	!	 	
Deer Park	1 100	l High	!	 Low	1
Deer rura	1	Texture/surface			i
	i	layer	i	i İ	i
	I	thickness/rock	1	l	I
	!	fragments	!	<u> </u>	!
190783:] 	I] 	1
190783: Deer Park	I 100	ι lHiαh	1	 Low	1
			11.00	•	i
	•	surface layer	İ	İ	i
	I	thickness	I	I	I
	I	I	I	I	I

Table 6.-Land Management, Part IV (Site Restoration)-Continued

		 Potential for dama soil by fire	-	Potential for seedling mortality		
		Rating class and			Value	
		limiting features				
190784:		 	1	 		
Deer Park	i i 70	' High	i	 Low	i	
	i	Texture/surface	11.00	İ	i	
	I	layer	I	l	I	
		thickness/rock fragments		 	1	
	i	ITAGMENTS	i		i	
Roscommon	25	•	ĺ	High	İ	
	!	•	10.50	Wetness	11.00	
	 	fragments]]	!	
190786:	i	i İ	i	' 	i	
Dune land	100	Not rated	I	Not rated	I	
100707.					!	
190787: East Lake	I I 90	l Hiσh	 	 Low		
	i	Texture/rock	•	•	i	
		fragments	l	l	I	
190788:				 	!	
East Lake	I 90	ι Hiαh	<u> </u>	 Low	i	
		· -	11.00	İ	İ	
	!	fragments	I	<u> </u>	1	
190789:		 		l İ	!	
East Lake	1 90	ı High	i	 Low	i	
	ĺ	Texture/rock	11.00	l	İ	
	!	fragments	!		!	
190790:	 	 	1	 		
East Lake	90	High	i	Low	i	
	!	•	11.00	<u> </u>	1	
		fragments		l İ	!	
190791:	i	' 	i	' 	i	
Eastport	93	=		Low	I	
	!	Texture/surface	1.00	1	!	
	 	layer thickness/rock	 	l 		
	i	fragments	i	i İ	i	
	!	!	I	<u> </u>	1	
190792: Edwards	l l 70	l Low		 High		
Lanarab	'		i	Wetness	11.00	
	Ι	l	I	l	I	
Marl beds	20	Low		High	11 00	
	! 	! 	<u> </u>	Wetness Carbonate content	1.00	
	i	İ	i	j	i	
190794:		I	!	 -	!	
Emmet	60 	Low		Low	!	
Leelanau	30	 High	i	 Low	i	
	l	Texture/rock	1.00	l	I	
		fragments	!		1	
190795:	I I	I 		I 	1	
Emmet	60	Low	i	Low	i	
_	ļ .	!	ļ.	l	1	
Leelanau	30	· -		Low	1	
		Texture/rock fragments	1.00 	! 	1	
	:	l ====================================	i		i	

Table 6.-Land Management, Part IV (Site Restoration)-Continued

and soil name	of	Potential for dama soil by fire		mortality	
		Rating class and limiting features			
190796: Emmet	 50	 - Low	 	 - Low	
Leelanau		· •	 1.00 	 Low 	
190797: Emmet	 50	 Low	 	 Low	
Leelanau	 30 		 1.00 	 Low 	
190799: Emmet	 45 	 Low 	 	' Low 	
Leelanau	30 	-	 1.00	Low 	
190801: Emmet	I 70 	 - Low	 	 - Low 	
Mancelona	25 	Low 	i I I	Low Low	i I I
190803: Emmet	 60 	 Low	 	 Low	
Mancelona	, 30 	 Low 	 	 Low 	
190805: Emmet	 50 	 - Low	 	 - Low	
Omena	45 	Low 	i I	Low 	
190806: Emmet	 50 	 Low 	 	 Low 	
Omena	45 	Low 	İ I	Low 	l I
190807: Emmet	:	 Low 	:	 Low 	
Omena				Low Low	
190808: Emmet	 50 	 Low 	 	 Low 	
Omena	45 	Low	i I	Low	l I
190809: Emmet	 50 	 Low 	 	 Low 	
Omena	45 	Low Low		 Low 	
190811: Hettinger	 45 	 Low 	 	 High Wetness	 1.00
Muck	I 30 	 Low 	 	 High Wetness 	 1.00

Table 6.-Land Management, Part IV (Site Restoration)-Continued

		 Potential for damage soil by fire			ling
	map	Rating class and	Value	Rating class and	
	unit	limiting features	<u>!</u>	limiting features	!
190812: Hettinger	 45 	 - Low -		 High Wetness	1 1 1 1 1 1 1 1 1 1
Tonkey	 30 	 Low 	, 	 High Wetness 	1 1.00
190814: Kalkaska	•	 Moderate Texture/rock fragments	•	 Low 	
190815: Kalkaska	•	 Moderate Texture/rock fragments	•	 Low 	
190816: Kalkaska		 Moderate Texture/rock fragments	•	 Low 	
190817: Kalkaska	į	 Moderate Texture/rock fragments	•	 Low 	
190818: Kalkaska	 90	 Low	, 	 Low	
190819: Kalkaska	ĺ	 High Texture/rock fragments	•	 Low 	
East Lake		 High Texture/rock fragments	•	 Low 	
190820: Kiva	, 65	 Low	 	 Low	
Mancelona	30	Low		Low	į
190821: Kiva	 50	 - Low	! ! !	 - Low	
Mancelona	I 30	 Low	I 	 Low	
190823: Kiva	 50	 Low	 	 - Low	
Mancelona	1 30	Low	!	 Low	!
190824: Lake beaches	 100 	 Not rated 	 	 Not rated 	
190825: Lake bluffs		 Not rated 	 	 Not rated 	

Table 6.-Land Management, Part IV (Site Restoration)-Continued

		 Potential for dama soil by fire		Potential for seedling mortality		
		Rating class and			IVal 110	
	_	limiting features		limiting features		
	ī	I	ī	I	ī	
190826:	I	I	I	I	1	
Leelanau	60	High	1	Low	1	
	I	Texture/rock	1.00	I	1	
	I	fragments	I	I	I	
		<u> </u>	!	<u> </u>	!	
East Lake	30	-	•	Low	!	
	!	•	1.00	! !	!	
	!	fragments	!	! !		
190827:	;	! !	<u> </u>	! !	<u> </u>	
Leelanau	I 65	High	i	Low	i	
			11.00	•	i	
	ĺ	fragments	İ	İ	İ	
	I	I	I	I	1	
East Lake	25	· -	•	Low	1	
	I		1.00	I	1	
	!	fragments	!	!	1	
100000	!	!	!	<u> </u>	!	
190828: Leelanau	 6E	 Ui-ab	!	 T ===	!	
Leelanau	1 65		11.00	Low		
	<u> </u>		1	! !	<u> </u>	
	i	l ====================================	i	i i	i	
East Lake	25	High	i	Low	i	
	ĺ	=	11.00	İ	İ	
	I	fragments	I	I	1	
	I	I	I	I	1	
190829:	1	1	1	ļ.	1	
Leelanau			•	Low		
	!		11.00	! :	!	
	!	fragments	!	 	!	
East Lake	I I 35	l High	!	 Low		
Last Lake			11.00	•	i	
	i	fragments	1	i i	i	
	i	İ	i	İ	i	
190830:	I	I	I	I	1	
Leelanau	50	High	I	Low	1	
	1	Texture/slope/		<u> </u>	1	
	!	rock fragments	!	<u> </u>	!	
Foot John	1 25	 Ui-ab	!	 T e	!	
East Lake	1 35	· -	11.00	Low	1	
			I	! !	<u> </u>	
	i	Took Tragments	i		i	
190831:	İ		i		i	
Lupton	60	Low	I	 High	1	
	I	I	I	Wetness	1.00	
		<u> </u>	!	I	1	
Markey	1 30	Low	1	High		
	1	 	I	Wetness	1.00	
190832:	1	 		 		
Mancelona	1 90	ı Low	i	 Low	i	
	i	, 	i	 	i	
190833:	İ	· I	İ		İ	
Mancelona	90	Low	I	Low	1	
	I	I	I	I	1	

Table 6.-Land Management, Part IV (Site Restoration)-Continued

ļī	map unit 60 1	Texture/rock fragments High	Value 	Rating class and limiting features	
190834:	60	 High Texture/rock fragments High	 	 Low	<u> </u>
•	30	Texture/rock fragments High	•	•	
Mancelona 	30	Texture/rock fragments High	•	•	
Į.		 High	 	l	
		-	•	1	
East Lake		Toyture/rock	•	Low	į
		fragments	1.00 	 	
190835:	!		! !		<u> </u>
Mancelona			 1.00	Low 	
į	ĺ	fragments	 	 -	İ
East Lake	35	=		Low	l
		Texture/rock fragments	1.00 	 	
190836:		 	 	 	
Mancelona			•	Low	İ
		Texture/rock fragments	1.00 		
East Lake	30	_	 	Low	!
		Texture/rock fragments	1.00 	 	
190837:] 	 	 	
Mancelona		_	•	Low	į
i		· .	1.00 		i I
 East Lake	30	 High	 	 Low	
		Texture/rock fragments	1.00	 	
100000	į		į		į
190838: Mancelona	50	 High	 	 Low	
I I		Texture/slope/ rock fragments	1.00 	 	
<u> </u>		1	İ	-	į
East Lake	30	_	 1.00	Low 	
I I		rock fragments	 	 	
190839:	- 1	-	į	-	į
Mancelona	70	 TOM	 	Low	
Richter	25	Low	 	High Wetness	 1.00
100040	į		į		
190840: Nester	90	 Low	 	 Low	!
190841:] 	 	 	
Nester	90	Low	 	Low	İ
190842:			! 	 	!
Nester	90	Low 	 	Low 	

Table 6.-Land Management, Part IV (Site Restoration)-Continued

Map unit symbol		 Potential for dama soil by fire	_	Potential for seedling mortality		
		Rating class and			IValue	
		limiting features		limiting features	•	
	ı	l	ı	l	ī	
190843:	I	I	I	l	1	
Nester	90	Low	1	Low	1	
190844:	l	 	1	 	1	
Nester	1 1 90	I ITow	! !	I Low	;	
1,65,661	1	<u> </u>	i	1	i	
190846:	İ	i I	i	i İ	i	
Pits, gravel	100	Not rated	I	Not rated	1	
	I	<u> </u>	1	 -	1	
190847: Richter	 4E		1	 Ui-ab	1	
Richter	43 	I I TOM		High Wetness	11.00	
	i	i İ	i	Wedness	1	
Alcona	40	Low	i	Low	i	
	I	I	I	l	1	
190848:	I	I	I	1	1	
Richter	45	Low		High		
	l	 	1	Wetness	1.00	
Alcona	I I 40	I ITow	 	I Low	!	
ALCONA	- 0	I	i	104	i	
190849:	i	i I	i	i İ	i	
Roscommon	50	Moderate	I	High	1	
	I		0.50	Wetness	1.00	
	l	fragments	!	 -	!	
Markey	1 3U 	 Tow	1	 High	!	
Markey	1 30	I LOW			11.00	
	i	i İ	i		1	
190850:	I	I	I	l	I	
Sanilac	90	Low		High	1	
	!	<u> </u>	!	Wetness	11.00	
190851:	1] 		l İ	!	
Tonkey	1 40	i I T.ow	<u> </u>	ı High	i	
	i	 			11.00	
	İ	İ	ĺ	l	İ	
Munuscong	25	Low		High	1	
	!	<u> </u>	!	Wetness	11.00	
Iosco	l I 25	 Moderate		 High	!	
10360	•			Wetness	11.00	
	i	fragments			1	
	I	Ī	I	l	1	
190852:		<u> </u>	I	l	1	
Tonkey	35	LOW		High	11 00	
	I I] 	1	Wetness	11.00	
Munuscong	30	Low	i	ı High	i	
3				_	11.00	
	I	l	I	l	1	
Iosco	20	•		High		
	1	Texture/rock fragments	:		11.00	
	I I	l rradments	1	<u> </u>	1	
190853:	i		i		i	
Water	100	Not rated	I	Not rated	I	
	I	I	I	l	1	

Table 6.-Land Management, Part IV (Site Restoration)-Continued

		Potential for damage to soil by fire			
		Rating class and			Value
	lunit	limiting features	<u> </u>	limiting features	<u> </u>
190854:		 	1	 	
Wallace	50	 High	i	 Low	i
	ĺ	Texture/rock	11.00	l	İ
	!	fragments	1		!
Kalkaska	I I 45	l Moderate	1	 Low	1
			0.50	•	i
	I	fragments	ļ.	l	Į.
190855:	 	l I		 	
Wind eroded land	100	' High	i	Low	i
	I	Texture/rock	1.00	l	I
		fragments			!
190856:	 	! 	<u> </u>	 	<u> </u>
Wind eroded land	100			Low	İ
	!		11.00	<u> </u>	!
	l I	fragments 	1	l I	1
193236:	i	İ	i	i İ	i
Beaches	100	Not rated	!	Not rated	!
193237:	l I	 	1	l I	1
Thompsonville	50	 Moderate	i	Low	i
	l		0.50	l	I
		fragments		 	!
Milnichol	40	 Low	i	ı High	i
	ĺ	l	ĺ	Wetness	11.00
193255:		 		 	
Spinks	50	 Moderate	i	Low	i
	l	Texture/rock	0.50	l	I
		fragments		 	!
Coloma	40	 Low	i	I Low	i
	ĺ	l	ĺ	l	İ
193256: Spinks	50	 Moderate		 Low	!
Spinks	30 		10.50	•	<u> </u>
	i	fragments	İ	İ	i
0-1	1 40		!		!
Coloma	40 	 TOM		Low 	<u> </u>
193257:	i	İ	i	İ	i
Spinks	55			Low	!
	 	Texture/rock fragments	10.50	l İ	!
	i		i	' 	i
Coloma	35	Low	I	Low	I
193258:	l I	 	I I	 	
Spinks	50	 Moderate	i	I Low	i
	I	Texture/rock	0.50	I	I
	1	fragments		 -	
Coloma	 40	I Low		 Low	
	I	I	I	I	l
193260: Copemish	 0E	 Tow		 Moderate	!
cobemisii	32 	I TOM		Moderate Soil reaction	I 10.50
	i	I	i	I	1

Table 6.-Land Management, Part IV (Site Restoration)-Continued

		 Potential for dama@ soil by fire			ling
	_	Rating class and limiting features		Rating class and limiting features	
			<u>'</u> 		
193262: Kaleva	 95 	 Low 	 	 Low 	
193263: Kaleva	 95 	 Low	 	 Low	
193265: Grattan	, 95	 Low	 	 Low	
193266: Grattan	 95	 Low	! ! !	 Low	
193267: Grattan	 95	 Low	 	 Low	
193269: Grattan	 95 	_	 1.00 	 Low 	
193270: Covert	, 90 	 Low	 	 - Low	
193271: Pipestone	 90 	 Low	 	 High Wetness	 1.00
193272: Dair	 90 	 Low 	 	 High Wetness	 1.00
193277: Benona	 90 	 Low	 	 Moderate Soil reaction	 0.50
193278: Benona	 90 	 Low	 	 Moderate Soil reaction	 0.50
193279: Benona	 90 	 Low	 	 Moderate Soil reaction	 0.50
193284: Udorthents	 55	 - Low	! 	 Low	
Udipsamments	 35 		 1.00 	 Low 	
193285: Lumley	 55 	 - Fom -	 	 High Wetness Soil reaction	 1.00 0.50
Makinen	 40 	 Low 	 	 High Wetness	 1.00

Table 6.-Land Management, Part IV (Site Restoration)-Continued

		 Potential for dama soil by fire			ling
	_	Rating class and		=	
	unit	limiting features	<u> </u>	limiting features	<u> </u>
193286:	! 	 	! !	! 	<u> </u>
Histosols	55	Low	ĺ	High	Ì
	!	<u> </u>	!	Wetness	11.00
Aquents	 45	l Hiah	 	 High	
	0	-	11.00	-	11.00
	I	fragments	I	l	I
193287:	 		1	 	1
Dune land	, 55	 Not rated	i	 Not rated	i
	l	l	ĺ	l	Ì
Quartzipsamments		-		Low	<u> </u>
	 	Texture/rock fragments	1.00 	 	
	i		i	İ	i
193288:		<u> </u>	I	<u> </u>	ļ.
Udipsamments		-	 1.00	Low	
		fragments	1	 	i
	l	I	I	l	I
193342: Gorvan	1 32		1	 High	!
GOL Vali	33	I TOW	! 	-	11.00
	i i	İ	i	İ	İ
Houghton	30	Low	!	High	
	 	 	! !	Wetness 	11.00
Glendora	20	 Moderate	i	High	i
	ļ		10.50	Wetness	11.00
	 	fragments	 	 	
193349:	i	İ	i	i İ	i
Spinks	50	Low	!	Low	!
Coloma	I I 40	l High	 	 Low	
COTOMA	40	-	1.00	•	i
	l	surface layer	I	l	I
	 	thickness	1	 	1
193351:	! 	! 	i	 	i
Benona	95	Low	I	Moderate	1
	 	<u> </u>	1	Soil reaction	10.50
193354:	' 	 	i	' 	i
Dune land	50	Not rated	I	Not rated	I
Quartzipsamments	 40	 Wiah		 Low	
Quartzipsamments	1 0	· •	11.00	I TOW	<u> </u>
	İ	fragments	İ	İ	İ
193357:	l				
Shavenaugh	I I 85	 Moderate	! !	 Low	
	İ		0.50	i	i
	!	fragments	!	<u> </u>	!
193359:	i I	 	i I	I I	
Shavenaugh	85	Moderate	i	Low	i
	!		10.50	 -	!
	i I	fragments	I I] 	I I
	1	ı	1	ı	1

Table 6.-Land Management, Part IV (Site Restoration)-Continued

		 Potential for dama soil by fire	_		ling
	_	Rating class and limiting features		Rating class and limiting features	
193360: Shavenaugh	l I	 Moderate	l I	 - Low	
193362: Benzonia	 90 	 Moderate Texture/rock fragments		 Low 	
193363: Benzonia	•	•	 0.50 	 Low 	
193364: Benzonia	 90 	•	 0.50 	 Low 	
193365: Benzonia	 90 		 0.50	 Low 	
193371: Dair	 50 	 Low	 	 High Wetness	 1.00
Pipestone	 40 	 Low 	 	 High Wetness 	 1.00
193372: Access Denied	 100 	 Not rated 	 	' Not rated 	; ! !
193423: Benona	 95 	-	•	 Moderate Soil reaction 	 0.50
193484: Pits, sand and gravel	 100	 Not rated	' 	 - Not rated 	
193494: Nordhouse	 100 	-	 1.00 	 Moderate Soil reaction 	 0.50
193496: Nordhouse	 95 	 Low	 	 Moderate Soil reaction	1 1 1 1 1 1 1 1 1 1
193497: Nordhouse	 95 	 Low 	 	 Moderate Soil reaction 	 0.50

Table 6.-Land Management, Part IV (Site Restoration)-Continued

I	map unit 40	soil by fire Rating class and limiting features	Value		
	unit	limiting features 		<u>-</u>	
Nordhouse		 Low	<u> </u>		
Nordhouse		 Low	1		I
i I		Low	I		I
 Platteriver 	35		!	Moderate	
Platteriver 	35	<u> </u>	!	Soil reaction	10.50
	33	 T ===	!	 Moderate	!
į		I TOW	•	Wetness	10.50
:		! 	i	Soil reaction	10.50
		i I	i	2011 100001011	1
Dair	25	Low	i	High	i
I		I	I	Wetness	11.00
I		I	1	1	1
193503:		I	1		I
Spinks			•	Low	I
!			10.50		!
		fragments	!		!
 Shavenaugh	40	 Madamata	!	 Low	!
Snavenaugn			10.50		1
		fragments	10.50		i
j		l III.	i		i
193504:		i	i		i
Spinks	50	Moderate	i	Low	i
I		Texture/rock	10.50	1	1
I		fragments	1		1
I		I	1		I
Shavenaugh	40		•	Low	1
			10.50		!
		fragments	!]]	1
193505: I		! !			<u> </u>
Spinks	50	' Moderate	i	Low	i
			0.50	•	i
i		fragments	İ		İ
I		I	1	1	I
Shavenaugh	40		•	Low	1
I			0.50		I
!		fragments	!		!
193506: I] 	!		!
	50	 Moderate		Low	!
Spriiks	50	•	10.50	•	i
i		fragments	1	1	i
i		I	i		i
Shavenaugh	40	Moderate	I	Low	1
I		Texture/rock	0.50	l	I
I		fragments	I		I
103507.		1	!		!
193507:	E0	l Torr	1	l Tow	1
Spinks	50	I I TOM		Low	1
Shavenaugh	40	l Low	i	Low	i
I	-0		i	· —- ··	i
193508:			İ		İ
Madaus	90	Low	1	High	I
I		l	I	Wetness	11.00
I		I	1	Carbonate content	11.00

Table 6.-Land Management, Part IV (Site Restoration)-Continued

		Potential for dama soil by fire		Potential for seedling	
		Rating class and			177-1
	_	limiting features		_	
100-00	!	!	Ţ.	<u>.</u>	Ţ.
193509: Boyer	l I 50	 Tow	!	 Low	!
DOYEL	30 	I TOW	i	I I I I I I I I I I I I I I I I I I I	i
Shavenaugh	40	Moderate	İ	Low	İ
	I		10.50	<u> </u>	1
	 	fragments	!	l İ	!
193510:	<u>'</u>	' 	i	' 	i
Boyer	50	Low	I	Low	1
6 1 1.	1 40	136.4	!	 	!
Shavenaugh	40	Moderate Texture/rock		Low	1
	<u>'</u>	fragments	10.50	! 	i
	i	İ	i	i İ	i
193511:		!	1	!	1
Boyer	50	Low	!	Low	!
Shavenaugh	I 40	 Moderate	<u> </u>	 Low	i .
--			0.50	•	i
	l	fragments	I	l	1
193513:			!	 	!
Dair	I 50	 Low	<u> </u>	ı High	i .
	İ	İ	i	Wetness	11.00
	l	<u> </u>	!	l	1
Adrian	45			High Wetness	11.00
	<u>'</u>	fragments	I	wechess	1
	i	İ	İ	İ	i
193514:	!	<u> </u>	!	<u> </u>	1
Platteriver	55 	Low		Moderate Wetness	 0.50
	<u>'</u>	! 	i	Nethess Soil reaction	10.50
	i	İ	İ	İ	i
Pipestone	40	Low	!	High	
	 	 		Wetness	11.00
202010:	i	 	i	! 	i
Houghton	55	Low	İ	High	İ
		<u> </u>	!	Wetness	11.00
Adrian	I I 40	 Moderate		 High	1
Adl Laii	1 20	•		Wetness	11.00
	İ	fragments	İ	İ	i
202016.	1	!	!	<u> </u>	!
202016: Spinks	I I 50	 Moderate		 Low	1
	, 30 I	Texture/rock	10.50	•	i
	I	fragments	I	I	1
malaadah3	1	!	!	<u> </u>	!
Tekenink, sandy substratum	I I 40	 Moderate		 Low	1
_ abb c1 a can	, 20 	Texture/rock	10.50	•	i
	l	fragments	I	I	1
	I	I	I	I	1

Table 6.-Land Management, Part IV (Site Restoration)-Continued

		 Potential for damage to soil by fire		 Potential for seedling mortality	
	map	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	<u> </u>
631170: Fogg			 1.00 	 Low 	
Benzonia	 40	 Low	 	 Low	
631171: Fogg	 50	 Low	 	 Low	
Benzonia	•	•	 0.50 	 Low 	
631172:	i	i İ	i	i İ	i
Fogg	ĺ	Ī	l I	Low 	l I
Benzonia	40 		 0.50 	Low -	
631173:	i	' 	i	' 	i
Fogg	50	Low	İ	Low	İ
Benzonia	 40 		 0.50 	 Low 	
631174:	i	! 	İ	! 	i
Fogg	50 	Low 	 	Low 	i i
Benzonia	40 	•	 0.50	Low 	
680939:	 	! 	i	 	<u> </u>
Fern	•		 0.50	Low 	
Spinks			 0.50 	 Low 	!
680943: Milnichol	 90 	 Low 	 	 High Wetness 	 1.00
680945: Fern	į	•	 0.50 	 Low 	
680946: Fern	l I	 Moderate Texture/rock fragments 	 0.50 	 Low 	

Table 6.-Land Management, Part IV (Site Restoration)-Continued

and soil name	of	soil by fire	_		
	-	Rating class and			
	unit	limiting features	<u>!</u>	limiting features	<u>!</u>
680971: Nessen	 50	 Low	 	 Low	
Kaleva	 40 	 Low 	 	 Low 	
680972: Nessen	 50	 Low	 -	 Low	
Kaleva	 40 	 Low 	 	I Low 	!
680973: Nessen	 50	 Low	 	 Low	
Kaleva	 40 	 Low 	 	 Low 	
680974: Nessen	 50	Low	! !	Low	
Kaleva	I 40 	 Low 	 	 Low 	
893251: Boyer	 50	 Low	 	 Low	
Shavenaugh	 40 	•	 0.50 	 Low 	
894062: Remus	 50	 Low	 	 Low	
Spinks	 40 		 0.50 	 Low 	
894063: Remus	 50	 Low	 	 Low	
Spinks	 40 		 0.50 	Low 	;
894064: Fern			 0.50	 Low 	
Remus	I 40 	 Low 	 	 Low 	
894065: Fern	 50 		 0.50	 Low -	
Remus	 40 	 Low 	 	 Low 	
894104: Mollineaux	 50 	Texture/rock	 0.50	 Low 	
Remus				 Low 	

Table 6.-Land Management, Part IV (Site Restoration)-Continued

Map unit symbol	 Pct	 Potential for dama	ge to	Potential for seed	lling
		soil by fire			
		Rating class and			Value
	-	limiting features		_	
004105	!	<u> </u>	I		1
894105:	I =0	 No denote		 T	!
Mollineaux	•	•	I 10.50	Low	!
	!	fragments	10.50		
	;	l IIagments	<u> </u>		<u> </u>
Remus	40	Low	i	Low	i
	I	I	I	l	1
894165:	I	I	I		1
Spinks	50	Low	1	Low	1
Tekenink, sandy	!	 	 		1
substratum	1 40	I T.OW	i	Low	i
3455 52 4 54	i	I	i		i
899682:	i	İ	i	İ	i
Kaleva	90	High	I	Low	1
	I		1.00	l	1
	I	surface layer	I	l	1
		thickness	1		1
899722:		! 	 		
Goodharbor	i 90	' Low	i	Low	i
	i	l	i		i
899731:	I	I	I	l	1
Covert	50	Low	I	Low	1
5		 	1		1
Pipestone	1 40	LOW		High	11.00
	!	! !	 	Wetness	11.00
899733:	i	i i	i		i
Covert	I 50	Low	i	Low	i
	İ	İ	İ		İ
Dair	45	Low	I	High	1
	1	!	I	Wetness	11.00
000724			I		1
899734: Benzonia	1 00	I I ov	1	 Low	1
Delizonia	1 30	I TOW		I TOW	1

Table 7.—Recreation, Part I (Camp and Picnic Areas)

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

Map unit symbol and soil name			 I		<u> </u>	
and soil name	Map unit symbol	Pct.	Camp areas		Picnic areas	
190775:			=		l	
190775:		map	Rating class and	Value	Rating class and	Value
Adrian		unit	limiting features	1	limiting features	1
Adrian		I	I	I	1	1
Depth to 1.00 Ponding 1.00 Saturated zone Ponding 1.00 Saturated zone Ponding 1.00 Saturated zone Dusty 0.01 Dusty 0.01		!	<u> </u>	1	<u> </u>	1
saturated zone Depth to 1.00 Ponding 1.00 Saturated zone Dusty 0.01 Dust	Adrian		· -			•
Ponding		:	_		_	•
Dusty		!	•		·	•
Houghton		!	•	•	•	•
Depth to 1.00 Ponding 1.00 Saturated zone Depth to 1.00 Depth to 1.00		i	l Dascy	1	l Dasey	1
Depth to 1.00 Ponding 1.00 Saturated zone Depth to 1.00 Depth to 1.00	Houghton	45	Very limited	i	Very limited	i
Ponding	3		-	11.00	Ponding	11.00
Dusty		Ì	saturated zone	İ	Depth to	11.00
190777: Alcona		I	Ponding	1.00	saturated zone	1
Alcona		I	Dusty	0.01	Dusty	0.01
Alcona		I	I	1	I	1
Richter		I	I	I	I	1
Depth to 1.00 Depth to 0.99 saturated zone saturated zone saturated zone saturated zone	Alcona	55	Not limited	!	Not limited	!
Depth to 1.00 Depth to 0.99 saturated zone saturated zone saturated zone saturated zone	Diebten	1 20	 	!	 Gamasahak limikad	!
saturated zone saturated zone 10001 Dusty 0.01 190778:	Richter		·	•		10 00
Dusty 0.01 Dusty 0.01 190778:		!			·	
190778: Alcona		!	•	•	•	•
Alcona		i	l Dascy	1	l Dasey	1
Richter	190778:	i	i	i	i I	i
Depth to 1.00 Depth to 0.99 saturated zone saturated zone	Alcona	65	Not limited	Ì	Not limited	Ì
Depth to 1.00 Depth to 0.99 saturated zone saturated zone		I	I	I	I	1
saturated zone saturated zone 10.01 Dusty	Richter	25	Very limited	1	Somewhat limited	1
Dusty 0.01 Dusty 0.01 190779:		I	•	1.00		10.99
190779: Alpena		I	•	•	•	•
Alpena		!	Dusty	0.01	Dusty	[0.01
Alpena	100770.	!	! :	!	 	!
Gravel content 0.36 Gravel content 0.36		1 90	 Somewhat limited	!	 Somewhat limited	
190780: Au Gres	Aipella			•	•	•
Au Gres		i	l Graver concent	1	l Graver concent	1
saturated zone Depth to 0.99 Too sandy 1.00 saturated zone	190780:	i	i	i	i I	i
saturated zone Depth to 0.99 Too sandy 1.00 saturated zone	Au Gres	45	Very limited	İ	Very limited	Ì
Too sandy 1.00 saturated zone		I	Depth to	1.00	Too sandy	11.00
		I				0.99
Too sandy 1.00 Too sandy 1.00		I	Too sandy	1.00	saturated zone	1
Too sandy 1.00 Too sandy 1.00		1	1	1	!	1
	Kalkaska	35	-		·	
Depth to 1.00 Ponding Ponding		!	Too sandy	11.00	Too sandy	11.00
Depth to 1.00 Ponding Ponding	190781 •	1	I I	1] 	1
Depth to 1.00 Ponding 1.00 saturated zone Depth to 1.00 Ponding 1.00 Ponding 1.00 Depth to 1.00 Ponding 1.00 Saturated zone Depth to Depth to Depth to 1.00 Saturated zone Depth to Depth to Depth to 1.00 Depth to		90	 Verv limited	i	 Verv limited	i
saturated zone Depth to 1.00 Ponding 1.00 saturated zone Slow water 0.26 Slow water 0.26 movement movement Dusty 0.01 Dusty 0.01		1	· · · · · · · · · · · · · · · · · · ·			
Ponding		i	-		· -	
Slow water 0.26 Slow water 0.26 movement movement Dusty 0.01 Dusty 0.01		:	•	•	-	
Dusty 0.01 Dusty 0.01		I	-			
		I				1
		I	Dusty	0.01	Dusty	0.01
		I	I	I	I	1

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

	Pct. of	Camp areas 		Picnic areas 	
	map	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	1
	1	!	1	<u> </u>	1
190782:	1 100	 	!		!
Deer Park		-		Very limited	1 00
	!	· <u>-</u>		Too sandy Slope	1.00 0.63
		Slope	10.63	l stobe	10.63
190783:	i	i I	i		i
Deer Park	100	Very limited	i	Verv limited	i
	i	Slope	11.00	Very limited Too sandy	11.00
	I			Slope	1.00
	I	I	1	l	1
190784:	I	I		l	1
Deer Park				Very limited	1
	1	Too sandy	11.00	Too sandy	11.00
_		l	!	 Very limited Too sandy	!
Roscommon		Very limited	1 00	Very limited	1 00
	•	_		_	1.00
	•	saturated zone Ponding	1 1 00	•	1.00 1.00
				saturated zone	1
	i	l 100 banay	1	l sacaracea rone	i
190786:	i	i i	i	i I	i
Dune land	100	Not rated	i	Not rated	i
	ĺ	İ	İ	l	İ
190787:	I	I	1	l	1
East Lake	90	Somewhat limited	1	Somewhat limited	1
	1	Too sandy	0.42	Too sandy	0.42
100700	!	!	!		!
190788: East Lake	1 00	 Comowhat limited	1	 Somewhat limited	!
				Too sandy	10.42
		· <u>-</u>		Slope	10.04
	i	l Seeke	1	220F0	1
190789:	i	İ	i	İ	i
East Lake	90	Very limited	1	Very limited	1
	I			Slope	1.00
	I	Too sandy	0.42	Too sandy	0.42
	1	<u> </u>		<u> </u>	1
190790: East Lake	1 00	 	!		!
East Lake	1 90			Very limited Slope	11.00
		•	•	Siope Too sandy	10.42
	i	l 100 Sandy	10.42	l 100 Sandy	10.42
190791:	i	i i	i	i I	i
Eastport	93	Very limited	i	Very limited	i
	I	Too sandy	1.00	Too sandy	1.00
	I	I	1	l	1
190792:	I	I	1	I	1
Edwards	70	Very limited		Very limited	
	!	Depth to	1.00	-	1.00
	1	saturated zone	11 00	Depth to	1.00
		Flooding	11.00	•	11 00
		Ponding Organic matter	1.00 1.00	-	11.00
		Organic matter content	1.00 	Content Slow water	 0.96
	i	Slow water	10.96	•	10.96
		, ,	, 5.50	,	
	ĺ	movement	1	Flooding	0.40

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name		 Camp areas 		 		
		Rating class and limiting features				
190792:					I	
Marl beds	1 20	 Very limited	<u> </u>	 Very limited	1	
nair beab		· =		•	11.00	
	•	saturated zone		•	11.00	
	ĺ	Ponding	11.00	saturated zone	İ	
	I	Slow water			0.96	
	I			movement	1	
		Dusty	10.03	Dusty	10.03	
190794:	İ	 	i	' 	i	
Emmet					1	
		-		Dusty 	0.01 	
Leelanau		Somewhat limited	i	Somewhat limited	i	
	1	Too sandy	0.72	Too sandy	0.72	
190795:	 	! 		! 	<u> </u>	
Emmet	60	Somewhat limited	I	Somewhat limited	1	
	I	-		Slope	0.04	
		:		Dusty	0.01	
Leelanau	I 30		 	 Somewhat limited	1	
		Too sandy			0.72	
	l	Slope	0.04	Slope	10.04	
190796:	l I	 		 		
Emmet	50	Very limited	ĺ	Very limited	İ	
					1.00	
				Dusty	0.01	
Leelanau	30		 	 Very limited	i	
	I	Slope	11.00	Slope	1.00	
		Too sandy	0.72	Too sandy	10.72	
190797:	 	! 	<u> </u>	! 	i	
Emmet	50	Very limited	I	Very limited	1	
		•		Slope	11.00	
	 	Dusty 	0.01	Dusty 	10.01	
Leelanau	30	 Very limited	i	 Very limited	i	
	•				11.00	
	 	Too sandy 	0.72 	Too sandy 	10.72	
		 	i	' 	i	
Emmet	45	=		Very limited	1	
	!	•		Slope	11.00	
	 	Dusty 	10.01 I	Dusty 	0.01 	
Leelanau	30	•		Very limited	İ	
	1	· •		Slope	1.00	
	I I	Too sandy 	0.72 	Too sandy 	0.72 	
190801:	i	i	i	i	i	
Emmet	70	•		Somewhat limited		
	l I	•	•	Gravel content	10.12	
		Dusty 	0.01 	Dusty 	0.01 	
Mancelona	25			Somewhat limited	i	
	1	Gravel content		Gravel content	10.26	
	1	I		I	1	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name		 Camp areas 		Picnic areas		
		Rating class and limiting features				
190803:	l	 	1	 	 	
	-i 60	Very limited	i	Very limited	i	
		·		Slope	1.00	
		Gravel content				
		Dusty 	10.01	Dusty 	0.01 	
Mancelona	- i 30	Very limited		Very limited	i	
	•	·		·	11.00	
	!	Gravel content	10.26	Gravel content	10.26	
190805:	!	l İ		 		
	-I 50	 Somewhat limited	i	 Somewhat limited	i	
				Dusty	0.01	
	1	I	1	I	I	
Omena		Somewhat limited			1	
		Dusty	0.01	Dusty	0.01	
L90806:	<u> </u>	! 		! 	I I	
	- j 50	 Somewhat limited	i	 Somewhat limited	i	
	1	Slope	0.04	Slope	10.04	
	1	Dusty	0.01	Dusty	10.01	
Omena	 - 15	 Somewhat limited		 Comorrhat limited	1	
Omena					10.04	
		·		•	0.01	
	Ì	Ī	Ì	Ī	Ì	
.90807:		<u> </u>	1	<u> </u>	!	
Emmet		· -		Very limited	1 00	
		•		Slope Dusty	1.00 0.01	
	i	2000,	1	20003	1	
Omena	- 45	Very limited	Ì	Very limited	Ì	
		•		•	11.00	
	!	Dusty	0.01	Dusty	10.01	
.90808:		 	<u> </u>	! 	<u> </u>	
Emmet	- j 50	Very limited	i	Very limited	i	
	1	·		·	11.00	
	!	Dusty	0.01	Dusty	[0.01	
Omena	 - 45	 Very limited		 Very limited		
Omeria		· -		· -	11.00	
	Ì	Dusty	0.01	Dusty	10.01	
	1	<u> </u>	1	<u> </u>	!	
190809:		 Very limited		 Tome limited	!	
Emmet	-1 50	Slope	1 1.00	Very limited Slope	11.00	
	i	Dusty	0.01	•	10.01	
	Ì	Ī	Ì	Ī	Ì	
Omena	- 45	Very limited	•	Very limited	1	
		Slope	11.00	•	11.00	
		Dusty 	0.01 	Dusty 	0.01 	
190811:	i		i	I	i	
Hettinger	- 45	Very limited		Very limited	1	
	!	Depth to	11.00	•	1.00	
	1	saturated zone	11 00	Depth to	1.00	
		Ponding Slow water	1.00 0.96		 0.96	
	i	movement	10.30	movement	10.30	
	1	Dusty	0.02	•	0.02	
	1	I	1	I	1	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

	 Pct. of	 Camp areas 		 	
		Rating class and			
	unit	limiting features	<u>!</u>	limiting features	<u> </u>
190811:			!		!
Muck	1 130	 Not rated	1	 Not rated	1
Muck	30 	 	i	 	i
190812:	İ	İ	i	İ	i
Hettinger	45	Very limited	I	Very limited	1
	I	· -			11.00
	!	saturated zone			11.00
		=		saturated zone Slow water	10.96
	i			movement	1
	i				0.02
	I	I -	I	I	1
Tonkey	30	Very limited		Very limited	1
	!			-	1.00
	! !	saturated zone Ponding		bepth to saturated zone	11.00
	i	•			0.01
	İ	i	i	i -	i
190814:	l	l	1	I	1
Kalkaska		· -		Very limited	
	l	Too sandy	11.00	Too sandy	11.00
190815:	 	! 	! !	! 	1
Kalkaska	85	 Very limited	i	 Very limited	i
	ĺ	Too sandy	11.00	Too sandy	11.00
	l	Slope	0.04	Slope	0.04
100016	!	<u> </u>	!	<u> </u>	!
190816: Kalkaska	I I GN	 Very limited	<u> </u>	 Very limited	1
Naikaska	1 30	· -		•	11.00
	i	=		Slope	11.00
	l	l	1	I	1
190817:	I	<u> </u>	!	<u> </u>	1
Kalkaska	90			Very limited Too sandy	11.00
	<u> </u>	•	11.00	· -	11.00
	i				1
190818:	I	I	I	I	I
Kalkaska	90	•	•	Very limited	
		•		•	1.00 1.00
	! !	Too sandy 	11.00	Slope	11.00
190819:	i		i	i I	i
Kalkaska	55	Somewhat limited	İ	Somewhat limited	İ
	I	Too sandy	0.42		0.42
Book Toka			!		!
East Lake	35 			Somewhat limited Too sandy	 0.42
	i I	100 Sanay		100 Sandy 	
190820:	İ	İ	į	I	i
Kiva	65		•	Somewhat limited	İ
	l	Gravel content	•	•	0.11
	l	Dusty	0.01	Dusty	0.01
Mancelona	1 3N	 Somewhat limited	 	 Somewhat limited	
1.411.0610114	, 30 I	Gravel content			10.26
	I	•	:	İ	İ

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

	 Pct. of	 Camp areas 		Picnic areas		
	-	Rating class and limiting features				
190821:	 	 	 	 	1	
Kiva	50	 Somewhat limited	i	 Somewhat limited	i	
	I	•	•	Gravel content	0.11	
	l .	·		Slope	0.04	
	 	Dusty	10.01	Dusty	0.01	
Mancelona	30	 Somewhat limited	i	 Somewhat limited	i	
	ĺ	Gravel content	0.26	Gravel content	10.26	
	!	Slope	0.04	Slope	0.04	
190823:]]	1]]	1	
	50	 Very limited	i	 Very limited	i	
	ĺ	Slope	11.00	Slope	11.00	
		•	•	•	0.11	
		:	0.01 	Dusty	0.01 	
Mancelona	I 30		•	 Very limited	i	
Mancelona	i	Slope		•	11.00	
	I	Gravel content	10.26	Gravel content	10.26	
190824:		 	1	 	!	
Lake beaches	1 100	 Not rated	İ	 Not rated	i .	
	İ	İ	i	j	i	
190825:		<u> </u>	1	<u> </u>	1	
Lake bluffs	100	Not rated	1	Not rated	1	
190826:	 	 	i i	 	i	
Leelanau	60		i	Somewhat limited	i	
	I	Too sandy	10.72	Too sandy	10.72	
East Lake	1 3U	 Somewhat limited	1	 Somewhat limited	 	
East Dake				Too sandy	10.42	
	ĺ	Ī	ĺ	Ī	İ	
190827:			1		!	
Leelanau				Somewhat limited Too sandy	I 0.72	
	i	·		Slope	10.72	
	ĺ	Ī	ĺ	Ī	İ	
East Lake	25			Somewhat limited		
	!	·		Too sandy Slope	0.42 0.04	
	' 	Siope	0.0 1 	Siobe	10.04	
190828:	İ	İ	İ	İ	i	
Leelanau		_		Very limited	1	
	!	-		Slope	11.00	
	 	Too sandy 	U . / Z 	Too sandy 	0.72 	
East Lake	25	Very limited	i	Very limited	i	
	I	•		Slope	1.00	
		Too sandy	0.42	Too sandy	0.42	
190829:	I I	1 	I I	1 		
Leelanau	50	Very limited	i	Very limited	i	
	I	=		Slope	1.00	
		Too sandy	0.72	Too sandy	10.72	
East Lake	 35	l Verv limited	 	 Very limited	1	
		_		Slope	11.00	
	I	-		Too sandy	0.42	
	I	I	1	I	1	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of	 Camp areas 		Picnic areas		
		Rating class and limiting features	•		•	
190830:	1	 		 	1	
Leelanau	50	Very limited	Ì	Very limited	İ	
	1	Slope	1.00	Slope	1.00	
		Too sandy	10.72	Too sandy 	10.72	
East Lake	35	 Very limited	i	 Very limited	i	
	I	-		Slope	11.00	
	1	Too sandy 	10.42	Too sandy 	10.42	
190831:	i	İ	i	İ	i	
Lupton		Very limited		Very limited		
	!	•		Ponding	1.00	
	!	saturated zone		Depth to	1.00	
	!		•	saturated zone	 0.01	
		Dusty 	10.01 I	Dusty 	10.01 I	
Markey	30	Very limited	1	Very limited	1	
	I	Depth to		Ponding	11.00	
	!	saturated zone		Depth to	11.00	
	!	Ponding	•	saturated zone	11 00	
	!	Organic matter content	11.00 I	Organic matter content	1.00	
	i	•	•	Dusty	0.01	
190832:	1	<u> </u>	1	<u> </u>	1	
Mancelona	I I 90	 Not limited	i	 Not limited	i	
	•	İ	i	İ	i	
190833:	1		!		!	
Mancelona	90 	Slope	•	Somewhat limited Slope	10.04	
	i		i		i	
190834:			!		!	
Mancelona	1 60	Somewhat limited Too sandy	•	Somewhat limited Too sandy	10.42	
	<u> </u>	100 sandy 	0.42	100 sandy 	0.42	
East Lake	30	Somewhat limited	1	Somewhat limited	1	
	1	Too sandy	0.42	Too sandy	0.42	
190835:	<u> </u>	! 	i	! 	i	
Mancelona	55	Somewhat limited	1	Somewhat limited	1	
	I	Too sandy	•	Too sandy	0.42	
		Slope	10.04	Slope	10.04	
East Lake	35	 Somewhat limited	i	 Somewhat limited	i	
	1	Too sandy	0.42	Too sandy	0.42	
	!	Slope	0.04	Slope	0.04	
190836:		 		 	1	
	50	Very limited	I	Very limited	I	
	I	Slope	11.00	Slope	1.00	
	1	Too sandy	0.42	Too sandy	0.42	
East Lake	30	 Very limited	i	 Very limited		
	I	Slope		Slope	11.00	
	!	Too sandy	0.42	Too sandy	0.42	
190837:		! 		! 		
Mancelona	45	Very limited	I	Very limited	1	
	I	Slope	11.00	•	11.00	
	1	Too sandy	10 42	Too sandy	0.42	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

		Pct. Camp areas of		Picnic areas		
į	map	Rating class and limiting features		•		
190837:			!		!	
East Lake	I 30	 Verv limited	<u> </u>	 Very limited	<u> </u>	
		=		Slope	11.00	
	İ	Too sandy	0.42	Too sandy	0.42	
190838:		! 		! 		
Mancelona	50	Very limited	I	Very limited	1	
	I	-		Slope	11.00	
	 	Too sandy 	0.42 	Too sandy 	0.42 	
East Lake	30	Very limited	i	Very limited	i	
	I	Slope	1.00	Slope	1.00	
		Too sandy 	0.42	Too sandy 	0.42	
190839:	i	 	<u> </u>	! 		
Mancelona	•	•		Somewhat limited	1	
		Gravel content	10.26	Gravel content	10.26	
Richter	25	 Very limited	i	 Somewhat limited	i	
	i	•		Depth to	0.99	
	I	saturated zone	I	saturated zone	1	
		Dusty	0.01	Dusty	0.01	
190840:	i	! 	i	' 	i	
Nester	90	Somewhat limited	•	Somewhat limited	1	
	!	•	•	Slow water	10.96	
		movement Dusty	 0.03	movement Dusty	10.03	
100041	ļ.	! :	!] :	!	
190841: Nester	I I 90	 Somewhat limited	<u> </u>	 Somewhat limited	<u> </u>	
	i	•		Slow water	0.96	
	I	movement	I	movement	1	
	1	•		Slope	10.04	
	 	Dusty 	0.03 	Dusty 	0.03 	
190842:	i	İ	i	İ	i	
Nester	90	-		Very limited		
	!	•	11.00	Slope Slow water	1.00 0.96	
	i	movement	1	movement	1	
	i	Dusty		Dusty	0.03	
190843:	 	 		 	1	
		 Very limited		Very limited	i	
	ĺ	Slope	11.00	=	11.00	
	I	Slow water	10.96		10.96	
	!	movement		movement		
	 	Dusty 	0.03 	Dusty 	0.03 	
190844:			İ	<u> </u>	İ	
Nester	90	Very limited		Very limited	11 00	
	1	Slope Slow water	1.00 0.96	•	1.00 0.96	
	<u> </u>	movement	0.90	movement	10.96	
	į	Dusty	0.03	•	0.03	
190846:	l I	 	 	 	1	
Pits, gravel	100	Not rated	i	 Not rated	i	
· -	l	I	I	I	1	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name		 Camp areas 		 	
	-	Rating class and limiting features		•	
190847: Richter	İ	Depth to saturated zone Dusty	1.00 0.01	 Somewhat limited Depth to saturated zone Dusty	 0.99 0.01
Alcona	 - 40 	•	 	 Not limited 	
190848: Richter	İ	saturated zone Dusty	1.00 0.01	 Somewhat limited Depth to saturated zone Dusty	 0.99 0.01
Alcona	- 40	•	 	 Not limited	!
190849: Roscommon	1	saturated zone Ponding	1.00 1.00	Too sandy	 1.00 1.00 1.00
Markey	1	Depth to saturated zone Ponding Organic matter content	1.00 1.00 1.00	 Very limited Ponding Depth to saturated zone Organic matter content Dusty	 1.00 1.00 1.00 1.00
190850: Sanilac	1	Depth to Saturated zone Flooding Slow water movement	1.00 1.00	·	 0.94 0.26 0.01
190851: Tonkey		Depth to saturated zone Ponding	11.00		 1.00 1.00 0.01
Munuscong	 - 25 	Depth to Saturated zone Ponding Slow water movement	 1.00 1.00 0.96 	Depth to Saturated zone Slow water movement	 1.00 1.00 0.96 0.01
Iosco	 - 25 	saturated zone Too sandy Slow water movement	1.00 0.78 0.26	saturated zone Too sandy	 0.99 0.78 0.26

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

	 Pct. of	 Camp areas 		 Picnic areas 	
	map	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	<u> </u>
100050	!	!	!	<u> </u>	!
190852: Tonkey	l 135	 Very limited	!	 Very limited	1
TOTIKEY		·		· -	11.00
	i	saturated zone		•	11.00
	i			saturated zone	
	ĺ	Dusty	0.01	Dusty	0.01
Manage and a			!	 Very limited	!
Munuscong		·		•	1
	<u> </u>	saturated zone		•	11.00
	i			saturated zone	1
	i	•		Slow water	10.96
	i	•		movement	İ
	i			Dusty	0.01
_			!		1
Iosco	•	Very limited	•	Somewhat limited Depth to	10.00
	!		•	Depth to saturated zone	0.99
		•		•	10.78
	i	-		Slow water	10.26
	i	movement	1	movement	
	ĺ	İ	İ	Ī	İ
190853:		<u> </u>	!	<u> </u>	!
Water	1 100	Not rated	!	Not rated	!
190854:	 	! 	<u> </u>	! 	i
Wallace	50	Very limited	i	Very limited	i
	I	Depth to	1.00	Too sandy	1.00
	I	cemented pan	1	Depth to	1.00
		Too sandy	11.00	cemented pan	1
Kalkaska	I I 45	l Verv limited		 Very limited	1
-14-11-1-1-1		•		Too sandy	11.00
	i	i -	i	i -	i
190855:	1	l	1	l	I
Wind eroded land		=		Very limited	
	!	Too sandy 	11.00	Too sandy 	11.00
190856:	i	!]	i		i
Wind eroded land	100	Very limited	1	Very limited	I
	I	Too sandy	1.00	Too sandy	1.00
	!	Slope	11.00	Slope	11.00
193236:	 	 	1	İ	1
Beaches	1 100	 Not rated	i	 Not rated	i
	i		i		i
193237:	I	I	I	l	I
Thompsonville	50	•		Very limited	I
	1	•	1.00		1.00
	1	-	0.98	· -	10.75
	I I	saturated zone	!	saturated zone	
Milnichol	40	 Very limited	i	 Very limited	i
	i	Depth to		Too sandy	11.00
	I	saturated zone		Depth to	11.00
	l	Too sandy	11.00	saturated zone	I
	I	l	1	1	I

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	of			Picnic areas 		
	_	Rating class and limiting features		_		
193255:	I I	 	 	 	 	
Spinks		· =	11.00	Very limited Too sandy	 1.00	
Coloma	 - 40 	· =		 Very limited Too sandy	 1.00	
193256:		 		 		
Spinks		Too sandy	1.00 0.04	Slope	 1.00 0.04	
Coloma	İ	Too sandy	 1.00	 Very limited Too sandy Slope	 1.00 0.04	
193257:	i	! 	<u> </u>	! 		
Spinks	İ	Slope	11.00	•	 1.00 1.00	
Coloma		Very limited Too sandy	 1.00	•	 1.00 1.00	
193258:		 		 		
Spinks		Slope	11.00	Slope	 1.00 1.00	
Coloma		Slope	 1.00	 Very limited Too sandy Slope	 1.00 1.00	
193260:	i	 	i	! 	İ	
Copemish	 	cemented pan	1.00 	Very limited Too sandy Depth to cemented pan	 1.00 1.00 	
193262:	i		į	 Very limited	į	
Kaleva		•	•	•	11.00	
193263: Kaleva	 - 95 	 Very limited Too sandy Slope		 Very limited Too sandy Slope	 1.00 0.04	
193265: Grattan	 - 95 	 Very limited Too sandy		 - Very limited Too sandy	1 1.00	
193266: Grattan	 - 95 	 - Very limited Too sandy Slope 	11.00	 Very limited Too sandy Slope	1 1.00 10.04	
193267: Grattan	 - 95 	 - Very limited Too sandy Slope 	1.00 1.00	 - Very limited Too sandy Slope 	 1.00 1.00	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

and soil name	of	Pct. Camp areas of		Picnic areas			
	_	Rating class and limiting features		Rating class and limiting features			
193269:	 	 	 	 	 		
Grattan	95 	Slope	 1.00 1.00	•	 1.00 1.00		
193270: Covert	 90 	Too sandy Depth to	1.00	 Very limited Too sandy Depth to saturated zone	 1.00 0.19		
193271: Pipestone	 90 	Depth to saturated zone	1.00 	 Very limited Depth to saturated zone Too sandy	 1.00 0.99		
193272: Dair		Depth to saturated zone	1.00 	 Very limited Ponding Depth to saturated zone	 1.00 1.00		
193277: Benona	 90 	·	•	 Very limited Too sandy 	 1.00		
193278: Benona	 90 	Too sandy	11.00	 Very limited Too sandy Slope	 1.00 0.04		
193279: Benona	 90 	Too sandy		 Very limited Too sandy Slope	 1.00 1.00		
193284: Udorthents	55 	Slope Slow water movement	 1.00 0.26 0.01	Slow water movement	 1.00 0.26 0.01		
Udipsamments	 35 	Slope	 1.00 1.00	•	 1.00 1.00		
193285: Lumley	55 	saturated zone Ponding	 1.00 1.00 0.03	Depth to saturated zone	 1.00 1.00 0.03		
Makinen	 40 	saturated zone Ponding	11.00	Depth to saturated zone	 1.00 1.00 0.03		

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

	 Pct. of	· -		Picnic areas			
		Rating class and limiting features		Rating class and limiting features			
193286:	 	 	1	 	1		
Histosols	I 55	Very limited	i	Very limited	i		
	i	Depth to	11.00	•	11.00		
	ĺ	saturated zone	İ	Depth to	11.00		
	I	Ponding	1.00	saturated zone	1		
	I	Organic matter	1.00	Organic matter	1.00		
	I	content	1	content	1		
		Dusty	10.03	Dusty	[0.03		
Aquents	I I 45	 Very limited		 Very limited			
-	i	Depth to	11.00	•	11.00		
	ĺ	saturated zone	İ	Ponding	11.00		
	I	Ponding	1.00	Depth to	1.00		
	l	Too sandy	11.00	saturated zone	1		
193287:	 	 	1	 	1		
Dune land	55	Not rated	į	 Not rated	į		
Quartzipsamments	I I 40	 Very limited	<u> </u>	 Very limited	<u> </u>		
_ <u>-</u>	ĺ	Slope	11.00	Too sandy	11.00		
	1	Too sandy	11.00	Slope	11.00		
193288:	 	 	1	 			
Udipsamments	1 100	 Verv limited	i	 Very limited	i		
0a_p0a01	-00	Too sandy	11.00	•	11.00		
	ĺ	Ī	İ	Ī	İ		
193342:	25	 Town limited	1	 Tames limited	1		
Gorvan	1 33	Very limited Depth to	11.00	Very limited Ponding	11.00		
	<u> </u>	saturated zone	1	Depth to	11.00		
	i	Flooding	11.00	· -	1		
	i	Ponding	11.00	•	0.40		
	i	Slow water	0.26	•	0.26		
	ĺ	movement	İ	movement	İ		
	I	Dusty	10.03	Dusty	10.03		
Houghton	1 30	 Very limited	1	 Very limited			
noughcon	1	Depth to	11.00		11.00		
	i	saturated zone	1	Depth to	11.00		
	i	Flooding	11.00	saturated zone	i		
	ĺ	Ponding	11.00	Organic matter	11.00		
	I	Organic matter	1.00	content	1		
	I	content	1	Flooding	0.40		
	!	Dusty	[0.03	Dusty	10.03		
Glendora	I I 20	 Very limited	1	 Very limited	1		
	i	Depth to	11.00	-	11.00		
	i	saturated zone	i	Depth to	11.00		
	ĺ	Flooding	11.00	saturated zone	İ		
	I	Ponding	1.00	Too sandy	10.50		
	!	Too sandy	10.50	Flooding	0.40		
193349:	I I	1 	I	1 	1		
	50	 Very limited	i	Very limited	i		
	l	Slope	1.00	Too sandy	1.00		
	ļ .	Too sandy	11.00	Slope	11.00		
Coloma	I I 40	 Very limited	1	 Very limited	1		
	, -v	Slope	11.00	_	1.00		
	İ	Too sandy	11.00	•	11.00		
			i	. <u>-</u> I	i		

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

	 Pct. of	- ·		Picnic areas		
	-	Rating class and limiting features		Rating class and limiting features		
193351: Benona		Slope	11.00	 Very limited Too sandy Slope	 1.00 1.00	
193354: Dune land	 50	:	:	 Not rated	<u>.</u>	
		Very limited Too sandy	11.00	 Very limited Too sandy Slope	 1.00 0.63	
193357: Shavenaugh		Slope	11.00	 Very limited Slope Too sandy	 1.00 0.96	
193359: Shavenaugh	 85 	Too sandy	0.96	 Somewhat limited Too sandy Slope	 0.96 0.04	
193360: Shavenaugh	•	•	•	 Somewhat limited Too sandy 	 0.96	
193362: Benzonia		Slope	11.00	 Very limited Too sandy Slope	 1.00 1.00	
193363: Benzonia	 90 	Too sandy	11.00	 Very limited Too sandy Slope	 1.00 1.00	
193364: Benzonia	 90 	Too sandy	11.00	 Very limited Too sandy Slope	1 1 1 1 1 1 1 1 1 1	
193365: Benzonia	 90 	·		 Very limited Too sandy	 1.00	
193371: Dair	 50 	Depth to saturated zone		 Very limited Ponding Depth to saturated zone	 1.00 1.00	
Pipestone	 40 	Depth to saturated zone	1.00 	 Very limited Depth to saturated zone Too sandy	 1.00 0.99	
193372: Access Denied		 Not rated 	 	 Not rated 	 	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

	 Pct. of	 Camp areas 		Picnic areas		
	map	Rating class and limiting features		_		
193423: Benona		Slope	11.00	 Very limited Too sandy Slope	 1.00 1.00	
193484: Pits, sand and gravel	 100	 - Not rated	 	 Not rated	i 	
193494: Nordhouse		Slope	11.00	 Very limited Too sandy Slope	 1.00 1.00	
193496: Nordhouse		•	11.00	 Very limited Too sandy Slope	 1.00 0.63	
193497: Nordhouse		•	•	 Very limited Too sandy	 1.00	
193498: Nordhouse		•		 Very limited Too sandy	1 1.00	
Platteriver	ĺ	Too sandy	1.00 0.98 	 Very limited Too sandy Depth to saturated zone	 1.00 0.75	
Dair		Depth to saturated zone	1.00 	 Very limited Ponding Depth to saturated zone	 1.00 1.00	
193503: Spinks	 50 	 Very limited Too sandy	1 1.00	 Very limited Too sandy	1 1.00	
Shavenaugh				 Somewhat limited Too sandy	 0.96	
193504: Spinks	 50 	 Very limited Too sandy Slope		 Very limited Too sandy Slope	 1.00 0.04	
Shavenaugh		 Somewhat limited Too sandy Slope		 Somewhat limited Too sandy Slope	 0.96 0.04	
193505: Spinks	 50 	 Very limited Too sandy Slope		 Very limited Too sandy Slope	 1.00 1.00	
Shavenaugh		 Very limited Slope Too sandy 	1.00 0.96	 Very limited Slope Too sandy 	 1.00 0.96	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of	<u>-</u>		Picnic areas		
		· =		Rating class and limiting features		
193506:		 		 	1	
Spinks	- j 50	Very limited	i	 Very limited	i	
	1	•		Too sandy	11.00	
		Too sandy 	11.00	Slope 	11.00	
Shavenaugh	- 40	Very limited	i	Very limited	i	
	1	•		Slope	11.00	
	!	Too sandy 	10.96	Too sandy	10.96	
193507:	i	! 	i		i	
Spinks	- 50	Very limited	1	Very limited	1	
	1	•		Too sandy	1.00	
	1	Too sandy 	11.00	Slope	1.00 	
Shavenaugh	- 40	 Very limited	i	 Very limited	i	
	1	Slope	11.00	Slope	11.00	
	1	Too sandy	10.96	Too sandy	10.96	
193508:	i	! 			i	
Madaus	- 90	Very limited	1	Very limited	I	
	I	·		Ponding	11.00	
	!	saturated zone	•	Depth to saturated zone	1.00	
	-		•	Organic matter	11.00	
	i	content		content	1	
	i	Slow water	0.96	Slow water	0.96	
	1	movement	•	movement	1	
		Dusty 	10.03	Dusty 	10.03	
193509:	i	İ	i	İ	i	
Boyer	- 50	Somewhat limited		Somewhat limited		
	1	Dusty 	10.01	Dusty 	0.01 	
Shavenaugh	- 40	 Somewhat limited	•	 Somewhat limited	i	
	!	Too sandy	10.96	Too sandy	10.96	
193510:	1	 	1		<u> </u>	
Boyer	- 50	Somewhat limited	i	Somewhat limited	i	
	1	Slope	0.04	Slope	10.04	
	1	Dusty	[0.01	Dusty	0.01	
Shavenaugh	- 40	 Somewhat limited	i	 Somewhat limited	i .	
.				Too sandy	0.96	
	!	Slope	10.04	Slope	10.04	
193511:	1	 	1	 	1	
	- 50	Very limited	i	Very limited	i	
	1	Slope	11.00	Slope	11.00	
	!	Dusty	0.01	Dusty	0.01	
Shavenaugh	 - 40	 Very limited		 Very limited	1	
· · · · · · · · · · · · · · · · · · ·	i	Slope	11.00	-	11.00	
	!	Too sandy	10.96	Too sandy	0.96	
193513:	I I	 	1	 	1	
Dair	- 50	Very limited	i	 Very limited	i	
	1	Depth to	11.00	Ponding	11.00	
	!	saturated zone		Depth to	11.00	
	1	Ponding	1.00	saturated zone	1	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

	 Pct. of	 Camp areas 		 	
	-	Rating class and limiting features		Rating class and limiting features	
193513: Adrian	 45 	Depth to saturated zone Ponding	1.00 1.00	 Very limited Ponding Depth to saturated zone Dusty	 1.00 1.00 0.03
193514: Platteriver	 55 	Too sandy Depth to	1.00 0.98	 Very limited Too sandy Depth to saturated zone	 1.00 0.75
Pipestone		Depth to saturated zone	1.00 	 Very limited Depth to saturated zone Too sandy	 1.00 0.99
202010: Houghton		Depth to Saturated zone Ponding Organic matter content	1.00 1.00 1.00	 Very limited Ponding Depth to saturated zone Organic matter content Dusty	 1.00 1.00 1.00 1.00
Adrian		saturated zone Ponding	1.00 	Very limited Ponding Depth to saturated zone Dusty	 1.00 1.00 0.03
202016: Spinks		·		 Very limited Too sandy 	 1.00
Tekenink, sandy substratum	 40 			 Somewhat limited Too sandy 	 0.50
631170: Fogg	 50 	 Very limited Slope Too sandy		 Very limited Too sandy Slope	 1.00 1.00
Benzonia	 40 	 Very limited Slope Too sandy 	11.00	 Very limited Too sandy Slope 	 1.00 1.00
631171: Fogg	 50 	 Very limited Slope Too sandy	1.00 1.00		 1.00 1.00
Benzonia	 40 	 Very limited Slope Too sandy 	 1.00 1.00	 Very limited Too sandy Slope 	 1.00 1.00

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of					
	_	_		Rating class and limiting features		
631172:	l I	 	1	 	 	
Fogg	- 50	Very limited	1	Very limited	1	
		· •		Too sandy	1.00	
	-	Slope	11.00	Slope 	11.00	
Benzonia	- i 40	Very limited		Very limited	i	
	1	Too sandy	1.00	Too sandy	1.00	
	!	Slope	1.00	Slope	1.00	
631173:	-	 	<u> </u>	! 	i .	
Fogg	- j 50	 Very limited	i	Very limited	i	
	1			Too sandy	1.00	
	!	Slope		Slope	10.04	
Benzonia	-I 40	 Verv limited	•	 Very limited	1	
		·		Too sandy	11.00	
			0.04	Slope	0.04	
601174	!		!		!	
631174: Fogg	- I 50	 Very limited	1	 Very limited	1	
99		Too sandy		· -	11.00	
	1	I	1	I	1	
Benzonia	- 40	Very limited		Very limited		
	-	Very IIMIted Too sandy 	11.00	Too sandy 	11.00	
680939:	i	' 	i		i	
Fern	- 50	Very limited	I	Very limited	1	
		Too sandy			1.00	
	-	Depth to saturated zone		Slow water	0.26 	
	i			Depth to	0.19	
	į	movement		saturated zone	į	
Spinks	- 40	 Very limited	<u> </u>	 Very limited	i	
-		-		=	11.00	
	!	Slope	10.04	Slope	10.04	
680943:	-]]		 	1	
Milnichol	-i 90	 Very limited	i	 Very limited Too sandy	i	
	1				1.00	
	!	saturated zone			11.00	
	-	Too sandy 	11.00	saturated zone	1	
680945:	i	' 	i	i İ	i	
Fern	- 90	Very limited	I	Very limited	1	
	!	Too sandy	11.00		11.00	
	-	Depth to saturated zone	0.39 	Slow water movement	0.26 	
	i	Slow water	0.26	•	0.19	
	i	movement	i	saturated zone	i	
	1	Slope	10.04	Slope	10.04	
680946:	1	 	1] 	I I	
Fern	- 90	 Very limited	i	 Very limited	i	
	İ	Too sandy	11.00	_	11.00	
	!	Depth to	10.39	•	10.26	
	!	saturated zone	10.26	movement	10 10	
	-	Slow water movement	0.26 	Depth to saturated zone	0.19 	
	i	,	i		i	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

and soil name	of	·		 Picnic areas 		
	-	Rating class and limiting features		-		
680971:	 	 	 	 	 	
Nessen	50	Very limited	İ	Very limited	İ	
	I	·		· •	11.00	
	 	Too sandy 	1.00 	Slope 	1.00 	
Kaleva	40	Very limited	•	Very limited	i	
	I	· =		· <u>-</u>	1.00	
	 	Too sandy 	11.00	Slope	11.00	
680972:	i	İ	i	i İ	i	
Nessen		Very limited		Very limited	1	
	•	· -		· •	1.00	
	 	Slope 	11.00	Slope 	1.00 	
Kaleva	40		i	Very limited	i	
	I	_		•	1.00	
		Slope	11.00	Slope	11.00	
680973:	i	' 	i	' 	i	
Nessen		Very limited		Very limited	1	
		· -	•	•	11.00	
	l I	Slope 	U.U4 	Slope 	0.04 	
Kaleva	40	Very limited	i	Very limited	i	
	I	·		· <u>-</u>	1.00	
		Slope	10.04	Slope	10.04	
680974:	 	 	i	! 	i	
Nessen	50			Very limited	1	
		Too sandy	1.00	Too sandy	11.00	
Kaleva	I I 40	 Very limited	<u> </u>	 Very limited	i	
					11.00	
893251:		 		 	1	
	 50	 Very limited	i	 Very limited	i	
_				_	11.00	
		Dusty	0.01	Dusty	0.01	
Shavenaugh	I I 40	 Verv limited		 Very limited		
-				_	11.00	
	1	Too sandy	10.96	Too sandy	10.96	
894062:	l I	l 1		 		
	50	Very limited	i	Very limited	i	
	I	Slope	1.00	Slope	1.00	
	l .	Slow water	0.01		0.01	
	 	movement Dusty	I IO 01	movement Dusty	 0.01	
	İ	Duscy	I	Duscy	1	
Spinks	40	Very limited		Very limited	1	
		Slope	11.00	· •	1.00	
	 	Too sandy 	1.00 	Slope 	1.00 	
894063:	I	<u> </u>	1	!	I	
Remus	50	Very limited		Very limited	11 00	
	I I	Slope Slow water	1.00 0.01	•	1.00 0.01	
	i	movement	U.U.	movement	10.01	
	I	Dusty	0.01	•	0.01	
	I	I	I	I	1	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct.	Camp areas 		Picnic areas		
		Rating class and limiting features		Rating class and limiting features		
004063	!	!	!	[!	
894063: Spinks	1 40	 Vorm limited		 Very limited	!	
Spinks	1 40	•		Too sandy	11.00	
	į	Slope	11.00	·	11.00	
894064:	1	 		 		
Fern	50	Very limited	1	Very limited	1	
	!	· -		Too sandy	11.00	
	!	Depth to		Slow water	10.26	
	!	saturated zone		movement	10 10	
	!	Slow water movement		Depth to saturated zone	0.19 	
	;	Slope	I IO 04	Slope	10.04	
	i		1		1	
Remus	40	Somewhat limited		Somewhat limited	1	
	1	Slope	•	Slope	10.04	
	!	Slow water		Slow water	[0.01	
	!	movement	•	movement Dusty	 0.01	
	<u> </u>	Dusty 	10.01	Dusty 	10.01	
894065:		<u> </u>	1	!	1	
Fern	50	Very limited	•	Very limited	1 00	
	!	•	•	Too sandy	11.00	
	!	Depth to saturated zone		Slow water movement	0.26 	
	;	Slow water	•	Depth to	0.19	
	i	movement	1	saturated zone		
Remus	1 40	 Somewhat limited	 	 Somewhat limited	1	
	1	Slow water	•	Slow water	0.01	
	i	movement	i	movement	i	
	!	Dusty	[0.01	Dusty	0.01	
894104:		! 	<u> </u>	! 	¦	
Mollineaux	50	Very limited	i	Very limited	İ	
	1	Slope	11.00	Slope	1.00	
	1	Too sandy		Too sandy	10.88	
	!	Slow water	10.26	Slow water	10.26	
		movement		movement		
Remus	40	 Very limited	i	Very limited	i	
	1	Slope		Slope	1.00	
	I	Slow water	0.01	Slow water	0.01	
	!	movement		movement		
		Dusty 	0.01 	Dusty 	0.01 	
894105:	İ	İ	i	İ	i	
Mollineaux	50	•		Very limited		
	!	Slope	11.00	•	11.00	
	1	Too sandy Slow water	0.88 0.26	•	0.88 0.26	
	i	movement	U.20	movement		
D		 	1	 	1	
Remus	1 40	Very limited Slope		Very limited	I I1 00	
	1	Slope Slow water	1.00 0.01	•	1.00 0.01	
	i	movement	10.01	movement	10.01	
	İ	Dusty	0.01		0.01	
	1	I -		i -	i	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

	 Pct. of	 Camp areas 		 	
		Rating class and	IVa lua	l Rating class and	I Value
		limiting features	•		•
894165:	 		!	 -	1
	I 50	 Very limited	i	 Very limited	<u> </u>
5,5		·	11.00	· -	11.00
	İ	· •	11.00	· •	11.00
Tekenink, sandy	 	 	 	 	1
substratum	40	Very limited	i	 Very limited	i
	ĺ			Slope	11.00
	l	Too sandy	0.50	Too sandy	10.50
899682:	 	 		 	
Kaleva	90	Very limited	I	Very limited	1
	l	Slope	11.00	Too sandy	11.00
	 	Too sandy	1.00	Slope	1.00
899722:	 	 	i	l 	i
Goodharbor	90	Very limited	I	Very limited	1
	 	Too sandy	1.00	Too sandy	11.00
899731:	 	 	i	l 	i
Covert	50			Very limited	1
	l				1.00
	l	Depth to		Depth to	0.19
	l I	saturated zone 	 	saturated zone 	1
Pipestone	40	-		Very limited	i
	l			Depth to	1.00
	!				
	l I	Too sandy 	0.99 	Too sandy 	0.99
899733:		<u> </u>	į	i	į
Covert		=		Very limited	
	!	·		Too sandy	1.00
	!	· •	:	Depth to	0.19
	 	saturated zone 	 	saturated zone 	
Dair	45	Very limited	İ	Very limited	I
	I	•	•	Ponding	1.00
	I	saturated zone		Depth to	1.00
	 	Ponding 	1.00 	saturate zone 	1
899734:	İ	I	i	I	i
Benzonia	90	•		Very limited	
			1.00		1.00
	I	Too sandy	1.00	Slope	1.00

Table 7.—Recreation, Part II (Trail Management)

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

				<u> </u>	
Map unit symbol	 Pct.	 Foot traffic an	d	ı Mountain bike a	nd
and soil name	of	equestrian trai	ls	off-road vehicle t	rails
	map	Rating class and	Value	Rating class and	Value
	lunit	limiting features	<u> </u>	limiting features	<u> </u>
	Į.	!	1	!	1
190775:			!	 Very limited	!
Adrian		-		Very limited Depth to	11.00
	<u> </u>			saturated zone	1
	i			Ponding	11.00
	i	Dusty	0.01	Dusty	0.01
	I	I -	I	I -	1
Houghton	45			Very limited	1
	1			•	11.00
	!			saturated zone	
	!	•			11.00
	!	Dusty	10.01	Dusty	10.01
190777:	<u> </u>	! !	<u> </u>	! 	<u> </u>
Alcona	I 55	Not limited	i	 Not limited	i
	i	İ	i	İ	i
Richter	30	Somewhat limited	I	Somewhat limited	1
	I	-		Depth to	0.99
	I	saturated zone		saturated zone	1
	1	Dusty	0.01	Dusty	0.01
190778:	!	 -	1	 	!
Alcona	I I 65	 Not limited	i	 Not limited	
Arcona	1	l	i	I	i
Richter	25	' Somewhat limited	i	 Somewhat limited	i
	ĺ	Depth to	0.99	Depth to	0.99
	I	saturated zone	I	saturated zone	1
	I	Dusty	0.01	Dusty	0.01
100000	!	!	!	!	!
190779: Alpena	1 00	 Not limited	I I	 Not limited	!
Aipena	:		 	NOC IIMICEA	
190780:	i	i I	i	! 	i
Au Gres	45	Very limited	i	Very limited	i
	I			Too sandy	11.00
	I	Depth to	0.99	Depth to	0.99
	I	saturated zone	I	saturated zone	I
77 - 11 1 -			!		!
Kalkaska				Very limited Too sandy	1
	:	100 sandy 	1 ± . 00	100 sandy 	1 . 00
190781:	i	i	i	i İ	i
Bach	90	Very limited	i	Very limited	i
	I	Depth to	11.00	· -	11.00
	I	saturated zone	I	saturated zone	1
	I		11.00		11.00
	Į.	Dusty	0.01	Dusty	[0.01
100792.	1	 -	I	 -	!
190782: Deer Park	I I 100	 Very limited	I I	 Very limited	1
Peer Lary	, ±00	•	1	_	 1.00
	i	· -	1	,	1

Table 7.—Recreation, Part II (Trail Management)—Continued

		 Foot traffic and equestrian trai		 Mountain bike a off-road vehicle t		
	-	Rating class and limiting features		Rating class and limiting features		
190783: Deer Park	 100	 - Very limited Too sandy	l I	 - Very limited Too sandy	 1.00 0.44	
190784: Deer Park	 70 	 Very limited Too sandy	 1.00	 - Very limited Too sandy	 1.00	
Roscommon	•	Depth to saturated zone Too sandy	1.00 1.00	saturated zone Too sandy	 1.00 1.00 1.00	
190786: Dune land	 100 	 Not rated 	! 	 Not rated 	 	
190787: East Lake			 0.42 	 Somewhat limited Too sandy 	 0.42	
190788: East Lake	•	•	 0.42	 Somewhat limited Too sandy 	 0.42	
190789: East Lake			 0.42	 Somewhat limited Too sandy	 0.42	
190790: East Lake		Slope	 0.82 0.42	•	 0.42 	
190791: Eastport	 93 	•	 1.00	 Very limited Too sandy 	 1.00	
190792: Edwards	 	Depth to saturated zone Organic matter content Ponding Flooding	1.00 1.00	saturated zone Organic matter content Ponding Flooding	 1.00 1.00 1.00 0.40 0.01	
Marl beds		Depth to saturated zone Ponding	 1.00 1.00 1.00	saturated zone Ponding	 1.00 1.00 0.03	
190794: Emmet	 60	' Somewhat limited	 	 Somewhat limited	i i	
	, 00 	Dusty	0.01		 0.01 	
Leelanau		Somewhat limited Too sandy	 0.72	Somewhat limited	 0.72 	

Table 7.—Recreation, Part II (Trail Management)—Continued

		Foot traffic and equestrian trai		•	Mountain bike and off-road vehicle trails		
	-	Rating class and					
	unit	limiting features	<u>!</u>	limiting features	!		
190795: Emmet	60			 Somewhat limited Dusty	 0.01		
Leelanau		 Somewhat limited Too sandy 		 Somewhat limited Too sandy 	 0.72		
190796: Emmet				 Somewhat limited Dusty	0.01		
Leelanau	•	•	•	 Somewhat limited Too sandy 	 0.72		
190797: Emmet	İ	Slope		 Somewhat limited Dusty	 0.01		
Leelanau	i	Slope	•	 Somewhat limited Too sandy 	 0.72 		
Emmet	I	Slope	11.00	 Somewhat limited Slope Dusty	 0.96 0.01		
Leelanau		Slope	11.00	 Somewhat limited Slope Too sandy	 0.96 0.72		
190801:		 		 	!		
Emmet	 70 	•	•	 Somewhat limited Dusty 	 0.01		
Mancelona	25	Not limited	i	Not limited	i		
190803: Emmet	İ	Slope	11.00	 Somewhat limited Slope Dusty	 0.04 0.01		
Mancelona	 30 	_	 1.00	 Somewhat limited Slope	1 0.04		
190805:	İ	' 		' 	i		
Emmet	50 		 0.01 	Somewhat limited Dusty 	 0.01		
Omena	45 		•	Somewhat limited Dusty 	 0.01 		
190806:	i		i i	I	i		
Emmet				Somewhat limited Dusty 	 0.01 		
Omena	45 	· -	0.01	Somewhat limited Dusty 	 0.01		

Table 7.—Recreation, Part II (Trail Management)—Continued

	 Pct. of	 Foot traffic and equestrian trai	d ls	 Mountain bike a off-road vehicle t	nd rails
		Rating class and			
		limiting features	<u> </u>	limiting features	<u>!</u>
	•	•		 Somewhat limited Dusty	 0.01
Omena			•	 Somewhat limited Dusty 	 0.01
190808: Emmet	İ	Slope		 Somewhat limited Dusty	 0.01
	ĺ	Slope		 Somewhat limited Dusty 	 0.01
190809: Emmet		Slope Dusty	11.00	 Somewhat limited Slope Dusty	 0.96 0.01
Omena		 Very limited Slope	11.00	 Somewhat limited Slope Dusty 	 0.96 0.01
190811: Hettinger	l I	Depth to saturated zone Ponding Dusty	1.00 1.00 0.02	•	 1.00 1.00 0.02
Muck	I 30 	•	 	 Not rated 	
190812: Hettinger	l I	Depth to saturated zone Ponding Dusty	1.00 1.00 0.02	 Very limited Depth to saturated zone Ponding Dusty	 1.00 1.00 0.02
Tonkey		Very limited Depth to saturated zone Ponding	1.00 1.00	 Very limited Depth to saturated zone Ponding Dusty	 1.00 1.00 0.01
190814: Kalkaska	 85 			 Very limited Too sandy 	 1.00
190815: Kalkaska	 85 			 Very limited Too sandy 	 1.00
190816: Kalkaska	 90 	Too sandy	11.00	 Very limited Too sandy 	 1.00

Table 7.-Recreation, Part II (Trail Management)-Continued

Map unit symbol and soil name	Pct. of	Foot traffic and equestrian trai	d ls	Mountain bike a off-road vehicle t	Mountain bike and off-road vehicle trails		
		Rating class and					
	_	limiting features		limiting features			
	i	i I	i	i	i 		
190817:	ĺ	İ	ĺ	l	İ		
Kalkaska	90	Very limited	I	Very limited	I		
	I	Too sandy	1.00	Too sandy	1.00		
	I	Slope	0.82	I	I		
100010	!	!	!	<u> </u>	!		
190818: Kalkaska	I I 00	 Trans. limited	1	 Very limited	!		
Naikaska	1 90	Slope	•		11.00		
		-		· •	10.78		
	i	l 100 banay	1	l Siope	1		
190819:	i	i	i	i İ	i		
Kalkaska	55	Somewhat limited	i	Somewhat limited	i		
	I	Too sandy	0.42	Too sandy	0.42		
	I	I	I	I	I		
East Lake				Somewhat limited	1		
	I	Too sandy	0.42	Too sandy	0.42		
100000	!	<u> </u>	!	 	!		
190820: Kiva	I I 65	 Compathst limited	1	 Somewhat limited	!		
KIVA				Dusty	10.01		
	i	<u>-</u>	1	l Dascy	1		
Mancelona	I 30			Not limited	i		
	İ	İ	i	i I	i		
190821:	I	I	I	l	I		
Kiva	50	•	•	Somewhat limited	I		
	I	Dusty	0.01	Dusty	0.01		
M 1	1		!		!		
Mancelona	1 30	NOT limited	1	Not limited	!		
190823:		! !	<u> </u>	! 	<u> </u>		
Kiva	I 50	' Somewhat limited	i	' Somewhat limited	i		
	İ			Dusty	0.01		
	I	Dusty	0.01	Ī	I		
	I	I	I	I	I		
Mancelona				Not limited	I		
	!	Slope	10.82	<u> </u>	!		
190824:	l	! !	1] :	1		
Lake beaches	I I 100	 Not rated	i i	 Not rated			
Take Deaches	1 100	l	i	l	i		
190825:	i	i	i	i İ	i		
Lake bluffs	100	Not rated	I	Not rated	I		
	I	I	I	I	I		
190826:	I	I	I	I	I		
Leelanau	60	•		Somewhat limited			
	!	Too sandy	10.72	Too sandy	0.72		
East Lake	1 3U 1	 Somewhat limited	! !	 Somewhat limited	<u> </u>		
East lake	1 30			Too sandy	10.42		
	i	, 200 2	<u> </u>	, 200 2000 ,	1		
190827:	I		i		į		
Leelanau	65	Somewhat limited	i	Somewhat limited	I		
	I	Too sandy	0.72	Too sandy	0.72		
	Ι.	l	I	l	I		
East Lake	25	Somewhat limited	•	Somewhat limited			
	ļ .	:		Too sandy	0.42		
	I	I		I	1		

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	 Pct. of	 Foot traffic and equestrian trai	d ls	 Mountain bike a off-road vehicle t	nd rails
		Rating class and			
	-	limiting features		limiting features	
100000	!	<u> </u>	!	<u> </u>	!
190828: Leelanau	l 1 65	 Comowhat limited	! !	 Somewhat limited	1
Leelanau	•	•	I 0.72	•	10.72
	i		· · · -	100 5aa.ş	1
East Lake	25	Somewhat limited	İ	Somewhat limited	i
	I	Too sandy	0.42	Too sandy	0.42
	I	<u> </u>	1	Į.	1
190829:	I =0		!	 Gamasahat limited	!
Leelanau	1 20	•		Somewhat limited Too sandy	I 0.72
	! !	-	10.82	· <u>-</u>	10.72
	i	l 100 Sandy	10.72		i
East Lake	35	Somewhat limited	i	Somewhat limited	i
	ĺ	Slope	0.82	Too sandy	0.42
	I	Too sandy	0.42	I	I
	I	I	I	I	I
190830:		l	!	l	!
Leelanau	50			Somewhat limited	10.70
	1				0.78 0.72
	<u> </u>	l 100 sandy	0 . / <u>2</u> 	l 100 sandy	10.72
East Lake	I 35	' Very limited	i	' Somewhat limited	i
	İ	Slope	11.00	Slope	0.78
	I	Too sandy	0.42	Too sandy	0.42
	I	I	I	I	I
190831:		<u> </u>	!	<u> </u>	!
Lupton				Very limited	11 00
	!	· <u>-</u>		Depth to saturated zone	1.00
	1	saturated zone Ponding		•	 1.00
		-		•	10.01
	i		 	 	1
Markey	30	Very limited	İ	Very limited	İ
	I	·			1.00
	I			saturated zone	I
	I	=		Organic matter	11.00
	!	•		content	11 00
	1	-	10.01	•	1.00 0.01
	<u> </u>	l Duscy	0.01 	l Dusty	10.01
190832:	i	i i	i	i	i
Mancelona	90	Not limited	İ	Not limited	İ
	I	I	I	I	I
		<u> </u>		<u> </u>	!
Mancelona	90	Not limited	!	Not limited	!
190834:	1] 	! !	 	!
Mancelona	I 60	I Isomewhat limited	! 	 Somewhat limited	<u> </u>
110110010110	1		0.42		10.42
	i	I	i	i I	İ
East Lake	30	Somewhat limited	I	Somewhat limited	I
	I	Too sandy	0.42	Too sandy	0.42
100005	!	<u> </u>	!	<u> </u>	1
190835:		 Companhot limited	I	 Companies Timited	1
Mancelona	55 			Somewhat limited Too sandy	I 0.42
	I I	l roo sandy	∪.44∠ 	ı roo sandy I	∪.4∠
East Lake	I 35	 Somewhat limited	i i	 Somewhat limited	i
				Too sandy	0.42
	I	Ī	I	Ī	I

Table 7.-Recreation, Part II (Trail Management)-Continued

Map unit symbol and soil name	 Pct. of	 Foot traffic and equestrian trai	d ls	 Mountain bike and off-road vehicle trails	
		Rating class and			
	unit	limiting features	<u> </u>	limiting features	<u> </u>
190836: Mancelona					 0.42
East Lake	•	•		 Somewhat limited Too sandy 	 0.42
190837: Mancelona	İ	Slope		 Somewhat limited Too sandy	 0.42
East Lake	İ	Slope		 Somewhat limited Too sandy 	 0.42
190838:	l	l	I	l	I
Mancelona		Slope Too sandy	11.00	•	 0.78 0.42
East Lake	ĺ	Very limited Slope	 1.00	•	 0.78 0.42
190839: Mancelona	 70	 Not limited	 	 Not limited	
Richter	•	Depth to saturated zone	0.99 	Somewhat limited Depth to saturated zone Dusty	 0.99 0.01
190840: Nester	•	•	•	 Somewhat limited Dusty 	 0.03
190841: Nester	 90 	•	•	 Somewhat limited Dusty 	 0.03
190842: Nester	 90 			 Somewhat limited Dusty 	 0.03
190843: Nester	 90 	Slope		 Somewhat limited Dusty 	 0.03
190844: Nester	90 	Slope	•	 Somewhat limited Slope Dusty	 0.96 0.03
190846: Pits, gravel				 Not rated 	

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of	, Foot traffic an equestrian trai	d ls	Mountain bike and off-road vehicle trails		
		Rating class and limiting features	Value		Value	
190847: Richter	•	Depth to saturated zone Dusty	0.99 0.01	 Somewhat limited Depth to saturated zone Dusty	 0.99 0.01	
Alcona	 - 40 	•	 	 Not limited 		
190848: Richter	İ	Depth to saturated zone Dusty	0.99 0.01	 Somewhat limited Depth to saturated zone Dusty	 0.99 0.01	
Alcona	 - 40	•	 	 Not limited	!	
190849:		I 	 	 		
Roscommon		Depth to saturated zone Too sandy	1.00 1.00	Very limited Depth to saturated zone Too sandy Ponding	 1.00 1.00 1.00	
Markey	i I	Depth to saturated zone Organic matter content Ponding	1.00 1.00	Organic matter content Ponding	 1.00 1.00 1.00 0.01	
190850: Sanilac	 - 90 	Depth to saturated zone	0.86 	 Somewhat limited Depth to saturated zone Dusty 	 0.86 0.01	
190851: Tonkey	 - 40 	Depth to saturated zone Ponding	1.00 	 Very limited Depth to saturated zone Ponding Dusty	 1.00 1.00 0.01	
Munuscong	 - 25 	Depth to saturated zone Ponding	 1.00	 Very limited Depth to saturated zone Ponding Dusty	 1.00 1.00 0.01	
Iosco	 - 25 	Depth to saturated zone		 Somewhat limited Depth to saturated zone Too sandy	 0.99 0.78	
190852:		 		 		
Tonkey	- 35 	Depth to saturated zone Ponding Dusty	1.00 1.00 0.01	saturated zone Ponding	 1.00 1.00 0.01	

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. Of	 Foot traffic an equestrian trai	d ls	, Mountain bike a off-road vehicle t	
		Rating class and			
	-	limiting features		limiting features	
	ı	<u> </u>	ı	l	ī
190852:		l	!		!
Munuscong				Very limited	11 00
	1	•	11.00 I	Depth to saturated zone	1.00
		•	•	Ponding	11.00
	i		0.01		0.01
	İ	i -	İ	i -	i
Iosco	20			Somewhat limited	1
	I	_		Depth to	10.99
	I			saturated zone	
	l	Too sandy	10.78	Too sandy	10.78
190853:	! !	I I	! !	l I	!
Water	I 100	 Not rated	i	Not rated	i
	İ	I	i		i
190854:	I	I	I	l	I
Wallace	50	· -		Very limited	1
	I	Too sandy	11.00	Too sandy	11.00
77 - 111 -			!		!
Kalkaska	•			Very limited Too sandy	1
	! !	ı 100 sandy I	1	i 100 sandy	1
190855:	i		i		i
Wind eroded land	100	Very limited	i	Very limited	i
	I	Too sandy	11.00	Too sandy	11.00
	I	I	I	I	I
190856:		l	!		!
Wind eroded land				Very limited Too sandy	11.00
	! !	·		Slope	10.14
	i	l Brope	1	biope	1
193236:	İ	i I	İ	i İ	i
Beaches	100	Not rated	I	Not rated	I
	I	I	I	l	I
193237:		l	!	l	!
Thompsonville				Very limited Too sandy	11.00
	! !	·		Depth to	10.44
	i	saturated zone		saturated zone	1
	İ	i I	İ	i I	i
Milnichol	40	Very limited	I	Very limited	1
	I	·		Depth to	1.00
	!			saturated zone	
	1	Too sandy	11.00	Too sandy	1.00
193255:	! !	I I	! !	l I	!
Spinks	I 50	' Verv limited	i	 Very limited	i
-	İ			Too sandy	11.00
	I	I	I	l	I
Coloma	40	·		Very limited	I
	!	Too sandy	11.00	Too sandy	11.00
193256:	I 1] 	I] 	1
Spinks	I I 50	 Very limited	I I	 Very limited	1
		·		Too sandy	11.00
	İ				İ
Coloma	40	Very limited	ĺ	Very limited	I
	1			Too sandy	11.00
	I	I	I	l	1

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	 Pct. of	, Foot traffic an equestrian trai	d ls	, Mountain bike a off-road vehicle t	nd rails
		Rating class and limiting features	Value		Value
193257:	1	 	 	 	I I
Spinks	55			Very limited	i
	 	Too sandy 	1.00 	Too sandy 	1.00
Coloma	35 		•	Very limited Too sandy	11.00
193258:		 		 	1
Spinks				Very limited	1
		Slope	11.00	Too sandy Slope	1.00 0.04
Coloma		 Very limited	 	 Very limited	
	l			Too sandy	1.00
	 	Slope 	1.00 	Slope 	0.04
193260:	i .	İ	i	İ	i
Copemish		·		Very limited Too sandy	 1.00
	i	100 sandy 	1	100 sandy 	1
193262:		 	1	 Very limited	1
Kaleva		·		Too sandy	11.00
193263:		 	 	 	
Kaleva				Very limited	
	l I	Too sandy 	1.00 	Too sandy 	1.00
193265:	 		į		į
Grattan				Very limited Too sandy	1
100066	İ	-	İ	_	İ
193266: Grattan	I I 95	 Verv limited		 Very limited	1
		-		Too sandy	11.00
193267:	 	 	 	 	
Grattan	•	_		Very limited	i
	 	Too sandy 	1.00 	Too sandy 	11.00
193269:	i	İ	i	i İ	i
Grattan				Very limited Too sandy	 1.00
	<u> </u>	· -		Slope	11.00
102270.	!				1
193270: Covert	I I 90	 Very limited		 Very limited	<u> </u>
	į	_		Too sandy	11.00
193271:	I I	I 	 	 	I
	90	Very limited		Very limited	<u>.</u>
	 		1.00 	Depth to saturated zone	1.00
	į		0.99		0.99
193272:	I I	 	 	 	1
Dair	90	Very limited		Very limited	<u>.</u>
	 			Depth to saturated zone	1.00
	i		 1.00		1
	l	I	ĺ	ĺ	İ

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol	l Pct	 Foot traffic an	d	 Mountain bike a	ınd
		equestrian trai		•	
		Rating class and			
	unit	limiting features	<u> </u>	limiting features	<u> </u>
193277:		 		 	
Benona	, 90	 Very limited	i	 Very limited	i
		•		Too sandy	11.00
193278:			!		1
Benona	I I 90	 Very limited	<u> </u>	 Very limited	-
20		=		Too sandy	1.00
193279:	l I	 	 	 	1
Benona	90	Very limited	i	Very limited	i
	ļ .	Too sandy	11.00	Too sandy	11.00
193284:	 	! 		! 	
Udorthents	55	Very limited	ĺ	Very limited	Ì
	I	-		Slope	1.00
		Dusty	0.01	Dusty	0.01
Udipsamments	ı I 35	 Verv limited	<u> </u>	 Very limited	1
•		•		•	11.00
	l	Too sandy	11.00	Slope	11.00
193285:	 	 		 	
	55	 Very limited	i	Very limited	i
-		=		Depth to	11.00
	I	•	I	•	1
	1		•	•	11.00
	 	Dusty 	10.03	Dusty 	0.03
Makinen	40	 Very limited	i	 Very limited	i
	I	_	1.00	Depth to	1.00
	l .	•		•	•
	 	•		Ponding Dusty	1.00 0.03
	i	Dascy	1	Duscy 	1
193286:	!	<u> </u>	I	<u> </u>	1
Histosols		=		Very limited	11.00
		Depth to saturated zone	11.00	Depth to saturated zone	11.00
	i	•	•	Organic matter	11.00
	i	content	į.	content	i
	I	Ponding	1.00	Ponding	1.00
		Dusty	10.03	Dusty	10.03
Aquents	 45	 Very limited	<u> </u>	 Very limited	1
-	ĺ	Depth to	11.00		11.00
	I	saturated zone	I	saturated zone	I
	1	•	11.00	•	11.00
	 	Ponding	1.00 	Ponding 	11.00
193287:	i	İ	i	İ	i
Dune land	55	Not rated	!	Not rated	1
Quartzipsamments	40	 Very limited		 Very limited	<u> </u>
•	1	•	11.00	_	11.00
	Į.	Too sandy	11.00	Slope	1.00
193288:	I I] 	 	 	
Udipsamments	100	Very limited	i	 Very limited	i
		Too sandy	11.00	_	11.00
	I	l	I	l	1

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. Of		d .1s	 Mountain bike a off-road vehicle t	
		Rating class and limiting features		Rating class and limiting features	
193342:	I I	 	I	 	Ī
Gorvan	1 35	 Very limited	i	 Very limited	i
	i	Depth to		Depth to	11.00
	i	saturated zone		saturated zone	i
	İ	Ponding	11.00	Ponding	11.00
	1	Flooding	0.40	Flooding	0.40
		Dusty 	0.03 	Dusty	10.03
Houghton	30	 Very limited	i	 Very limited	i
	1	Depth to		Depth to	11.00
	1	saturated zone		saturated zone	
	!	Organic matter		Organic matter	11.00
	!	content	•	content	1 00
	!	•		Ponding	11.00
	!	Flooding Dusty	10.40	Flooding Dusty	0.40 0.03
	i	Dusty	l	Dusty 	10.03
Glendora	20	Very limited	1	Very limited	1
	I	Depth to		Depth to	1.00
	1	saturated zone		saturated zone	
	!	Ponding		Ponding	11.00
	!	•	10.50	•	10.50
		Flooding 	0.40 	Flooding 	0.40
193349: Spinks	 50	 Very limited	1	 Very limited	
Spinks	1 30	Slope	11.00	•	11.00
	i	Too sandy	11.00	•	11.00
Coloma	I I 40	 Very limited	1	 Very limited	1
COTOMA	1 -20	Slope	11.00	•	11.00
	i	Too sandy	11.00	•	11.00
193351:	1	 	1	 	1
	1 95	 Very limited	i	 Very limited	i .
20110114	1	Too sandy		Too sandy	11.00
	į	Slope	11.00	•	0.14
193354:	 	 	1	 	
Dune land	50	Not rated	į	Not rated	į
Quartzipsamments	 40	 Very limited		 Very limited	
-	İ	Too sandy	11.00	Too sandy	11.00
193357:	1	 		l İ	
Shavenaugh	1 85	ı Verv limited	i	 Somewhat limited	i .
2a - 2a ag	1	Slope	11.00		0.96
	i	Too sandy	0.96	· -	0.01
193359:	1	 	1	 	1
	i 85	 Somewhat limited	i	 Somewhat limited	i
	i	Too sandy	0.96		0.96
193360:	1	 	1	 	1
	85	Somewhat limited	i	 Somewhat limited	i
	i	Too sandy	0.96	•	0.96
193362:	1	 	1	 	1
Benzonia	1 90	 Very limited	1	 Very limited	1
	1	Too sandy	11.00	=	11.00
	i	Slope	11.00	•	10.04
	i	<u></u> .	1	<u></u> .	1

Table 7.-Recreation, Part II (Trail Management)-Continued

Map unit symbol and soil name	Pct. of	Foot traffic an equestrian trai	d ls	Mountain bike a off-road vehicle t	nd rails
		Rating class and limiting features	Value		Value
193363: Benzonia		·		 Very limited Too sandy	 1.00
193364: Benzonia	:			 - Very limited Too sandy	 1.00
193365: Benzonia		·		 Very limited Too sandy	 1.00
193371: Dair		Depth to saturated zone	1.00 	 Very limited Depth to saturated zone Ponding	 1.00 1.00
Pipestone	 40 	saturated zone	i	 Very limited Depth to saturated zone Too sandy	 1.00 0.99
193372: Access Denied	 100 	 Not rated 	 	 Not rated 	
	 95 	Slope		 Very limited Too sandy Slope	 1.00 1.00
193484: Pits, sand and gravel	 100	 Not rated	 	 - Not rated	
193494: Nordhouse	 100 	Too sandy	11.00	 Very limited Too sandy Slope 	 1.00 1.00
193496: Nordhouse	 95 			 Very limited Too sandy	 1.00
193497: Nordhouse	 95 	·	 1.00	 Very limited Too sandy 	 1.00
193498: Nordhouse	 40 	 Very limited Too sandy	1 1.00	 Very limited Too sandy	 1.00
Platteriver	 35 	Too sandy	11.00	 Very limited Too sandy Depth to saturated zone	 1.00 0.44
Dair	 25 	saturated zone	1.00 	 Very limited Depth to saturated zone Ponding 	 1.00 1.00

Table 7.—Recreation, Part II (Trail Management)—Continued

		 Foot traffic and equestrian trai		 Mountain bike a off-road vehicle t	
	-	Rating class and limiting features		Rating class and limiting features	
193503: Spinks	 50 	 Very limited Too sandy 	 1.00	 Very limited Too sandy 	 1.00
Shavenaugh					 0.96
193504:	 	! 	! 	! 	<u> </u>
Spinks	•	Very limited Too sandy 		Very limited Too sandy 	 1.00
Shavenaugh				Somewhat limited Too sandy	 0.96
193505:	i	i I	i	i I	i
Spinks		Very limited Too sandy 		Very limited Too sandy 	 1.00
Shavenaugh		Somewhat limited Too sandy			 0.96
193506:	 	 	l I	 	1
Spinks	50			Very limited	i
	•			- <u>-</u>	11.00
	 	Slope 	1.00 	Slope 	0.04
Shavenaugh	40	Very limited	i	Somewhat limited	i
	l			· •	10.96
	 	Too sandy 	0.96 	Slope	0.04
193507:	<u> </u>	 	i I	' 	i
Spinks				Very limited	
		· •	1.00 1.00	· •	1.00 1.00
	 	100 sandy 	1	 STODE	11.00 I
Shavenaugh	40			Very limited	i
		·			11.00
	 	Too sandy 	0.96 	Too sandy 	0.96
193508:		l 	!	l 	!
Madaus	:			Very limited Depth to	 1.00
	•	saturated zone	l	saturated zone	•
	ļ			_	11.00
	 	•	 1.00	•	 1.00
	İ	•		-	10.03
193509:		 -	l	 -	!
Boyer	I I 50	 Somewhat limited	! 	 Somewhat limited	<u> </u>
-	İ		0.01	Dusty	0.01
Charranauah	1 40	 Companies limited	l	 Compathet limited	!
Shavenaugh			I 0.96	Somewhat limited Too sandy	 0.96
102510.	ļ .		l		ļ .
193510: Boyer	I I 50	 Somewhat limited	l I	 Somewhat limited	
=-1	i	•	0.01		0.01
Charranauah		 Comprehent limited	•	•	
Shavenaugh			 0.96	Somewhat limited Too sandy	 0.96
	I	ı -		· -	İ

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol	Pct.	Foot traffic an equestrian trai	d 1s	Mountain bike a	nd
		Rating class and			
		limiting features			
	i I		i	<u>. </u>	i
193511:	I	I	I	l	1
Boyer	50	Very limited	I	Somewhat limited	1
	I	Slope	1.00	Slope	0.04
	1	:		Dusty	0.01
Shavenaugh	1 40			 Somewhat limited	1
Silavellaugii		· =			 0.96
	<u> </u>	•		Slope	10.04
	i				1
193513:	ĺ	İ	İ	l	İ
Dair		Very limited	I	 Very limited Depth to	1
	I				1.00
	!			saturated zone	
		Ponding	1.00	Ponding	1.00
Adrian	I I 45	 Very limited		 Very limited	
				Depth to	11.00
	i			saturated zone	
	ĺ	Ponding	11.00	Ponding	11.00
	I	Dusty	0.03	Dusty	0.03
	I	I	I	l	1
193514:			!		!
Platteriver		very limited Too sandy	11 00	Very limited	11 00
				Depth to	1.00 0.44
	i	•		saturated zone	10.44
	i		i		i
Pipestone	40			Very limited	1
	I			Depth to	1.00
	1			saturated zone	
		Too sandy	0.99	Too sandy	10.99
202010:	 	 	!	 	1
Houghton	, 55	Very limited	i	Very limited	i
3				Depth to	11.00
	I			saturated zone	1
	I	Organic matter		=	1.00
	I			content	1
	!	•		•	1.00
	!	:	0.03 	Dusty	10.03
Adrian	I 40	 Very limited	•	 Verv limited	i
	i	-		Depth to	11.00
	ĺ	saturated zone	İ	saturated zone	Ì
	I	Ponding	1.00	Ponding	1.00
		Dusty	10.03	Dusty	10.03
202016.			!		1
202016: Spinks	I I 50	 Very limited	!	 Very limited	!
Spinks	1 30	· =		Too sandy	11.00
	<u>'</u>	, 100 Sanay		, 100 Sanay 	1
Tekenink, sandy	İ	İ	į	İ	i
substratum	40	Somewhat limited	I	Somewhat limited	1
	l	Too sandy	0.50	Too sandy	0.50
	!	<u> </u>	!		!
	I	I	I	I	I

Table 7.—Recreation, Part II (Trail Management)—Continued

	<u> </u>	<u> </u>		<u> </u>	
Map unit symbol	Pct.	Foot traffic an equestrian trai	d	Mountain bike a	nd
		Rating class and limiting features		limiting features	
	1	l	i	l	i
631170:	i	i	i	i İ	i
Fogg	50	Very limited	I	Very limited	1
	I			· -	1.00
	!	Too sandy	11.00	Slope	11.00
Benzonia	1 40	 Very limited	!	 Very limited	!
Belizonia	•	. =		-	11.00
	i			Slope	11.00
631171:	i	i	i	i I	i
Fogg	50	Very limited	I	Very limited	1
	I	=		· -	11.00
	!	Slope	11.00	Slope	10.04
Benzonia	1 40	 Vorumelimited	1	 Very limited	1
Belizolita		-		-	11.00
	i	=		Slope	10.04
	i	i	i	i I	i
631172:	I	I	I	I	1
Fogg		Very limited		Very limited	1
	!	Too sandy	11.00	Too sandy	11.00
Benzonia	1 40	 Very limited	!	 Very limited	!
		· =			11.00
	i	,	İ		i
631173:	I	I	I	l	I
Fogg		=		Very limited	1
	!	Too sandy	11.00	Too sandy	11.00
Benzonia	I I 40	 Very limited	<u> </u>	 Very limited	!
Delizonia		· =		_	11.00
	i	,	İ		i
631174:	ĺ	Ì	İ	l	İ
Fogg		· =		Very limited	1
	!	Too sandy	11.00	Too sandy	11.00
Benzonia	1 40	 Vorumelimited	1	 Very limited	1
Belizonia		· =			11.00
	i	,	İ		i
680939:	ĺ	Ì	İ	l	İ
Fern	50			Very limited	I
	!	Too sandy	11.00	Too sandy	11.00
Spinks	1 40	 Tame limited		 Tom: limited	!
Spinks	1 40 1	Too sandy	•	Very limited Too sandy	1
	i	l 100 sandy	1	l 100 sanay	1
680943:	i	i i	i	I	i
Milnichol	90	Very limited	I	Very limited	I
	!	Depth to		Depth to	11.00
	!	saturated zone	11 00	saturated zone	
	1	Too sandy	1.00	Too sandy 	1.00
680945:	<u> </u>	' 	<u> </u>	! 	i
Fern	90	 Very limited	i	 Very limited	i
	I	Too sandy	1.00	-	1.00
		I	I	l	I

Table 7.-Recreation, Part II (Trail Management)-Continued

Map unit symbol and soil name	Pct. Of	, Foot traffic an equestrian trai	d ls	Mountain bike a off-road vehicle t	nd rails
		Rating class and			
	_	limiting features		limiting features	
	1	i imitting reacures	 	i iimitting reacures	
680946:	! !	! !	!	! !	!
Fern	1 1 90	 Very limited		 Very limited	;
rem		-		·	1.00
	i	l 100 banay	1	l 100 banay	1
680971:	i	i I	i		i
Nessen	I 50	Very limited	i	Very limited	i
		•	11.00	Too sandy	11.00
	I	Slope	1.00	Slope	0.04
	I	I	I	l	1
Kaleva	40	Very limited	1	Very limited	1
	I	Too sandy	1.00	Too sandy	1.00
	I	Slope	1.00	Slope	0.04
	I	I	1	I	1
680972:	I	I	I	I	1
Nessen	50	Very limited		Very limited	
	l	Too sandy	11.00	Too sandy	11.00
		l	!	l	!
Kaleva		-		Very limited	1 00
	!	Too sandy	11.00	Too sandy	11.00
680973:	1	! !	!] 	1
Nessen	I 50	 Very limited	<u> </u>	 Very limited	i
Nessen		-		Too sandy	1.00
	i	l	1	l	1
Kaleva	40	Very limited	i	Very limited	i
	İ	Too sandy	11.00	Too sandy	11.00
	ĺ	i -	İ	<u>-</u> I	İ
680974:	I	I	I	l	1
Nessen			I	Very limited	1
	I	Too sandy	1.00	Too sandy	1.00
	1	I	I	I	1
Kaleva		-		Very limited	
	!	Too sandy	11.00	Too sandy	11.00
002051.	l .	!	!	 	!
893251: Boyer	I 50	 Compathst limited	!	 Somewhat limited	!
Polet				Dusty	10.01
	i	l Dascy	1	l Dascy	1
Shavenaugh	I 40	' Somewhat limited	i	 Somewhat limited	i
3				Too sandy	0.96
	ĺ	i -	İ	<u>-</u> I	İ
894062:	I	I	I	l	1
Remus	50	Very limited	I	Somewhat limited	1
	I			Slope	0.04
	I	Dusty	0.01	Dusty	0.01
		<u> </u>	!	<u> </u>	!
Spinks	1 40	· =		Very limited	1 00
	l	•		Too sandy	11.00
	I I	Slope	11.00	Slope	10.04
894063:	! 	! 	1	1 	1
Remus	I 50	 Somewhat limited	i	 Somewhat limited	i
	. 50 I			Dusty	0.01
	i			, .==== <u>,</u>	1
Spinks	40	 Very limited	i	Very limited	i
	I	•		Too sandy	11.00
	I	:		i -	i

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. Of	, Foot traffic an equestrian trai	d ls	Mountain bike a off-road vehicle t	nd rails
		Rating class and			
	-	limiting features		limiting features	
894064:			!		!
Fern	I I 50	 Very limited	!	 Very limited	1
rem		-		· -	11.00
	i	l 100 sandy	1	l 100 sandy	1
Remus	40	Somewhat limited	i	Somewhat limited	i
	İ	Dusty	0.01	Dusty	0.01
	I	I -	I	I -	1
894065:	I	I	I	I	1
Fern				Very limited	1
	I	Too sandy	11.00	Too sandy	11.00
5	1 40		!		!
Remus	40			Somewhat limited	10 01
	1	Dusty	10.01	Dusty	10.01
894104:	i	! !	i	! 	i
Mollineaux	I 50	Very limited	i	Somewhat limited	i
		•		Too sandy	0.88
	ĺ	Too sandy	0.88	Slope	0.04
	I	I	I	I	1
Remus	40	Very limited		Somewhat limited	I
	I	•		•	10.04
	!	Dusty	0.01	Dusty	[0.01
894105:	l	! !	!	 	!
Mollineaux	I 50	 Comowhat limited	!	 Somewhat limited	!
MOTITHEAUX	•	•	•	Too sandy	10.88
	i	l 100 banay	1	l 100 banay	1
Remus	40	Somewhat limited	i	Somewhat limited	i
	ĺ	Dusty	0.01	Dusty	0.01
	I	I	I	I	1
894165:	I	!	1	!	1
Spinks		•		Very limited	
	!	-		•	11.00
	1	Too sandy	11.00	Slope	11.00
Tekenink, sandy	İ	i I	i	i I	i
substratum		Very limited	i	Very limited	i
	ĺ	Slope	11.00	Slope	11.00
	I	Too sandy	0.50	Too sandy	10.50
	I	I	I	I	1
899682:	1	 	!	 	!
Kaleva		· -	•	Very limited Too sandy	11.00
	! !	Slope Too sandy		Too sandy Slope	11.00
	i	l 100 sandy	1	l Biope	1
899722:	i	I	i	I	i
Goodharbor	90	Very limited	İ	Very limited	İ
	I	Too sandy	11.00	Too sandy	1.00
	1	!	1	!	1
899731:		177	!		I
Covert	50	•		Very limited	11 00
	l I	Too sandy	11.00	Too sandy	11.00
Pipestone	ı I 4∩	 Very limited	1	 Very limited	1
		Depth to		Depth to	11.00
	İ	saturated zone		saturated zone	
	I	Too sandy		Too sandy	0.99
	l	I	I	I	I

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Table 7.-Recreation, Part II (Trail Management)-Continued

		<u> </u>		<u> </u>	
	!	!	_	!	_
Map unit symbol	Pct.	Foot traffic a	nd	Mountain bike a	and
and soil name	of	equestrian tra	ils	off-road vehicle t	rails
	map	Rating class and	Value	Rating class and	Value
	unit	limiting features	1	limiting features	1
	1	I	T	I	ī
899733:	1	I	1	I	1
Covert	- 50	Very limited	1	Very limited	1
	1	Too sandy	11.00	Too sandy	11.00
		I	1	I	1
Dair	- 45	Very limited	1	Very limited	1
	1	Depth to	11.00	Depth to	11.00
	1	saturated zone	1	saturated zone	1
	1	Ponding	1.00	Ponding	11.00
	1	I	1	I	1
899734:	1	I	1	I	1
Benzonia	- 90	Very limited	1	Very limited	1
	1	Slope	11.00	Too sandy	11.00
	1	Too sandy	11.00	Slope	11.00
	1	I	1	I -	1

Table 8.-Dwellings and Small Commercial Buildings

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

	 Pct. of	 Dwellings witho basements	ut	 Dwellings with bas 	ements	Small commercial buildings		
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	•	
	!		<u> </u>	! !	<u> </u>	! !	İ	
190775: Adrian	l I 55	 Very limited	 	 Very limited	 	 Very limited	!	
	1			_		Ponding	11.00	
	i	•	11.00	•	11.00	•	11.00	
	i	•		•	•	Depth to	11.00	
	İ	saturated zone		saturated zone	İ	saturated zone	i	
Houghton	 45	 Very limited	 	 Very limited	 	 Very limited	1	
110 ag 11 co 11	1	·		· _		Ponding	11.00	
	i	•	11.00		•	Subsidence	11.00	
	i	•	•	•	•	Depth to	11.00	
	i	saturated zone		saturated zone		_	1	
	i					Organic matter	11.00	
	i		İ		İ	content	i	
190777:		 -	1	 -		 -	1	
Alcona	I I 55	 Not limited	! !	 Somewhat limited	!	 Not limited		
ALCOHA	1 33	I	<u>'</u>		10.47		<u> </u>	
	İ	! 	i	saturated zone	•	 	i	
	İ	I	i	I	İ	İ	i	
Richter	30					Very limited	1	
	I	· =		· -		Depth to	1.00	
	 	saturated zone	1	saturated zone	1	saturated zone	1	
190778:	i	i I	i	· 	i	i I	i	
Alcona	65	Not limited	I	Somewhat limited	1	Not limited	1	
	I	l	I	Depth to		I	1	
		1	!	saturated zone	!		!	
Richter	I I 25	l Very limited	<u> </u>	 Very limited	<u> </u>	 Very limited	1	
KICHCGI	1 23		1.00	_		Depth to	11.00	
	İ	saturated zone		saturated zone		saturated zone	1	
100000	!	 -	!		!	 -	!	
190779: Alpena	I I 90	l Not limited	! !	 Not limited	1	 Somewhat limited	!	
TII POILU			i		i	Slope	0.50	
100700	ļ .	<u> </u>	!		!	<u> </u>	!	
190780:	 4E	 	1	 	!		1	
Au Gres	1 43	·		_		Very limited	11.00	
	1	Depth to saturated zone		Depth to saturated zone		Depth to saturated zone	11.00	
	! 	Saturated zone	i	Saturated zone	i	Sacuraced zone	i	
Kalkaska	35	Not limited	İ	Not limited	İ	Not limited	İ	
190781:	 	 	1	<u> </u>	1	 	!	
Bach	1 1 90	 Very limited	<u>'</u>	 Very limited		 Very limited	<u> </u>	
24011	1		1.00	_	11.00		11.00	
	i	·	11.00	-	11.00		11.00	
	i	saturated zone	1	saturated zone	1	saturated zone	1	
	i		i		i		i	
	i	I	ĺ	I	I	l	1	
190782: Deer Park	 100	 Somewhat limited Slope	 0.63	 Somewhat limited Slope	 0.63	 Very limited Slope	 1.00	

Table 8.—Dwellings and Small Commercial Buildings—Continued

	 Pct. of			 Dwellings with base 		buildings		
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features		
190783: Deer Park	 100 	· =		· -	 1.00	 Very limited Slope 	 1.00	
190784:	. 70	, 	į	, 	į		į	
Deer Park	70 	Not limited 	 	Not limited 	 	Not limited		
Roscommon	25 	Ponding	1.00 1.00	•	1.00 1.00	Very limited Ponding Depth to saturated zone	 1.00 1.00	
190786:	i	' 		 		i I	i	
Dune land	100 	Not rated 	 	Not rated 	 	Not rated 	I I	
190787:	Ĺ	ĺ	İ	ĺ	İ	ĺ	İ	
East Lake	90 	Not limited 	 	Not limited 	 	Not limited	 	
190788: East Lake	l 1 90	 Somewhat limited	 	 Somewhat limited	 	 Very limited	1	
Labe Lake		•			0.04	· -	1.00	
190789:	 	 	 	 	 	 		
East Lake		· =		Very limited Slope	 1.00	Very limited Slope	11.00	
190790:		! 	 	! 	 	! 		
East Lake	90 	· =		Very limited Slope	 1.00	Very limited Slope	 1.00	
190791:	i	! 	i	 	İ	İ	i	
Eastport	93 	Not limited 	 	Not limited	 	Not limited	 	
190792:	i	İ	i	İ	i	i	i	
Edwards	 	Ponding Subsidence Flooding Depth to saturated zone	1.00 1.00 1.00	Ponding Subsidence Flooding Depth to saturated zone	 1.00 1.00 1.00 1.00 	Subsidence Flooding	 1.00 1.00 1.00 1.00 1.00	
Marl beds	20 	Ponding	 1.00 1.00 	Ponding	 1.00 1.00 	•	 1.00 1.00	
190794:	i	i I	i	i	i	i	i	
Emmet	60 	Not limited 	 	Not limited 	 	Not limited	 	
Leelanau] 30 I	Not limited		 Not limited 	 	Not limited	İ	
190795:	i	i I	i	İ	İ	İ	i	
Emmet	60 		 0.04	Somewhat limited Slope	 0.04	Very limited Slope	 1.00	
Leelanau	 30 	Slope	 0.04	 Somewhat limited Slope	 0.04 	 Very limited	 1.00	

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name		basements		Dwellings with bas		buildings	
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190796:	I	 	1	 	 	 	I I
Emmet						Very limited Slope	11.00
Leelanau	•		•	 Very limited Slope		 Very limited Slope	1 1.00
190797:]]] 	
Emmet		=	•	•		Very limited Slope	11.00
Leelanau						 Very limited Slope	1 1.00
190799:		 	 	 	 	 	l I
Emmet				 Very limited Slope		Very limited Slope	11.00
Leelanau	•	•		-	•	 Very limited Slope	1 1.00
190801: Emmet	 - 70 	 Not limited 	 	 Not limited 		 Very limited Slope	 1.00
Mancelona	 - 25 	 Not limited 	 	 Not limited 		 Very limited Slope	 1.00
190803: Emmet				-		 Very limited Slope	 1.00
Mancelona						 Very limited Slope	1 1.00
190805:		 	 	 	 	 	
Emmet	- 50 	Not limited 	 	Not limited	 	Not limited	
Omena	- 45 	Not limited	İ	Not limited 	I	Not limited	į
190806: Emmet						 Very limited Slope	 1.00
Omena	 - 45 			•	İ	 Very limited Slope	 1.00
190807:		 	 	 	 	 	
Emmet		•		Very limited Slope 		Very limited Slope	11.00
Omena	•					 Very limited Slope	11.00
190808:		 	 	 	 	 	
Emmet				Very limited Slope		Very limited Slope	11.00
Omena	- 45 	•				 Very limited Slope	1 1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

		Dwellings witho basements	ut	Dwellings with basements		, Small commerci buildings	ial
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	<u> </u>
100000	!	!	!	<u> </u>	!	!	!
190809: Emmet	•	 Very limited	!	 Very limited	1	 Very limited	1
Little C		· =		·		Slope	11.00
	i		i		I		i
Omena	45			·		Very limited	1
	!	Slope	11.00	Slope	11.00	Slope	11.00
190811:	 	 	!	 	1	 	1
Hettinger	45	Very limited	i	Very limited	i	 Very limited	i
	I	Ponding	1.00	Ponding	1.00	Ponding	11.00
	I	·		· =		Depth to	1.00
		saturated zone	!	saturated zone	!	saturated zone	1
Muck	I I 30	l Verv limited	!	 Very limited	<u> </u>	 Very limited	1
114011		· =		·		Ponding	11.00
		-		-		Subsidence	11.00
	I	Depth to	1.00	Depth to	1.00	Depth to	11.00
	!	saturated zone	!	saturated zone	1	saturated zone	1
190812:	 	 	!	 		 	1
Hettinger	' 45	 Very limited	i	 Very limited	i	 Very limited	i
-	İ	· =		· -	11.00	Ponding	11.00
	I	•	•	· =		Depth to	11.00
	!	saturated zone	1	saturated zone	!	saturated zone	1
Tonkey	1 3N	 Very limited	1	 Very limited	1	 Very limited	1
Tollkey		· =		·		Ponding	11.00
	i	-		-		Depth to	11.00
	I	saturated zone	I	saturated zone	I	saturated zone	1
190814:		<u> </u>	1	<u> </u>	!		1
Kalkaska	ı I 85	 Not limited	i	 Not limited	i	 Not limited	<u> </u>
			i		i		i
190815:	l	l	I	l	1	l	1
Kalkaska						•	
	 	Slope	10.04	Slope	10.04	Slope	11.00
190816:	! 	! 	i	! 	i	! 	i
Kalkaska	90	 Very limited	i	 Very limited	i	Very limited	i
	I	Slope	1.00	Slope	1.00	Slope	1.00
190817:			!		1		
Kalkaska	I I 90	 Very limited	1	 Very limited	1	 Very limited	1
		· =		_		Slope	11.00
	I	I	I	I	I	I	1
190818:		<u> </u>	1	<u> </u>	1	<u> </u>	ļ
Kalkaska	90	•		Very limited		Very limited	 1.00
	! 	Slope	1	Slope 	11.00	Slope 	11.00
190819:	i	I	i	I	i	I	i
Kalkaska	55	Not limited	I	Not limited	I	Not limited	1
Foot Tobo		 Not limit-3	1	 Not limit-1	1	 Not limited	1
East Lake	პ5 	Not limited	1	Not limited	1	Not limited	1
190820:	İ		i		i	i I	i
Kiva	65	Not limited	I	Not limited	I	Not limited	İ
	ı	I	1	l	1	I	1
Mancelona			:	Not limited		Not limited	

Table 8.-Dwellings and Small Commercial Buildings-Continued

Map unit symbol and soil name	of	Dwellings witho		Dwellings with bas 		buildings	
	· -	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190821:	I] 	I I] 	I I] 	I I
Kiva				Somewhat limited Slope		Very limited Slope	11.00
Mancelona			•	 Somewhat limited Slope	•	 Very limited Slope	 1.00
190823:	1		1		!		1
Kiva				 Very limited Slope		 Very limited Slope	1 1.00
Mancelona		· -		 Very limited Slope		 Very limited Slope	1 1 1 00
190824: Lake beaches	 - 100	 Not rated		 Not rated	 	 Not rated	
	į	İ	İ	İ	İ	İ	į
190825: Lake bluffs	 - 100 	 Not rated 	 	 Not rated 	 	 Not rated 	
190826: Leelanau	i - 60	 Not limited	i !	 Not limited	į Į	 Not limited	!
East Lake	 - 30	 Not limited		 Not limited		 Not limited	
190827:	<u> </u>	I 	i	! 		! 	
Leelanau				Somewhat limited Slope		Very limited Slope	11.00
East Lake		 Somewhat limited Slope		 Somewhat limited Slope		 Very limited Slope	11.00
190828:	i	! 	i	! 	i	! 	i
Leelanau		· -		Very limited Slope 		Very limited Slope 	11.00
East Lake		· -		Very limited Slope		Very limited Slope	11.00
190829:	i	' 	i	i I	i	i I	i
Leelanau		· -		Very limited Slope 		Very limited Slope 	11.00
East Lake	- i 35 I	Very limited Slope	 1.00	 Very limited Slope	 1.00	 Very limited Slope	 1.00
190830:		 	 	 	 	 	1
Leelanau	- i 50	Very limited Slope		Very limited Slope		Very limited Slope	11.00
East Lake	 - 35 	 Very limited Slope		 Very limited Slope		 Very limited Slope	1
190831:		 	 	 	 	 	1
Lupton	- i 60	_		Very limited		Very limited	į
	1	Ponding		Ponding		Ponding Subsidence	11.00
	1	Subsidence Depth to	11.00	Subsidence Depth to	1.00	Subsidence Depth to	1.00 1.00
	i	Depth to saturated zone	11.00 I	=	1.00 	_	1
	i	Organic matter	•	Organic matter	•	Organic matter	11.00
	1	content	I	content	1	content	1

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of	basements		 Dwellings with bas 		buildings	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190831: Markey	 - 30 	Ponding Subsidence	1.00 1.00 1.00	Ponding Subsidence	1.00 1.00 1.00	•	 1.00 1.00 1.00
190832: Mancelona	 - 90	 Not limited	 	 Not limited	 	 Not limited	!
190833: Mancelona	 90 	•		 Somewhat limited Slope 		 Very limited Slope 	 1.00
190834: Mancelona	i - 60	 Not limited		 Not limited		 Not limited	!
East Lake	 30 	 Not limited 	 	 Not limited 	 	 Not limited 	
190835: Mancelona	 55 			 Somewhat limited Slope		 Very limited Slope	 1.00
East Lake	· 35 	•	•			 Very limited Slope	 1.00
190836: Mancelona	 50 	•		 Very limited Slope		 Very limited Slope	 1.00
East Lake	 - 30 	•		•		 Very limited Slope	 1.00
190837: Mancelona	 45 	· =		 Very limited Slope		 Very limited Slope	 1.00
East Lake	 30 	. =	•	-		 Very limited Slope	1 1 1 00
190838: Mancelona	 50 	•	•	-		 Very limited Slope	 1.00
East Lake	 30 	=	 1.00	 Very limited Slope	 1.00	 Very limited Slope	 1.00
190839: Mancelona	 70	 Not limited	 	 Not limited	 	 Not limited	
Richter	 25 	· =	 1.00 	 Very limited Depth to saturated zone	 1.00 	 Very limited Depth to saturated zone	 1.00
190840: Nester	 - 90 	•	 0.50	 - Somewhat limited Shrink-swell 	 0.50	 Somewhat limited Shrink-swell 	 0.50
190841: Nester	 - 90 	Slope	 0.50 0.04	•	 0.50 0.04	•	 1.00 0.50

Table 8.-Dwellings and Small Commercial Buildings-Continued

Map unit symbol and soil name	Pct. of	basements		Dwellings with bas		buildings	
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190842: Nester	 - 90 	Slope	11.00	Slope	11.00	 Very limited Slope Shrink-swell	 1.00 0.50
190843: Nester		Slope		Slope	1.00	 Very limited Slope Shrink-swell	 1.00 0.50
190844: Nester	 - 90 	Slope		Slope	11.00	 Very limited Slope Shrink-swell	 1.00 0.50
190846: Pits, gravel	 - 100	 Not rated	 	 Not rated	 	 Not rated	
190847: Richter		 Very limited Depth to saturated zone	11.00	:		 Very limited Depth to saturated zone	 1.00
Alcona	 - 40	 Not limited		 Not limited	 	 Not limited	
190848: Richter	 - 45 	 Very limited Depth to saturated zone	11.00	 Very limited Depth to saturated zone	11.00	 Very limited Depth to saturated zone	 1.00
Alcona	 - 40	 Not limited	 	 Not limited 	 	 Not limited 	
190849: Roscommon	 - 50 	Ponding	1.00 1.00	Ponding Depth to	1.00 1.00	•	 1.00 1.00
Markey	•	Ponding Subsidence	1.00 1.00 1.00	Ponding Subsidence	1.00 1.00 1.00	Subsidence	 1.00 1.00 1.00
190850: Sanilac	 - 90 	-	 1.00 1.00	-	 1.00 1.00	•	 1.00 1.00
190851: Tonkey	 - 40 	-	 1.00 1.00	-	 1.00 1.00	•	 1.00 1.00
Munuscong	 - 25 	-	 1.00 1.00 0.57	Depth to saturated zone	 1.00 1.00 0.99	Depth to saturated zone	 1.00 1.00 0.57

Table 8.—Dwellings and Small Commercial Buildings—Continued

		 I				 I	
	 Pct. of		ut	 Dwellings with bas 	ements	Small commerci buildings	.al
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190851: Iosco	•	· =	11.00	Depth to	11.00	saturated zone	 1.00
190852: Tonkey		Ponding	11.00	Depth to	11.00	 Very limited Ponding Depth to saturated zone	 1.00 1.00
Munuscong	 30 	Ponding Depth to saturated zone	1.00 1.00	Depth to saturated zone	1.00 1.00 	 Very limited Ponding Depth to saturated zone Shrink-swell	 1.00 1.00
Iosco		· =	11.00	 Very limited Depth to	İ I	 Very limited Depth to saturated zone	 1.00
190853: Water	 100	 Not rated 	 	 Not rated 	 	 Not rated 	
190854: Wallace	 50 	 Not limited 	i ! !	 Not limited 	 	 Somewhat limited Slope	 0.88
Kalkaska	 45 	 Not limited 	 	 Not limited 	 	 Somewhat limited Slope	 0.88
190855: Wind eroded land	 100 	 Not limited 	 	 Not limited 	 	 Somewhat limited Slope 	 0.50
190856: Wind eroded land	 100 	•	1 1.00	 Very limited Slope	1 1.00	 Very limited Slope	 1.00
193236: Beaches	 100	 Not rated 		 Not rated 	 	 Not rated 	
193237: Thompsonville	 50 		 0.98	 Very limited Depth to saturated zone	1 1.00	 Somewhat limited Depth to saturated zone	 0.98
Milnichol	 40 	· =	 1.00	 Very limited Depth to saturated zone	 1.00	 Very limited Depth to saturated zone	 1.00
193255: Spinks	 50	 Not limited 	 	 Not limited 	 	 Not limited 	
Coloma	40 	Not limited 	i I	Not limited	 	Not limited	

Table 8.-Dwellings and Small Commercial Buildings-Continued

Map unit symbol and soil name	Pct. of	basements		Dwellings with bas		buildings	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193256: Spinks			 0.04			 Very limited Slope	 1.00
Coloma	 40 	•	•	 Somewhat limited Slope		 Very limited Slope	 1.00
193257: Spinks		· =	•	· -		 Very limited Slope	 1.00
Coloma		· =		· -		 Very limited Slope	 1.00
193258: Spinks		· =		 Very limited Slope		 Very limited Slope	1 1.00
Coloma		•	•	· -		 Very limited Slope 	11.00
193260: Copemish	 95 	 Not limited 	! 	 Not limited 		 	 1.00
193262: Kaleva	 95	 Not limited	 	 Not limited	 	 Not limited	
193263: Kaleva			 0.04	 Somewhat limited Slope		 Very limited Slope 	 1.00
193265: Grattan	 - 95	 Not limited	 	 Not limited		, Not limited	;
193266: Grattan	 - 95 	•	•	•		 Very limited Slope 	 1.00
193267: Grattan	 95 	•		· -		 Very limited Slope	 1.00
193269: Grattan	 95 	•		 Very limited Slope		 Very limited Slope	 1.00
193270: Covert	 		 0.39 	 Very limited Depth to saturated zone	 1.00	 Somewhat limited Depth to saturated zone	 0.39
193271: Pipestone	 	=		 Very limited Depth to saturated zone		 Very limited Depth to saturated zone	 1.00
193272: Dair	 90 	Ponding		_	11.00	 Very limited Ponding Depth to saturated zone	 1.00 1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

		 I				 I	
Map unit symbol and soil name	 Pct. of	, , , , , , , , , , , , , , , , , , , ,	ut	 Dwellings with bas 	ements	Small commerci buildings	al
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
	Ī	<u> </u>	Ī	l	Ī	i	ī
193277: Benona	 90 	 Not limited 	 	 Not limited	 	 Not limited 	
193278:	i		i		i		i
Benona	90 		 0.04	Somewhat limited Slope	 0.04	Very limited Slope	11.00
193279:	i		i	i I	i	! 	i
Benona	90 	•	 1.00	Very limited Slope	 1.00	Very limited Slope	11.00
193284:	 	! 	<u> </u>	! 	;	! 	<u> </u>
Udorthents	55 	•	11.00	Very limited Slope	11.00	Very limited Slope	11.00
Udipsamments	I I 35	 Verv limited	<u> </u>	 Very limited		 Very limited	
		•	1.00	· -	11.00		1.00
193285:	 	 	1]]	1	 	1
Lumley	55	 Very limited	i	 Very limited	i	 Very limited	i
	I	Ponding	1.00	Ponding	1.00	Ponding	11.00
	1	•	11.00	·	11.00	•	11.00
	!	•	11.00	· <u>-</u>	11.00	•	11.00
	!	saturated zone Organic matter	 1.00	saturated zone Organic matter	1	saturated zone Organic matter	1
	i	content	1	content	1	content	1
Makinen	l I 40	 Verv limited	 	 Very limited	 	 Very limited	
	i	•	11.00	_	11.00	_	11.00
	İ	Subsidence	11.00	Subsidence	11.00	Subsidence	11.00
	I	Depth to	1.00	Depth to	1.00	Depth to	11.00
	I	saturated zone	1	saturated zone	1	saturated zone	1
	 	Organic matter content	1.00 	 	 	Organic matter content	1.00
193286:	1	 	1	 	 	 	1
Histosols	55	Very limited	i	Very limited	i	Very limited	i
	I	•	1.00	•	1.00	Ponding	1.00
	!	•	11.00	·	1.00	•	1.00
	!	•	11.00	Depth to saturated zone	11.00	· •	1.00
	!	saturated zone Organic matter	11.00		1	saturated zone Organic matter	11.00
	į	content			į	content	
Aquents	 45	 Very limited		 Very limited	 	 Very limited	
	I	-	1.00	-	1.00	Ponding	1.00
	I	· •	1.00	· •	1.00	•	1.00
	 	saturated zone	 	saturated zone	 	saturated zone	
193287:	İ	i İ	İ	İ	i	İ	İ
Dune land	55	Not rated	1	Not rated	1	Not rated	1
Quartzipsamments	I I 40	 Verv limited	1	 Very limited	1	 Very limited	1
2 F	1	=	1.00	_	1.00	_	1.00
193288:	 	 	 	 	 	 	
Udipsamments	100	Not limited	I	Not limited	I	Not limited	1
	I	l	I	I	I	I	I

Table 8.-Dwellings and Small Commercial Buildings-Continued

and soil name	 Pct. of	basements		 Dwellings with bas 		buildings	
		Rating class and limiting features	•	Rating class and limiting features	•	Rating class and limiting features	
193342:	l I]	I	 	l I	 	Ī
Gorvan	1 25	l Nort limited	i	 Very limited	:	 Very limited	:
GOLVAII	1 22	· =		-		·	11.00
	!	-		-		· -	•
	!	·		·			1.00
		Depth to saturated zone		-	1.00 	Depth to saturated zone	1.00
Houghton	1 30	 Very limited		 Very limited	 	 Very limited	
noughton	1 20	· =		-	•		11.00
			11.00	-	11.00		11.00
	!	•					
	!	·		·		· -	1.00
	!	·		-			11.00
	!	saturated zone				•	
		Organic matter content	1.00 		1.00 	Organic matter content	1.00
Clandana	I 20	 	1	 		 	1
Glendora	1 20	· =		-		Very limited	1 00
	!			-			1.00
	!	·		·		· -	1.00
	 	Depth to saturated zone		· -	1.00 	Depth to saturated zone	11.00
	i		i		i		i
193349:			!		ļ		!
Spinks			•	Very limited	•	Very limited	
	 	Slope 	1.00 	Slope 	1.00 	Slope 	1.00
Coloma	40	' Very limited	i	' Very limited	i	 Very limited	i
		Slope	11.00	Slope	11.00	Slope	11.00
193351:	 	 	 	 	 	 	I
Benona	I 95	Verv limited	i	' Very limited	i	 Very limited	i
20		· =		-		Slope	11.00
193354:	 	 	1	 	1	İ	I
Dune land	I 50	 Not rated	i	 Not rated	i	 Not rated	i
	I	I	i	İ	i	I	i
Quartzipsamments	40 			Somewhat limited Slope		Very limited Slope	 1.00
	i		1		1		1
193357: Shavenaugh	 0F	 Very limited		 Very limited	 	 Very limited	1
Silavellaugii	65	· =		·		Very limited Slope	1
	ļ.	!	ļ.	! - :	ļ	! - !	ļ
193359:		<u> </u>	1	<u> </u>	1	<u> </u>	1
Shavenaugh	85 		 0.04	Somewhat limited Slope	 0.04	Very limited Slope	 1.00
	i	 	1	 		 	1
193360:	I	I	I	I	I	I	1
Shavenaugh	85 	Not limited	1	Not limited	1	Not limited	1
193362:	i	' 	i	! 	i	! 	i
Benzonia	90	Very limited	I	Very limited	I	Very limited	1
	İ	Slope	11.00	Slope	11.00	-	11.00
193363:	 	 	 	 	l I	 	1
Benzonia	I 90	Verv limited	i	' Very limited	i	 Very limited	i
2011201114		•	1.00	-	1.00	·	11.00
193364:		 -		 -	 	 -	1
193364: Benzonia	i an	 Somewhat limited		 Somewhat limited		 Very limited	1
De11701170	1 90	LOOWEMITOR TIMITURG	1	LOOWEMITOR TIMITURE	1	1 ACTA TIMITION	1
	1	Slope	0.04	Slope	0.04	Slope	11.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

and soil name		basements		Dwellings with bas 		buildings	
	-	Rating class and		-		•	
	l	limiting features	<u> </u>	limiting features	 	limiting features	
193365: Benzonia	 90 	' Not limited 	 	 Not limited 	i 	, Not limited 	; ! !
193371: Dair	 50 	Ponding	1.00 1.00	-	1.00 1.00	 Very limited Ponding Depth to saturated zone	 1.00 1.00
Pipestone	40 	· =	11.00	-	11.00	 Very limited Depth to saturated zone 	 1.00
193372: Access Denied	 100	 Not rated 	 	 Not rated 	 	 Not rated 	
193423: Benona	 95 	· =		•	1 1.00	 Very limited Slope	 1.00
193484: Pits, sand and gravel	 100	 - Not rated 	 	 	 	 Not rated 	
193494: Nordhouse	 100 	· =		•		 Very limited Slope 	 1.00
193496: Nordhouse	 95 		 0.63	 Somewhat limited Slope	 0.63	 Very limited Slope	 1.00
193497: Nordhouse	 95 	 Not limited 	 	 Not limited 	 	 Not limited 	
193498: Nordhouse	 40 	 Not limited 	 	 Not limited 	 	 Not limited 	;
Platteriver	35 	 Somewhat limited Depth to saturated zone	0.98		11.00	Somewhat limited Depth to saturated zone	 0.98
Dair	 25 	Ponding	 1.00 1.00		 1.00 1.00	=	 1.00 1.00
193503: Spinks	 50	 Not limited 	 	 Not limited 	 	 Not limited 	
Shavenaugh	40	Not limited	i	 Not limited	i	 Not limited	i
193504: Spinks	 50 		 0.04	 Somewhat limited Slope	 0.04	 Very limited Slope	 1.00
Shavenaugh		Slope	 0.04 	 Somewhat limited Slope 	 0.04 	 Very limited Slope 	 1.00

Table 8.-Dwellings and Small Commercial Buildings-Continued

and soil name		basements		Dwellings with bas 		buildings	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
	Ī	<u> </u>	i	I	i	I	i
193505: Spinks		· -		 Very limited Slope		 Very limited Slope	
Shavenaugh		· -		 Very limited Slope 	•	 Very limited Slope 	11.00
193506: Spinks		=		 Very limited Slope		 Very limited Slope	 1.00
Shavenaugh		· -		 Very limited Slope		 Very limited Slope	11.00
193507:	i	! 	i	! 	i	! 	i
Spinks				Very limited Slope		Very limited Slope	11.00
Shavenaugh		· -		 Very limited Slope 		 Very limited Slope 	 1.00
193508: Madaus		Ponding	1.00 1.00	Ponding	1.00 1.00	 Very limited Ponding Depth to saturated zone	 1.00 1.00
193509:	i	i I	i	 	i	i I	i
Boyer	50 	Not limited		Not limited	 	Not limited	1
Shavenaugh	40 	 Not limited 	i	 Not limited 	i I	 Not limited 	i
193510:		l	!	l	!	l	1
Boyer				Somewhat limited Slope 		Very limited Slope 	1 1.00
Shavenaugh			•	Somewhat limited Slope		Very limited Slope	1 1.00
193511:	i	İ	i	İ	i	İ	i
Boyer		· -		-		Very limited Slope 	11.00
Shavenaugh	40 	Very limited Slope	11.00	Very limited Slope	11.00	Very limited Slope	11.00
193513:		! 		! 	i	! 	i
Dair	50 	Very limited Ponding Depth to saturated zone	 1.00 1.00	-	 1.00 1.00	•	 1.00 1.00
Adrian	 45 	 Very limited Ponding Subsidence Depth to saturated zone Organic matter	 1.00 1.00 1.00 	Subsidence Depth to saturated zone	 1.00 1.00 1.00	Subsidence	 1.00 1.00 1.00
	 	content		 -	į	content	

Table 8.—Dwellings and Small Commercial Buildings—Continued

		basements		, Dwellings with bas 		buildings	al
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	1	limiting features	<u> </u>	limiting features	1
	I	I	I	I	1	I	1
193514:	!	<u> </u>	!	<u> </u>	1	!	1
Platteriver	55			·	•	Somewhat limited	
	!	Depth to		=		Depth to	10.98
	!	saturated zone	!	saturated zone	1	saturated zone	1
Pipestone	1 40	 Very limited	i	 Very limited	<u> </u>	 Very limited	1
ripescone	1 -20	-	•		•	Depth to	11.00
	i	saturated zone		saturated zone		saturated zone	1
	i		i		i	1	i
202010:	i	i i	i	i i	i	i	i
Houghton	55	Very limited	i	Very limited	i	Very limited	i
	I	Ponding	1.00	Ponding	1.00	Ponding	11.00
	I	Subsidence	1.00	Subsidence	1.00	Subsidence	11.00
	I	Depth to	1.00	Depth to	1.00	Depth to	11.00
	I			saturated zone			1
	I			Organic matter		=	1.00
	1	content	1	content	1	content	1
		l	!	l	!	1	!
Adrian		-			•	Very limited	1 00
	!	-		•		Ponding	1.00
	!		11.00		11.00	Subsidence Depth to	1.00 1.00
	!	-		Depth to saturated zone		saturated zone	11.00
	<u> </u>	Organic matter		•	i	Organic matter	11.00
	i	content	1	! 	i	content	1
	i	1	i	i I	i	1	i
202016:	i	i	i	i i	i	i	i
Spinks	50	Not limited	i	Not limited	i	Not limited	i
_	I	l	1	l	1	I	1
Tekenink, sandy	I	I	1	I	1	I	1
substratum	40	Not limited	1	Not limited	1	Not limited	1
	1	ļ.	1	<u>l</u>	1	I	1
631170:		l	!	l	!	1	!
Fogg	50	-		Very limited		Very limited	1 00
	!	Slope	11.00	Slope	11.00	Slope	1.00
Benzonia	1 40	 Very limited	!	 Very limited	<u> </u>	 Very limited	1
Delizonia		-	•			Slope	11.00
	i	l STOPE	1	l STOPE	1	5_5p5 	1
631171:	i	i İ	i	i İ	i	i	i
Fogg	50	Very limited	İ	Very limited	İ	Very limited	İ
	I	Slope	1.00	Slope	1.00	Slope	11.00
	I	I	1	I	1	I	1
Benzonia	40	_		Very limited		Very limited	1
	1	Slope	11.00	Slope	11.00	Slope	11.00
604450	!	! :	!	<u> </u>	!	!	!
631172:	1	 	!		!	 	1
Fogg	1 50	very limited Slope		Very limited		Very limited	11 00
	!	ı I 210be	11.00	Slope	11.00	Slope	11.00
Benzonia	1 40	 Very limited	i	 Very limited	i	 Very limited	i
2011201114	1	Slope		Slope		Slope	11.00
	i		1		1		1
631173:	i		i		i		i
Fogg	50	Somewhat limited	I	Somewhat limited	1	Very limited	1
	I	Slope		Slope		Slope	11.00
	I	I	I	I	I	I	1
Benzonia	40	Somewhat limited	I	Somewhat limited	I	Very limited	1
	I	Slope	0.04	Slope	0.04	Slope	11.00
	I	l	I	l	I	I	1

Table 8.-Dwellings and Small Commercial Buildings-Continued

and soil name	Pct. of	basements		Dwellings with bas		buildings	
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
631174:	I	 	1	 	I	 	I
Fogg	 50 	 Not limited 	!	 Not limited 	! !	 Not limited 	<u> </u>
Benzonia	1 40	Not limited	į į	Not limited	İ	Not limited	İ
680939: Fern	•	Depth to	0.39	•	11.00	 Somewhat limited Slope	1 10.50
	 	saturated zone Shrink-swell 	 0.01 	•	0.01	Depth to saturated zone Shrink-swell	0.39 0.01
Spinks	40 		•			 Very limited Slope 	 1.00
680943: Milnichol			11.00	· -	11.00	 Very limited Depth to saturated zone 	 1.00
680945: Fern	90 	Depth to saturated zone Slope	0.39 	Depth to saturated zone Slope	1.00 0.04	· -	 1.00 0.39 0.01
680946: Fern	 90 	Depth to saturated zone	0.39 	Depth to saturated zone	1.00 	 Somewhat limited Depth to saturated zone Shrink-swell	 0.39 0.01
680971: Nessen		•		-		 Very limited Slope	 1.00
Kaleva		· =				 Very limited Slope 	 1.00
680972: Nessen		· =			11.00	 Very limited Slope	 1.00
Kaleva	 40 	•	 1.00	·	İ	 Very limited Slope	1 1.00
680973: Nessen	 50 	Slope	0.04	:		 Very limited Slope	11.00
Kaleva	 40 	Somewhat limited	 0.04	Somewhat limited	i	 Very limited Slope	1 1 1 1 1 1 1 1 1 1
680974: Nessen	 50	 Not limited 	 	 Not limited 	 	 Not limited 	
Kaleva	40	 Not limited	i	 Not limited	İ	 Not limited	

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name		Dwellings witho	ut	Dwellings with bas 	ements	Small commerci buildings	ial
	-	Rating class and		-		•	
	lunit	limiting features	!	limiting features	!	limiting features	<u> </u>
893251:	!	 		 		 	1
Boyer	·I 50	 Verv limited	i	 Very limited	i	 Very limited	i
,,-		•				Slope	11.00
	I	I -	I	I	1	I	I
Shavenaugh		•		Very limited		Very limited	1
	!	Slope	1.00	Slope	1.00	Slope	1.00
894062:	1	 	!	 	1	 	1
Remus	50	Very limited	i	Very limited	i	 Very limited	i
	I					Slope	11.00
	1	Shrink-swell	0.01	Shrink-swell	10.09	Shrink-swell	0.01
On in lan	1 40		!		!		!
Spinks		•		Very limited Slope		Very limited Slope	11.00
	i	l Siope	1	l Siope	1	Siope	1
894063:	1	I	I	l	I	I	1
Remus		•		Very limited		Very limited	1
	!					Slope	1.00
	1	Shrink-swell	10.01	Shrink-swell	10.09	Shrink-swell	10.01
Spinks	1 40	 Very limited	i	 Very limited	i	 Very limited	i
-				·		Slope	11.00
	I	l	1	l	1	l	1
894064:			!		1	 	!
Fern				•		Very limited Slope	1
	i			saturated zone		-	10.39
	i					saturated zone	1
	1	Shrink-swell	0.01	Shrink-swell	0.01	Shrink-swell	0.01
_			!		1		!
Remus	1 40					Very limited Slope	1
	i	•	•			Shrink-swell	10.01
	i	,	i		I	 	i
894065:	1	l	1	l	1	I	1
Fern	· [50	•				Somewhat limited	1
	1	Depth to saturated zone		Depth to saturated zone		Depth to saturated zone	0.39
	i .	•		•	•	Shrink-swell	10.01
	i	,	i	,	i	 	1
Remus	40	•	•	•	•	Somewhat limited	1
	!	Shrink-swell	0.01	Shrink-swell	10.09	Shrink-swell	10.01
894104:	!	 	!	 	1	 	1
Mollineaux	·I 50	 Verv limited	i	 Very limited	i	 Very limited	i
		_		_		Slope	11.00
	1	l	1	l	1	I	1
Remus	40	•		Very limited		Very limited	
	!	=	1.00 0.01	=	1.00 0.09	•	1.00 0.01
	i	SHITHE SWELL	U.U.	SHITHE SWELL		SHITTHE SWELL	1
894105:	İ	I	I	I	I	I	İ
Mollineaux		_		Very limited		Very limited	1
	1	Slope	11.00	Slope	11.00	Slope	1.00
Remus	I I 40	 Very limited	1	 Very limited	1	 Very limited	1
T-CMUS	40	=	11.00	_	11.00	_	11.00
	İ	=		Shrink-swell	0.09	_	0.01
	1	I.	1	I	1	İ	İ

Table 8.-Dwellings and Small Commercial Buildings-Continued

	Pct. Of		ut	Dwellings with bas 	ements	, Small commerci buildings	al
		Rating class and limiting features	•	Rating class and limiting features	•	Rating class and limiting features	•
894165: Spinks	 50 		 1.00	 Very limited Slope 	•	 Very limited Slope 	 1.00
Tekenink, sandy substratum	 40 	•	 1.00	 Very limited Slope 	 1.00	 Very limited Slope 	 1.00
899682: Kaleva				• •	 1.00	 Very limited Slope 	 1.00
899722: Goodharbor	 90 	 Not limited 	 	 Not limited 	 	 Somewhat limited Slope 	 0.50
899731: Covert	 50 	 Somewhat limited Depth to saturated zone	0.39	 Very limited Depth to saturated zone	•	 Somewhat limited Depth to saturated zone	 0.39
Pipestone	 40 	 Very limited Depth to saturated zone 	11.00	 Very limited Depth to saturated zone 	 1.00 	 Very limited Depth to saturated zone 	 1.00
899733: Covert	 50 		10.39	 Very limited Depth to saturated zone	11.00	 Somewhat limited Depth to saturated zone	 0.39
Dair	 45 	Ponding	1.00 1.00	Ponding	 1.00 1.00	,	 1.00 1.00
899734: Benzonia	 90 	-	 1.00	· <u>-</u>	 1.00	 Very limited Slope 	 1.00

Table 9.-Roads and Streets, Shallow Excavations, and Landscaping

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

	 Pct. of	streets		 Shallow excavati 		 Landscaping 	
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190775:	 	 	1	 	1	 	I
Adrian	55 	Ponding Depth to saturated zone	1.00 1.00 	Ponding Depth to saturated zone	1.00 1.00 		
	 			Dusty	0.01 0.01		0.01
Houghton	 	Ponding Depth to saturated zone Subsidence Frost action	1.00 1.00 1.00 1.00	Ponding Depth to saturated zone Organic matter content Dusty	1.00 1.00 1.00 1.00 0.01	Dusty 	 1.00 1.00 0.01
190777: Alcona	 55 	•	•	Depth to saturated zone	0.47 0.01	İ	
Richter	 30 	Frost action	1.00 0.99 	Depth to saturated zone Unstable excavation walls	1.00 0.01	Dusty 	 0.99 0.01
190778: Alcona	 65 	•		Depth to saturated zone	0.47 0.01	İ	
Richter	25 			saturated zone Unstable excavation walls	1.00 0.01	Dusty 	 0.99 0.01
190779: Alpena	90 	 Not limited 	 	 Very limited Unstable excavation walls 	11.00	 Very limited Droughty Gravel content 	 1.00 0.36

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

		 Local roads an streets	d	, Shallow excavation	ons	 Landscaping 	
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	lunit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	1
100700	!	<u> </u>	!	<u> </u>	!	 -	1
190780: Au Gres	•	 Somewhat limited	!	 Very limited	l I	 Somewhat limited	1
Au Gres				Depth to			10.99
	i .	saturated zone		saturated zone		-	•
	i	•					10.51
	i	I	İ				10.50
	İ	Ì	İ	Ì	ĺ	<u>-</u>	Ì
Kalkaska	35	Not limited	I	Very limited	I	Somewhat limited	1
	I	I	I	Unstable	1.00	Droughty	10.80
	I	I	I	excavation walls	l	Too sandy	10.50
	1	Į.	1	<u>I</u>	l	ļ	1
190781:		!	!	<u> </u>	!	<u> </u>	
Bach		· -		· -		Very limited	1 00
	!	-		-			1.00
	!	Depth to saturated zone		Depth to saturated zone		Depth to	1.00
		•				Dusty	10.01
	i .	l Trose acción	•	excavation walls	•	l Dascy	1
	i	i	•	•	0.01	i İ	i
	i	i	i	, <u>,</u>	, <u></u>	i i	i
190782:	i	İ	i	i	i İ	i İ	i
Deer Park	100	Somewhat limited	I	Very limited	I	Very limited	1
	I	Slope	10.63	Unstable	1.00	Droughty	11.00
	I	I	I	excavation walls	l	Slope	10.63
	I	I	I	Slope	0.63	Too sandy	10.50
	!	!	!	!	!	<u> </u>	1
190783:	1 100	 	!	 	!		!
Deer Park		· -				Very limited	11 00
	!	Slope	•	-		Slope Droughty	1.00 1.00
		! !		excavation walls			10.50
	i .	I	i	l excavacion waiis	' 	l 100 Sandy	1
190784:	i	i	i	i	i i	i i	i
Deer Park	70	Not limited	i			Very limited	i
	I	l	I	Unstable	1.00	Droughty	11.00
	I	I	I	excavation walls	l	Too sandy	10.50
	I	I	I	I	l	I	1
Roscommon		· -	•	· -		Very limited	
	!	•		-			1.00
	!	Depth to saturated zone	•		•	· •	11.00
	!			saturated zone Unstable			10.50
	;	l Flost action	10.50	excavation walls	•	Droughty	10.37
	i	i i	i	l excavación waiis		l Droughey	10.57
190786:	i	i i	i	i I	i	i I	i
Dune land	100	Not rated	i	Not rated	i i	Not rated	i
	i	İ	i	İ	İ	i I	i
190787:	1	I	I	I	I	I	1
East Lake	90	Not limited	I	Somewhat limited	I	Somewhat limited	1
	I	I	I	•	0.96	Droughty	0.44
	!	!	!	excavation walls	l	Large stones	10.03
	!	! :	!	<u> </u>	!	content	1
100700	!		!		l	1	1
190788:	1 00	 Companies Timited		 Comprehe limited	l I	 Companies Timited	1
East Lake	ו פע ו	•	I I0.04	Somewhat limited Unstable		Somewhat limited Droughty	10.44
		Slope	10.04 I	Unstable excavation walls			10.44
	1	! !	1	•	•	Large stones	10.04
	 	! 	i	l stope	0.0 1 	content	10.03

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

Map unit symbol and soil name	Pct. Of	streets		Shallow excavation		Landscaping 	
	-	-		Rating class and limiting features		Rating class and limiting features	
190789: East Lake		•	 1.00 	Slope	1.00 0.96	Droughty	 1.00 0.44 0.03
190790: East Lake	 90 	•	 1.00 	Slope	1.00 0.96	Droughty	 1.00 0.44 0.03
190791: Eastport	 93 	 Not limited 	 	 Very limited Unstable excavation walls	11.00		 0.85 0.50
190792: Edwards	 	Ponding Depth to saturated zone Subsidence Frost action	1.00 1.00	Ponding Depth to saturated zone Too clayey Flooding	1.00 1.00 1.00 0.80	Flooding Organic matter content	
Marl beds	20 	Ponding Depth to saturated zone Frost action	1.00 1.00 1.00	Ponding Depth to saturated zone Dusty	1.00 1.00 0.03 0.01	Depth to saturated zone Carbonate content	•
190794: Emmet	 60 	•	 0.50 	excavation walls	0.01	i -	 0.01
Leelanau	 30 	 Not limited 	 	 Somewhat limited Unstable excavation walls 	0.01		 0.17 0.03
190795: Emmet	 60 	Frost action	 0.50 0.04 	Unstable excavation walls Dusty	0.04 0.01 0.01	Dusty 	 0.04 0.01
Leelanau	30 		 0.04 	Somewhat limited Slope	0.04	Slope	 0.17 0.04 0.03

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

and soil name	of	•		 Shallow excavation		 Landscaping 	
	_	=		Rating class and limiting features		=	
190796:	 	I I	 	 	l I	I	
Emmet	50	Very limited	I	Very limited	I	Very limited	1
	I	Slope	1.00	Slope	1.00	Slope	1.00
	1	Frost action	10.50	Unstable	0.01	Dusty	0.01
	1	l	1	excavation walls	I	l	1
	I	I	I	Dusty	0.01	l	1
	I	I	1	I	I	I	1
Leelanau		· =		• •	•	Very limited	1
	!	Slope				Slope	11.00
	!	<u> </u>	!	Unstable			10.17
	 	 	 	excavation walls	•	Large stones content	0.03
	į	İ	į	į	į		į
190797:	I =0		!		!		!
Emmet		· =				Very limited	11 00
	!			-		Slope Dusty	10.01
	!	rrost action	10.50	Unstable excavation walls	•	l Dusty	10.01
	!	I I			1 0.01	I I	
	:	! 	i	•	I 0.01	! 	i .
Leelanau	I 30	' Verv limited	i	•	•	 Very limited	i
		· -		· -		Slope	11.00
	i	I	i			Droughty	0.17
	i	I	i	excavation walls			0.03
	İ	l	ĺ	İ	ĺ	content	İ
00700	!		!	<u> </u>	l		I
190799: Emmet	I I 15	 Very limited	!	 Very limited	! !	 Very limited	
Litatie C	1 43	· =		· -		Slope	11.00
	i			-		Dusty	10.01
	i	l	1	excavation walls		l Dascy	10.01
	i	' 	i	•	0.01	' 	i
_		<u> </u>	1		I	<u> </u>	1
Leelanau		_		Very limited		_	
	!	Slope				Slope	1.00
	!		!			Droughty	10.17
	!] 	!	excavation walls	! !	Large stones content	10.03
	i	! 	i	! 	! 		i
190801:	İ	l	İ	ĺ	ĺ	l	İ
Emmet	70		•	Somewhat limited	•	•	
	!	Frost action	10.50	Unstable			10.12
	!	 	!	excavation walls	•	Dusty	[0.01
	!	 	:	Dusty 	0.01 	 	1
Mancelona	25	' Not limited	i	Somewhat limited	i I	Somewhat limited	i
	i	I	i			Droughty	0.34
	İ	I	Ì	excavation walls	ĺ	Gravel content	10.26
190803:		 	!			 	1
Emmet	ı I 60	ı Verv limited	i	 Very limited	! !	 Very limited	i
	1		11.00			Slope	11.00
	i	•	10.50	-		Gravel content	0.12
	I	I	I	excavation walls		Dusty	0.01
	i	İ	İ		0.01	· -	i
W1		 	!	•	l	 	1
Mancelona	1 30		•			Very limited	I I1 00
	1	Slope	11.00		11.00	=	11.00
	I	I	1		0.71	·	10.34
	1	I	1	<pre> excavation walls</pre>	1	Gravel content	10.26

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

Map unit symbol and soil name	Pct.	•	d	, Shallow excavation	ons	 Landscaping 	
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190805: Emmet	•	•	 0.50 	Unstable excavation walls	0.01	 Somewhat limited Dusty 	 0.01
Omena	•		•	Somewhat limited Unstable excavation walls	0.01	 Somewhat limited Dusty 	 0.01
190806: Emmet	 50 	Frost action	0.50	Slope Unstable excavation walls	0.04 0.01	 Somewhat limited Slope Dusty 	 0.04 0.01
Omena	 45 	Frost action	0.50	 Somewhat limited Slope Unstable excavation walls	 0.04 0.01	Slope Dusty 	 0.04 0.01
190807: Emmet	 50 1 	Slope	 1.00 0.50 	Slope Unstable excavation walls	1.00 0.01	•	 1.00 0.01
Omena	 45 	Slope	11.00	Slope Unstable excavation walls	1.00 0.01	 Very limited Slope Dusty 	 1.00 0.01
190808: Emmet	 50 	Slope	1.00 0.50 	Slope Unstable excavation walls Dusty	1.00 0.01 0.01	•	 1.00 0.01
Omena	 45 	Slope		Slope Unstable excavation walls	 1.00 0.01	 Very limited Slope Dusty 	 1.00 0.01
190809: Emmet	 50 	Slope	11.00	Slope Unstable excavation walls Dusty	1.00 0.01 0.01	•	 1.00 0.01
Omena	 45 	Slope	 1.00 0.50 	Very limited Slope Unstable excavation walls Dusty	1.00 0.01 0.01	•	 1.00 0.01

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

and soil name	Pct. of	streets		Shallow excavation		Landscaping	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190811:	 	 	 	 	 	 	
Hettinger	45	Very limited	I	Very limited	l	Very limited	1
	1	Ponding	1.00	Ponding	1.00	Ponding	1.00
	1	Depth to	1.00	Depth to	1.00	Depth to	1.00
	1	saturated zone	1	saturated zone	l	saturated zone	1
	I				•	Dusty	10.02
	 	Low strength 	1.00 	Unstable excavation walls	0.01 	 	
Muck	 30	 Very limited	 	 Very limited	 	 Very limited	
	i	· =		· -		· =	11.00
	i			-		•	11.00
	i	saturated zone		saturated zone			i
	i	 Subsidence	11.00			Depth to	11.00
	i	Frost action	11.00			saturated zone	i
	į	 -	İ	Dusty	0.01	Dusty	0.01
190812:		 		 	! !	 	
Hettinger		· =		•	•	Very limited	1 00
	!	-		•	•		1.00
	!	·		· •	•	Depth to saturated zone	11.00
	!	•	•	saturated zone	•		•
	!			· -		•	10.02
		Low strength 	1.00 	Unstable excavation walls	0.01 	 	
Tonkey	 30	 Very limited	 	 Very limited	 	 Very limited	
	1	Ponding	11.00	Ponding	1.00	Ponding	1.00
	1	Depth to	11.00	Depth to	1.00	Depth to	1.00
	1	saturated zone	I	saturated zone	I	saturated zone	1
	1	Frost action	11.00	Unstable	0.01	Dusty	0.01
	1	I	I	excavation walls	l	I	1
	1] 	 	Dusty 	0.01 	 	1
190814: Kalkaska	 85	 Not limited	i I	 Very limited	 	 Somewhat limited	İ
Tid I Adona	1	1	i			Droughty	0.80
	į	İ	į	excavation walls		Too sandy	0.50
190815:	!	<u> </u>	ı				
	1	l	I	 	 	İ	
Kalkaska	85	•				 Somewhat limited	
	 85 	 Somewhat limited Slope		Unstable	11.00	Droughty	 0.80
	 85 	•		· -	11.00		0.50
	 85 	•		Unstable excavation walls	1.00 	Droughty	•
Kalkaska	 	Slope 	0.04 	Unstable excavation walls Slope	1.00 0.04 	Droughty Too sandy Slope	0.50
Kalkaska	 	Slope Very limited	0.04 	Unstable excavation walls Slope Very limited	1.00 0.04 	Droughty Too sandy Slope Very limited	0.50 0.04
Kalkaska	 	Slope Very limited	0.04 	Unstable excavation walls Slope Very limited Unstable	1.00 0.04 	Droughty Too sandy Slope Very limited Slope	0.50 0.04 1.00
Kalkaska	 	Slope Very limited	0.04 	Unstable excavation walls Slope Very limited Unstable excavation walls	1.00 0.04 	Droughty Too sandy Slope Very limited Slope Droughty	0.50 0.04
Kalkaska 190816: Kalkaska	 90 	Slope - - Wery limited Slope - -	0.04 1.00 	Unstable excavation walls Slope Very limited Unstable excavation walls Slope	1.00 0.04 1.00 1.00	Droughty Too sandy Slope Very limited Slope Droughty Too sandy	0.50 0.04 1.00 0.80
Kalkaska 190816: Kalkaska	 90 	Slope - - Very limited Slope - - -	0.04 1.00 	Unstable excavation walls Slope Very limited Unstable excavation walls Slope 	1.00 0.04 1.00 1.00	Droughty Too sandy Slope Very limited Slope Droughty Too sandy 	0.50 0.04
Kalkaska 190816: Kalkaska	 90 	Slope - - Wery limited Slope - -	0.04 1.00 	Unstable excavation walls Slope Very limited Unstable excavation walls Slope Very limited Slope	1.00 	Droughty Too sandy Slope Very limited Slope Droughty Too sandy Very limited Slope	0.50 0.04 1 1 1.00 0.80 0.50 1 1
Kalkaska 190816: Kalkaska	 90 	Slope - - Very limited Slope - - -	0.04 1.00 	Unstable excavation walls Slope Very limited Unstable excavation walls Slope Very limited Slope	1.00 	Droughty Too sandy Slope Very limited Slope Droughty Too sandy Very limited Slope	0.50 0.04
Kalkaska 190816: Kalkaska 190817: Kalkaska	 90 	Slope - - Very limited Slope - - -	0.04 1.00 	Unstable excavation walls Slope Very limited Unstable excavation walls Slope Very limited Slope Unstable	1.00 	Droughty Too sandy Slope Very limited Slope Droughty Too sandy Very limited Slope Droughty	0.50 0.04 1.00 0.80 0.50 1.00 0.80
Kalkaska 190816: Kalkaska		Slope 	0.04	Unstable excavation walls Slope Very limited Unstable excavation walls Slope Very limited Slope Unstable	1.00	Droughty Too sandy Slope Very limited Slope Droughty Too sandy Very limited Slope Droughty	0.50 0.04 1.00 0.80 0.50 1.00 0.80
Kalkaska 190816: Kalkaska 190817: Kalkaska		Slope 	0.04	Unstable excavation walls Slope Very limited Unstable excavation walls Slope Very limited Slope Unstable excavation walls 	1.00	Droughty Too sandy Slope Very limited Slope Droughty Too sandy Very limited Slope Droughty Too sandy Uery limited Slope	0.50 0.04 1.00 0.80 0.50 1.00 0.80
Kalkaska 190816: Kalkaska 190817: Kalkaska		Slope Very limited Slope Very limited Slope Slope	0.04	Unstable excavation walls Slope Very limited Unstable excavation walls Slope Very limited Slope Unstable excavation walls 	1.00	Droughty Too sandy Slope Very limited Slope Droughty Too sandy Very limited Slope Droughty Too sandy Uery limited Slope	0.50 0.04

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

Map unit symbol and soil name	of	· 		 Shallow excavation 		Landscaping	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190819: Kalkaska	•	 Not limited 	 	Unstable	1.00 	 Somewhat limited Droughty Large stones content	 0.58 0.03
East Lake	 35 	 Not limited 		 Somewhat limited Unstable excavation walls 	0.96		 0.44 0.03
190820: Kiva	 65 	 Not limited 	l I	 Somewhat limited Unstable excavation walls Dusty	0.95 		 0.21 0.11 0.01
Mancelona	 30 	 Not limited 	•	 Somewhat limited Unstable excavation walls	0.71	Droughty	 0.34 0.26
190821: Kiva		Slope	0.04 	-	0.95 0.04	Droughty	 0.21 0.11 0.04 0.01
Mancelona	 30 	•	0.04 	 Somewhat limited Unstable excavation walls Slope	0.71 		 0.34 0.26 0.04
190823:		I 	 	 	 	 	
Kiva			1.00 	Slope Unstable excavation walls	1.00 0.95 		 1.00 0.21 0.11 0.01
Mancelona	•		11.00	Slope	1.00 0.71		 1.00 0.34 0.26
190824: Lake beaches	1 100	 Not rated	 	 Not rated		 Not rated	
Lake Deaches	1	 	! 	 	! 	 	
190825: Lake bluffs	 100 	 Not rated 	 	 Not rated 	 	 Not rated 	
190826: Leelanau	 60 	 Not limited 	 	 Somewhat limited Unstable excavation walls 	0.01	 Somewhat limited Droughty Large stones content	 0.17 0.03
East Lake	 30 	 Not limited 	 	 Somewhat limited Unstable excavation walls 	0.96	 Somewhat limited Droughty Large stones content 	 0.44 0.03

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

Map unit symbol and soil name	Pct. of	streets		Shallow excavation		Landscaping	
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190827: Leelanau	•	•	 0.04 	-	0.04	 Somewhat limited Droughty Slope Large stones content	 0.17 0.04 0.03
East Lake	•	•	 0.04 	excavation walls	0.96 	 Somewhat limited Droughty Slope Large stones content	 0.44 0.04 0.03
190828: Leelanau		•	 1.00 	Slope	1.00 0.01	 Very limited Slope Droughty Large stones content	 1.00 0.17 0.03
East Lake	 - 25 	 Very limited Slope 	 1.00 	Slope	1.00 0.96	 Very limited Slope Droughty Large stones content	 1.00 0.44 0.03
190829: Leelanau		•	 1.00 	Slope	1.00 0.01	 Very limited Slope Droughty Large stones content	 1.00 0.17 0.03
East Lake	 - 35 	•	 1.00 	Slope	1.00 0.96	 Very limited Slope Droughty Large stones content	 1.00 0.44 0.03
190830: Leelanau	 - 50 	 Very limited Slope 	 1.00 	Slope	1.00 0.01	 Very limited Slope Droughty Large stones content	 1.00 0.17 0.03
East Lake	 - 35 	 Very limited Slope 	 1.00 	•	1.00 0.96	•	 1.00 0.44 0.03
190831: Lupton	 - 60 	 Very limited Ponding Depth to saturated zone Subsidence Frost action Low strength	 1	Depth to saturated zone Organic matter content Dusty	1.00 1.00 1.00 1.00 0.01	Depth to saturated zone Dusty	 1.00 1.00 0.01

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

and soil name	Pct. of	streets		Shallow excavation		Landscaping	
	-	-		Rating class and limiting features		•	
190831:	 	 	 	 	 	 	
Markey	30	Very limited	1	Very limited	I	Very limited	1
	1	Ponding	11.00	Ponding	11.00	Ponding	11.00
	i	•	11.00	•	11.00	•	11.00
	i	saturated zone		•		•	i
	i	•	•			Depth to	11.00
	:	•				saturated zone	•
	!	Frost action	11.00		•	•	•
	!	!	!		•	Dusty	[0.01
		! 	 	Unstable excavation walls	0.01 	 	
190832:		 -] !	 	 -	1
Mancelona	1 90	 Not limited	İ	 Somewhat limited	! 	Somewhat limited	i
	i	1	i	Unstable	•	•	10.22
	i	İ	i	excavation walls			i
190833:] 	 	 	
Mancelona	90	Somewhat limited	i	Somewhat limited	i	Somewhat limited	i
	I	Slope	0.04	Unstable	0.71	Droughty	10.22
	I	I	I	excavation walls	I	Slope	10.04
	I	l	I	Slope	0.04	I -	1
	1	!	I	ļ	I	1	1
190834: Mancelona	I I 60	 Not limited		 Somewhat limited	 	 Somewhat limited	1
Mancerona	1 60	NOC IIMICEA	!	•	•	•	10 24
	!	!	!	•	•	Droughty	10.34
	 	 	 	excavation walls	 	 	1
East Lake	i 30	Not limited	<u> </u>	' Somewhat limited	i	Somewhat limited	i
	1	1	i	•	•	Droughty	0.44
	;	! !		excavation walls		Large stones	10.03
	i	' 	i	excavacion warrs	i	content	1
	!	!	Į.	<u> </u>	l	!	!
190835: Mancelona	 55	 Somewhat limited	l I	 Somewhat limited	 	 Somewhat limited	1
Mancelona	1 22	•	•	•	•	Droughty	10.34
	!	Slope	10.04			·	•
	1	!	!	excavation walls		•	10.04
	 	 	 	Slope 	0.04 	 	1
East Lake	35	 Somewhat limited	i	 Somewhat limited	i	Somewhat limited	i
	1	Slope	0.04	Unstable	0.96	Droughty	0.44
	I	I	I	excavation walls	I	Slope	10.04
	I	l	I	Slope	0.04	Large stones	10.03
100006	!	!	1	<u> </u>	ļ	!	!
190836: Mancelona	I I 50	 Very limited		 Very limited	! !	 Very limited	!
Mancerona	1 30	-	1		 1.00		11.00
	!	Slope	11.00	•		——————————————————————————————————————	
	!	1	!	Unstable excavation walls	0.71	Droughty	10.34
	 	! 	<u> </u>	excavation waits	! !	! 	;
East Lake	30	Very limited	i	 Very limited	i	 Very limited	i
	I	· =	11.00			Slope	11.00
	I	I -	I	_	0.96	——————————————————————————————————————	0.44
	I	I	I	excavation walls		Large stones	10.03
	ļ.	!	ļ.	ļ.	ļ.	content	!
190837:	 	 	 	 	l I	 	I I
Mancelona	45	Very limited	i	 Very limited	İ	 Very limited	i
	I	=	11.00	_	11.00	Slope	11.00
	ı	I -	I	•	0.71	•	0.34
			-				
	i	I	I	excavation walls	I	1	1

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

	Pct. of	•	d	Shallow excavation	ons	Landscaping 	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190837:		 	1	 -			1
East Lake	30	Very limited	11.00	Slope	1.00 0.96	 Very limited Slope Droughty Large stones content	 1.00 0.44 0.03
190838:	<u> </u>	! 		! 	i I	! 	i
Mancelona	50 	•		Slope	1.00 0.71	Very limited Slope Droughty 	 1.00 0.34
East Lake		· -	11.00	Slope	1.00 0.96	 Very limited Slope Droughty Large stones	 1.00 0.44 0.03
	 	I I	 	 	 	content 	1
190839: Mancelona	 70 	 Not limited 		•	0.71	 Somewhat limited Droughty Gravel content	 0.34 0.26
Richter		 	!	 Very limited	 	 Somewhat limited	1
RICHCEL	23	Frost action	1.00 0.99	Depth to saturated zone	1.00 	Depth to	 0.99 0.01
	į	 	į	excavation walls		Ī	
	i	 	i	Dusty	0.01 		i
190840: Nester	l 1 90	 Very limited	 	 Somewhat limited	 	 Somewhat limited	
	 	Low strength Frost action Shrink-swell		Dusty Unstable	0.03 0.01	Dusty	0.03
190841:	i	! 	i	! 	! 	! 	i
Nester	90 	Low strength	1.00 0.50	Slope Dusty Unstable	0.04 0.03	•	 0.04 0.03
190842:	i	 	i	 	! 		i
Nester	90 	•	11.00	Slope Dusty Unstable	1.00 0.03 0.01	Very limited Slope Dusty 	 1.00 0.03
190843:		! 	İ	! 	! 	 	1
Nester	l l	Slope	1.00 1.00	Slope Dusty Unstable	1.00 0.03 0.01	•	 1.00 0.03

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of	streets		Shallow excavation		Landscaping	
	-	-		Rating class and limiting features		•	
190844:	 	 	 	 	 	 	
Nester	90	Very limited	1	Very limited	l	Very limited	1
	1	Slope	11.00	Slope	1.00	Slope	11.00
	I	Low strength	11.00	Dusty	0.03	Dusty	10.03
	I	Frost action	10.50	Unstable	0.01	l	1
	I	Shrink-swell	0.50	excavation walls	I	I	1
190846:	1	 	 	 	 	 	!
Pits, gravel	100	Not rated	i	Not rated	i	 Not rated	i
190847:		 -	1		 	 -	1
Richter	45	 Very limited	i	 Very limited	! 	 Somewhat limited	i
	i	· =		· -		Depth to	10.99
	i	•		saturated zone		•	1
	i	saturated zone				Dusty	0.01
	i	l Sacaracca rone	;	excavation walls		1	1
	i	! 	i	•	1 0.01	! 	i
	İ	İ	i	İ	İ	İ	i
Alcona	40	•		Somewhat limited			1
	I	Frost action	0.50	•	0.01	I	1
		<u> </u>		excavation walls			!
190848:	i	! 	i	! 	! 	! 	i
Richter	45	Very limited	I	Very limited	I	Somewhat limited	1
	i		11.00	· -		Depth to	10.99
	i	•		saturated zone		-	i
	i	saturated zone	•	•	•	Dusty	0.01
	i	i	i	excavation walls		i	1
	i	i İ	i		0.01	i	i
21			1		!	197.1. 1:	!
Alcona	1 40			Somewhat limited			!
	!	Frost action	10.50	Unstable excavation walls	0.01	 	1
	i	! 	i	excavacion warrs	! 	! 	i
190849:	Ι.,	l	l	I	I	l	1
Roscommon		· =		· -		Very limited	1
	I	-		· -	1.00	Ponding	1.00
	I	Depth to	1.00	Depth to	1.00	Depth to	1.00
	1	saturated zone	1	saturated zone	l	saturated zone	1
	I	Frost action	0.50	Unstable	1.00	Too sandy	10.50
			!	excavation walls	l	Droughty	10.37
Markey	30	ı Very limited	 	 Very limited	 	 Very limited	<u> </u>
-	I		11.00		1.00		11.00
	İ		11.00		11.00		11.00
	i	saturated zone	i	saturated zone	İ	content	i
	i		11.00	•	1.00		11.00
	i	•	11.00		i	saturated zone	i
	i	I	. = . • •	•	1.00	•	0.01
	i	i	i	·	0.01	•	1
	İ	i I	İ	excavation walls		İ	İ
100050.	1						!
190850: Sanilac	I I 90	 Very limited	I I	 Very limited	I 	 Somewhat limited	<u> </u>
	 I	· =	11.00		1.00		0.94
	i	•	11.00	•	1	· -	1
		· -	10.94	•	1 0.60		10.60
		i nentii ro	10.74	1 LIOUGING	10.00	1 rrooming	10.00
	!	·	1	IInatable	10 01	I Ductor	10 01
	-	saturated zone	1		0.01	Dusty	[0.01
	 	·	 	excavation walls		Ī	0.01

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

	Pct. Of	streets		Shallow excavation		Landscaping	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190851:	 	 	 	 	l I	 	
Tonkey	40	Very limited	I	Very limited	I	Very limited	I
-	i	Ponding	11.00	Ponding	11.00	Ponding	11.00
	i	•	11.00		11.00	-	11.00
	i	saturated zone	i	saturated zone	İ	saturated zone	i
	İ	Frost action	11.00	Unstable	0.01	Dusty	0.01
	l I	 	l I	excavation walls Dusty	 0.01	 	
Munuscong	 25	' Vorus limited	į	I	İ	İ	į
Munuscong	1 25	· =				Very limited Ponding	11.00
	!	-				Depth to	11.00
	!	:	11.00 I	•		saturated zone	•
	:	•	•			Dusty	10.01
	•	•		·	0.01	•	1
	i		10.57		•	!	i
	į	SHITHK SWELL		•	0.01		į
Iosco	 25	 Somewhat limited	 	 Very limited	 	 Somewhat limited	
	I	Depth to	0.99	Depth to	1.00	Depth to	0.99
	I	saturated zone	I	saturated zone	l	saturated zone	1
	I	Frost action	0.50	Unstable	0.01	I	1
	 	 	 	excavation walls	 	 	1
190852:			į		İ		į
Tonkey	35	· =				Very limited	
	!	-				Ponding	1.00
	!	•	11.00	•		Depth to	1.00
	1	saturated zone Frost action	11.00	saturated zone Unstable		saturated zone Dusty	10.01
	:	I FIOSE ACCION	1	excavation walls	•	l Duscy	10.01
	į	İ	į	•	0.01		į
Munuscong	 30	 Very limited	 	 Very limited	 	 Very limited	
	I	Ponding	1.00	Ponding	1.00	Ponding	1.00
	I	Depth to	1.00	Depth to	1.00	Depth to	1.00
	I	saturated zone	I	saturated zone	l	saturated zone	1
	I	•	•		0.92	Dusty	0.01
	I				0.01	I	I
	 	Shrink-swell 	0.57 	•	 0.01	 	
Iosco	20	 Somewhat limited		 Very limited	 	 Somewhat limited	1
10500	1 20	Depth to		•	•	Depth to	0.99
	i	saturated zone	1	saturated zone			1
	į	•	0.50	•	0.01	•	į
	į	! !		excavation walls	! !		!
190853: Water	 100	 Not rated		 Not rated	 	 Not rated	1
	100		i		İ		i
190854:		 	!	 	I	 	I
Wallace	1 50	NOT LIMITED	I	Very limited		Very limited	1
	1	1 1	1	Unstable excavation walls	1.00	:	1
	1	! !	1		I 0.50	pan Droughty	1
	i	! 	i	Dense layer	l 0.30		10.50
Kalkaska	 45	 Not limited	 	 Very limited	 	 Somewhat limited	1
	i	İ	i	——————————————————————————————————————		Droughty	0.80
	I	I	I	excavation walls		Too sandy	10.50
	I	l	I	I	I	I	1

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

	Pct. Of	•	d	 Shallow excavation	ons	 Landscaping 	
	map unit	Rating class and limiting features		Rating class and limiting features	•	Rating class and limiting features	
190855: Wind eroded land	 100 	 - Not limited - -	 	 - Very limited Unstable excavation walls	11.00	 Somewhat limited Droughty Too sandy 	 0.69 0.50
190856: Wind eroded land	100 	•	 1.00 	excavation walls	11.00	Droughty	 1.00 0.69 0.50
193236: Beaches	 100 	' Not rated 	 	 Not rated 	 	 Not rated 	
193237: Thompsonville	 50 		 0.75 	saturated zone	1.00 0.01	 Somewhat limited Depth to saturated zone Droughty 	 0.75 0.34
Milnichol	 40 	Depth to saturated zone	 1.00 0.50	Depth to saturated zone	1.00 0.01	saturated zone	 1.00 0.43
193255: Spinks	 50 	 Not limited 	 	 Very limited Unstable excavation walls	11.00	 - Somewhat limited Droughty Too sandy	 0.69 0.50
Coloma	 40 		 1.00 	 Very limited Unstable excavation walls	11.00	 Somewhat limited Droughty Too sandy	 0.90 0.50
193256: Spinks	 50 	•	 0.04 	excavation walls	11.00	Too sandy	 0.69 0.50 0.04
Coloma	 40 	Low strength	 	excavation walls	11.00	Too sandy	 0.90 0.50 0.04
193257: Spinks	 55 	=	 1.00 	excavation walls	11.00	Droughty	 1.00 0.69 0.50
Coloma	 35 	•	 1.00 1.00	excavation walls	1.00	Droughty	 1.00 0.90 0.50

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

	 Pct. of		d	 Shallow excavation	ons	 Landscaping 	
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193258: Spinks	 50 	· =	 1.00 	Slope	1.00 1.00	 Very limited Slope Droughty Too sandy	 1.00 0.69 0.50
Coloma	 40 	Slope	 1.00 1.00	Slope	1.00 1.00	-	 1.00 0.90 0.50
193260: Copemish	 95 1 			Unstable excavation walls	1.00 	 Very limited Depth to cemented pan Droughty Too sandy	 1.00 1.00 0.50
193262: Kaleva	 95 	 Not limited 	 		1.00	 Somewhat limited Droughty Too sandy	 0.69 0.50
193263: Kaleva	 95 		 0.04 	Unstable excavation walls	1.00 	 Somewhat limited Droughty Too sandy Slope	 0.69 0.50 0.04
193265: Grattan	 95 	 Not limited 	 	• •	11.00	 Somewhat limited Droughty Too sandy	 0.79 0.50
193266: Grattan	 95 	•	 0.04 	Unstable excavation walls	11.00	•	 0.79 0.50 0.04
193267: Grattan			•	Unstable excavation walls	11.00	 Very limited Slope Droughty Too sandy	 1.00 0.79 0.50
193269: Grattan	 95 	 Very limited Slope 	 1.00 	-	1.00 1.00	·	 1.00 0.79 0.50
193270: Covert	 90 	 Very limited Low strength Depth to saturated zone 	 1.00 0.19 	saturated zone	1.00 1.00	 Somewhat limited Droughty Too sandy Depth to saturated zone	 0.79 0.50 0.19

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

Map unit symbol and soil name	Pct. of	•	ıd	Shallow excavati 	ons	Landscaping 	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193271:		 	1	 	 	 	1
Pipestone	90	•	11.00	Depth to saturated zone	1.00 1.00	Droughty	 1.00 0.60 0.50
193272:		 	1	 	 	 	1
Dair	90 	•	1.00 1.00	Ponding Depth to saturated zone	1.00 1.00 1.00	saturated zone	 1.00 1.00
193277:		 	1	 	 	 	1
Benona	90 	•			11.00	Somewhat limited Droughty Too sandy	 0.68 0.50
193278:		 		 	 	 	
Benona	90 	•		Unstable excavation walls	11.00	Somewhat limited Droughty Too sandy Slope	 0.68 0.50 0.04
193279:		 		 	 	 	
Benona	 90 	•		Unstable excavation walls	1.00	Droughty	 1.00 0.68 0.50
193284:			!		1		!
Udorthents	 	Slope Frost action 	1.00 0.50 	Slope Unstable excavation walls	1.00 0.01	•	1.00 0.01
Udipsamments	 - 35 	· -	1.00	Slope	1.00 1.00	 Very limited Slope Droughty Too sandy	 1.00 0.69 0.50
193285:		 	1	 	 	 	1
	55 	Very limited Ponding Depth to saturated zone Subsidence Frost action	1.00 1.00 1.00	Depth to saturated zone Organic matter content	 1.00 1.00 1.00 1.00	Depth to saturated zone Dusty	 1.00 1.00 0.03
		 	 	Unstable excavation walls	0.01 	 	

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

	Pct. of	•	.d	Shallow excavati 	ons	Landscaping 	
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	1
102005.	!		!		ļ .		1
193285: Makinen	I I 40	 Very limited	i	 Very limited	 	 Very limited	1
	1	Ponding		-		Ponding	11.00
	i	Depth to	11.00	•		Depth to	11.00
	i	saturated zone	i	•	i	•	i
	I	Subsidence	11.00	Organic matter	1.00	Dusty	[0.03
	I	Frost action	1.00	content	I	I	1
	I	I	1		11.00	•	1
	!	!	1	Dusty	10.03	!	1
102206.	!	!	1	1	!	!	1
193286: Histosols	 66	 Vormalimited	<u> </u>	 Very limited	 	 Very limited	1
HISCOSOIS		•		•		Ponding	11.00
	i .	•		-		Organic matter	11.00
	i	saturated zone		•	i	•	1
	i	Subsidence	11.00	Organic matter	11.00	Depth to	11.00
	I	Frost action	1.00	content	I	saturated zone	1
	I	I	1	Too clayey	1.00	Dusty	10.03
	1	ļ.	1	Dusty	10.03	I	
			!		!	 	!
Aquents	1 45	Very limited Ponding		• •		Very limited Ponding	1
	1	Depth to	11.00			Depth to	11.00
	<u> </u>	saturated zone		•	1 ± . 00	saturated zone	1
	i	Frost action	11.00	•	11.00	•	0.92
	į .	İ	i	excavation walls	i	Too sandy	0.50
	I	I	1	I	I	I	1
193287:		<u> </u>	!	<u> </u>	!		1
Dune land	1 55	Not rated	1	Not rated	 	Not rated	1
Quartzipsamments	I I 40	ı IVerv limited	<u> </u>	 Very limited	i I	 Very limited	<u> </u>
gaar carpoananch co		Slope	1.00		1.00	•	11.00
	i	i	i	•	11.00	•	11.00
	İ	İ	İ	excavation walls	İ	Too sandy	10.50
	I	I	1	I	I	I	1
193288:		<u> </u>	!	l	!		!
Udipsamments	1 100	NOT limited	!	Very limited Unstable		Somewhat limited Droughty	10.69
	1	! !		Unstable excavation walls		Droughty Too sandy	10.50
	i	i i	i	excavación waiis	i	l 100 Sandy	1
193342:	i	İ	i	i	i	i	i
Gorvan	35	Very limited	1	Very limited	I	Very limited	1
	I	Ponding	1.00			Ponding	1.00
	I	Depth to	1.00			Flooding	11.00
	!	saturated zone		•	1	· •	11.00
	!	Frost action	11.00	•	10.80		10 03
	!	Flooding	1.00	=	0.03 0.01	_	10.03
	<u> </u>	! 	<u> </u>	excavation walls		! 	i
	i	i	i		i		i
Houghton	30	Very limited	1	Very limited	I	Very limited	1
	I	Ponding	1.00	=	1.00	•	11.00
	I	Depth to	1.00	•	1.00	•	11.00
	!	saturated zone		•	•	Organic matter	11.00
	Į.	Subsidence	1.00	•	11.00	•	
	!	Frost action	1.00		•	Depth to	11.00
	I	Flooding	1.00	Flooding	0.80	saturated zone	1
	1	1	1	Dusty	10.03	Dusty	[0.03

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of	streets		Shallow excavation		 Landscaping 	
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193342:	T I	 	I I	 	l I	 	I I
Glendora	- j 20	Very limited	i	Very limited	i	Very limited	i
	i	-	11.00	· -	11.00	•	11.00
	İ	Depth to	11.00	Depth to	11.00	Flooding	11.00
	1	saturated zone	1	saturated zone	I	Depth to	11.00
	1	Flooding	11.00	Flooding	08.0	saturated zone	1
	I I	Frost action 	0.50 	Unstable excavation walls	0.37 	Droughty 	0.45
193349:	İ	 	İ	 	 	 	i i
Spinks	- i 50	Verv limited	i	Very limited	i	Very limited	i
•	i	Slope	11.00	•	11.00	·	11.00
	i	i	i	•	11.00	·	0.69
	i	i	i	excavation walls		Too sandy	10.50
	i	İ	i	İ	i	i -	i
Coloma	- 40	Very limited	1	Very limited	I	Very limited	1
	1	Slope	11.00	Slope	1.00	Slope	11.00
	1	Low strength	11.00	Unstable	1.00	Droughty	10.90
	!	<u> </u>	!	excavation walls	!	Too sandy	10.50
193351:	i	! 	<u> </u>	! 	! !	! 	i
Benona	- 95	Very limited	İ	Very limited	İ	Very limited	İ
	1	Slope	11.00	Slope	1.00	Slope	11.00
	1	Low strength	11.00	Unstable	1.00	Droughty	10.68
	!	ļ	!	excavation walls	l	Too sandy	10.50
193354:		 		 	 	 	
Dune land	- 50	Not rated	1	Not rated		Not rated	1
Quartzipsamments	-I 40	' Somewhat limited	i	 Very limited	i i	 Very limited	i
Z	i		0.63	· -	11.00	•	11.00
	i	i	i	excavation walls	•	Slope	0.63
	i	İ	i	•	0.63	·	0.50
193357:	1	 	 	 	 	 	
Shavenaugh	- 85	Very limited	İ	Very limited	İ	Very limited	İ
	1	Slope	1.00	Slope	1.00	Slope	11.00
	1	I	1	Unstable	1.00	Too sandy	10.50
	1		<u> </u>	excavation walls	l	Droughty	0.13
193359:		! 	<u> </u>	 	! 	I 	
Shavenaugh	- 85			Very limited	•	Somewhat limited	1
	1	Slope	10.04			Too sandy	10.50
	1	<u> </u>	!	excavation walls		Droughty	10.13
	1	 	 	Slope	0.04 	Slope 	0.04
193360:	į	İ	İ	İ	İ	İ	İ
Shavenaugh	- 85	Not limited	!	Very limited		Somewhat limited	
	1	<u> </u>	!		11.00		10.50
	1	 		excavation walls	 	Droughty 	0.13
193362:	į	<u> </u>	į	!	į	<u> </u>	į
Benzonia	- J 90	-		Very limited		Very limited	
	!	Slope	11.00	-	11.00	•	11.00
	1	 	1	Unstable excavation walls	1.00 	Droughty Too sandy	0.65 0.50
100000	į	İ	į	!	İ		
193363: Benzonia	1 - 90	 Very limited	I I	 Very limited	I I	 Very limited	
-	i	Slope	11.00	-	1.00	_	11.00
	i	I -	1	excavation walls		Droughty	10.65
	1	I	I	Slope	11.00		0.50

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

		Local roads an streets	d	 Shallow excavation	ons	 Landscaping 	
	-	-		Rating class and limiting features		•	
193364: Benzonia	 90	 Somewhat limited	 	 Very limited Unstable excavation walls	 1.00	 Somewhat limited Droughty	 0.65 0.50 0.04
193365: Benzonia	 90 	 Not limited 	 	 Very limited Unstable excavation walls	11.00		 0.65 0.50
193371:	 	 	 	 	 	 	
Dair	 	Ponding Depth to saturated zone	1.00 1.00 0.50	· -	1.00 1.00 1.00	saturated zone	 1.00 1.00
Pipestone	i I	Depth to saturated zone	1.00 	 Very limited Depth to saturated zone Unstable excavation walls	1.00 1.00	saturated zone Droughty	 1.00 0.60 0.50
193372: Access Denied	•	 Not rated 	 	 Not rated 	 	 Not rated 	
193423: Benona	 95	 Very limited Slope	11.00	Slope	1.00 1.00	 Very limited Slope Droughty Too sandy	 1.00 0.68 0.50
193484:	i	 		 	! 	 	
Pits, sand and gravel		 Not rated	 	 Not rated	 	 Not rated	
193494: Nordhouse	•	Slope	11.00	Slope	1.00 1.00	 Very limited Slope Droughty Too sandy	 1.00 0.67 0.50
193496: Nordhouse	 95 		 0.63 	excavation walls	11.00	 Somewhat limited Droughty Slope Too sandy	 0.67 0.63 0.50
193497: Nordhouse	 95 	 Not limited 	 	 Very limited Unstable excavation walls	11.00	 Somewhat limited Droughty Too sandy	 0.67 0.50
193498: Nordhouse	 40 	 Not limited 	 	 Very limited Unstable excavation walls 	11.00	 Somewhat limited Droughty Too sandy 	 0.67 0.50

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of	streets		Shallow excavation		Landscaping 	
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193498: Platteriver	 35 			Depth to saturated zone	1.00 0.01	 Somewhat limited Droughty Depth to saturated zone	 0.87 0.75
Dair	 25 	Ponding Depth to saturated zone	1.00 1.00	Ponding Depth to saturated zone	1.00 1.00 1.00	 Very limited Ponding Depth to saturated zone 	 1.00 1.00
193503: Spinks	 - 50 	 Not limited 	 	•	11.00	 Somewhat limited Droughty Too sandy	 0.69 0.50
Shavenaugh	 - 40 	 Not limited 	 	•	11.00	 Somewhat limited Too sandy Droughty 	 0.50 0.13
193504: Spinks	 50 		0.04 	Unstable excavation walls	1.00	 - Somewhat limited Droughty Too sandy Slope	 0.69 0.50 0.04
Shavenaugh	 40 			Unstable excavation walls	11.00	 Somewhat limited Too sandy Droughty Slope	 0.50 0.13 0.04
193505: Spinks	 50 			Unstable excavation walls	1.00 	 Very limited Slope Droughty Too sandy	 1.00 0.69 0.50
Shavenaugh	 40 	•		Unstable excavation walls	1.00 	 Very limited Slope Too sandy Droughty	 1.00 0.50 0.13
193506: Spinks	 50 	 - Very limited Slope 	 1.00 	-	1.00 1.00	•	 1.00 0.69 0.50
Shavenaugh	 40 	•	 1.00 	-	1.00 1.00	•	 1.00 0.50 0.13
193507: Spinks	 50 	 Very limited Slope 	 1.00 	-	1.00 1.00	•	 1.00 0.69 0.50

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

	Pct.	•	.d	Shallow excavation	ons	Landscaping 	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
100505	<u> </u>	!	Ţ.	!	İ.	!	1
193507: Shavenaugh	40	 Very limited Slope 	 1.00 	Slope	1.00 1.00	•	 1.00 0.50 0.13
193508:		 	1				!
Madaus	90 	Ponding	11.00	Ponding	1.00 1.00	Organic matter	 1.00 1.00
	 		 1.00 	Too clayey Dusty	0.88 0.03 0.01	Depth to saturated zone Carbonate content	1.00 1.00 1.00
	i	' 	i	excavacion warrs	i	Duscy	
193509: Boyer	 50 	 Somewhat limited Frost action 	 0.50 	Unstable excavation walls	0.01	i -	 0.01
Shavenaugh	 40 	 Not limited 	 	Very limited	11.00	•	 0.50 0.13
193510:		! 	<u> </u>	! 	! !	! 	
Boyer	50 	Somewhat limited Frost action Slope 	0.50 0.04 	Slope Unstable excavation walls	0.04 0.01	Dusty 	 0.04 0.01
Shavenaugh	40 			Unstable excavation walls	11.00	Droughty	 0.50 0.13 0.04
193511: Boyer	 50 	•	 1.00 0.50 	Slope Unstable excavation walls	1.00 0.01	Dusty 	 1.00 0.01
Shavenaugh	 40 	 Very limited Slope 	 1.00 	Slope	1.00 1.00	-	 1.00 0.50 0.13
193513: Dair	 50 	 Very limited Ponding Depth to saturated zone Frost action	1.00 1.00	Depth to saturated zone	1.00 1.00 1.00	Depth to saturated zone	 1.00 1.00

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	 Pct. of		d	Shallow excavation	ons	 Landscaping 	
	map unit	Rating class and limiting features	•	Rating class and limiting features		Rating class and limiting features	
193513:	 	 	1	 	 	 	1
Adrian	1 45	' Very limited	i	 Very limited	i	 Very limited	i
	-0	•	11.00	· -	11.00	•	11.00
	i	Depth to	11.00		11.00	•	11.00
	;	saturated zone	1	i	1	saturated zone	1
	;	Subsidence	11.00		11.00		10.03
	-		11.00	-	1	ı Duscy	10.03
	-	i Fiose accion	1	•	11.00	! !	-
	i	! 	i	·	10.03	•	i
193514:	1	 	 	 	 	 	
Platteriver	I 55	Somewhat limited	i	 Very limited	i	 Somewhat limited	i
	i	Depth to	10.75	· -	11.00	Droughty	10.87
	i	saturated zone	i	saturated zone	i İ	Depth to	10.75
	i	i I	i	Unstable	0.01	saturated zone	İ
	į	į	į	excavation walls		į	į
Pipestone	 40	 Very limited	 	 Very limited	 	 Very limited	1
_	1	Depth to	11.00	Depth to	1.00	Depth to	11.00
	1	saturated zone	1	saturated zone	I	saturated zone	1
	1	Frost action	10.50	Unstable	1.00	Droughty	10.60
	I	I	I	excavation walls	I	Too sandy	10.50
202010:	1	 		 	 	 	1
Houghton	I 55	Very limited	i	 Very limited	i	Very limited	i
	i	Ponding	11.00	Ponding	11.00	Ponding	11.00
	i	Depth to	11.00		11.00	•	11.00
	i	saturated zone	i	saturated zone	i İ	content	i
	i	Subsidence	11.00	Organic matter	11.00	Depth to	11.00
	i	Frost action	11.00	content	İ	saturated zone	İ
	i	i I	İ	Dusty	0.03	Dusty	10.03
	1	I	1	Unstable	0.01	I	1
	!	 -	ļ.	excavation walls	ļ .	<u> </u>	!
Adrian	 40	 Very limited		 Very limited	 	 Very limited	
	1	Ponding	11.00	Ponding	1.00	Ponding	1.00
	1	Depth to	11.00	Depth to	1.00	Depth to	1.00
	1	saturated zone	1	saturated zone	I	saturated zone	1
	1	Subsidence	1.00	Organic matter	1.00	Dusty	10.03
	1	Frost action	1.00	content	I	I	1
	1	I	I	Too clayey	1.00	I	1
	1	 -	1	Dusty	10.03		1
202016:	i	! 	i	 		 	i
Spinks	50	Not limited	I	Very limited		Somewhat limited	1
	1	I	1		1.00	Droughty	10.69
	1	 -	1	excavation walls		Too sandy	10.50
Tekenink, sandy	İ	! 	İ	 	! 	! 	
substratum	40	Somewhat limited	I	Somewhat limited	I	Not limited	1
	I	Frost action	10.50	Unstable	0.01	I	1
	1	<u> </u>	1	excavation walls		<u> </u>	
631170:	i	 	i			i I	i
Fogg	50	•		Very limited		Very limited	1
	1	Slope	1.00	•	1.00	•	1.00
	1	I	1	Unstable	1.00	Too sandy	10.50
	1	I	1	excavation walls	I	Droughty	10.20
	I	I	I	I	I	1	İ

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

		 Local roads an streets	d 	, Shallow excavati 	ons	, Landscaping 	
	-	-		Rating class and		•	
	lunit	limiting features	!	limiting features	<u>!</u>	limiting features	<u>!</u>
631170: Benzonia	40	· -	11.00	Slope	1.00 1.00	 Very limited Slope Droughty Too sandy	 1.00 0.65 0.50
631171: Fogg		· -	11.00	Slope	1.00 1.00	 Very limited Slope Too sandy Droughty	 1.00 0.50 0.20
Benzonia		· -	1.00 	· -	1.00 1.00		 1.00 0.65 0.50
631172: Fogg		· -	1.00 	Unstable excavation walls	1.00 	 Very limited Slope Too sandy Droughty	 1.00 0.50 0.20
Benzonia		· -		Unstable excavation walls	1.00 	 Very limited Slope Droughty Too sandy	 1.00 0.65 0.50
631173:		! 	i	! 	i I	! 	i
Fogg	50 		0.04 	Unstable excavation walls Slope	1.00 	Somewhat limited Too sandy Droughty Slope	 0.50 0.20 0.04
Benzonia			0.04 	Very limited Unstable excavation walls	 1.00 	Somewhat limited Droughty	 0.65 0.50 0.04
631174: Fogg	 50 	 Not limited 	 	 Very limited Unstable excavation walls	1.00 	 Somewhat limited Too sandy Droughty 	 0.50 0.20
Benzonia	40 	 Not limited 	 	 Very limited Unstable excavation walls 	 1.00	 Somewhat limited Droughty Too sandy 	 0.65 0.50
680939:	i	i İ	i	İ	İ	İ	i
Fern	50 	Depth to saturated zone	0.19	saturated zone	1.00 0.01	Depth to	 0.50 0.19
Spinks	40 	•	 0.04 	excavation walls	1.00 0.04	 Somewhat limited Droughty Too sandy Slope 	 0.69 0.50 0.04

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name		 Local roads an streets	d	 Shallow excavation	ons	 Landscaping 	
	-	-		Rating class and		· =	
	unit	limiting features	 	limiting features	<u> </u>	limiting features	
680943: Milnichol	90	· =		 Very limited Depth to		 Very limited	 1.00
	:	saturated zone		saturated zone		_	•
	i	•	10.50	Unstable	0.01	Droughty	0.43
		 	!	excavation walls	1	 -	
680945:	! 	 	<u> </u>	! 	! !	! 	i
Fern	90	Somewhat limited	İ	Very limited	İ	Somewhat limited	i
	I	Depth to		· <u>-</u>		Too sandy	10.50
	I			saturated zone			0.19
	!					saturated zone	
	 	Shrink-swell 		Unstable excavation walls		Slobe	0.04
600046	ļ.	 -	1	 -	ļ .	 -	!
680946: Fern	 90	 Somewhat limited		 Very limited	! 	 Somewhat limited	1
	I	Depth to	0.19	Depth to	1.00	Too sandy	10.50
	I	saturated zone	I	saturated zone	I	Depth to	0.19
	1	Shrink-swell	0.01	Unstable excavation walls		saturated zone	1
	i	i İ	i		i	i İ	i
680971: Nessen		 Tames limited	!	 	I	 	I
Nessen		· -				Very limited Slope	11.00
	<u> </u>			-		Droughty	10.68
	i	İ	•	excavation walls			10.50
Kaleva	I I 40	 Verv limited	 	 Very limited	 	 Very limited	
		· =		-		Slope	11.00
	i	i I		Unstable		·	0.69
	!			excavation walls	l	Too sandy	10.50
680972:		 		 	! 	 	
Nessen	50	· -	I	Very limited	I	Very limited	1
	1	Slope	•			Slope	11.00
	!	l		excavation walls		Droughty	10.68
	 	 	 	Slope 	1.00 	Too sandy 	0.50
Kaleva	40		•			Very limited	1
	!	· •	•			•	1.00
		 	 	excavation walls Slope	•	Droughty Too sandy	0.69 0.50
600073	!				!	 -	!
680973: Nessen	I I 50	 Somewhat limited	<u> </u>	 Very limited	! !	 Somewhat limited	1
	i	Slope	0.04		11.00		0.68
	İ	Ī	İ	excavation walls	İ	Too sandy	10.50
	1	 -		Slope	0.04	Slope	10.04
Kaleva	40	ı Somewhat limited		 Very limited	! 	 Somewhat limited	1
	I	Slope	0.04			Droughty	10.69
	I	!	1	excavation walls		Too sandy	10.50
	 	 	 	Slope 	0.04 	Slope 	0.04
680974:	<u> </u>		į	<u> </u>	į	<u> </u>	į
Nessen	į 50	Not limited	!	Very limited		Somewhat limited	
	1] 	1	Unstable excavation walls	1.00	·	10.68
	1	I	1	excavation walls	I	Too sandy	10.50

 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

and soil name	of	Local roads an		Shallow excavation		Landscaping 		
			•	Rating class and limiting features	•		•	
680974: Kaleva	 40 	 Not limited 		· -	11.00		 0.69 0.50	
893251:	i	! 	i	! 	i I	 	i	
Boyer		Slope	1.00 0.50	Slope Unstable excavation walls	1.00 0.01	i -	 1.00 0.01 	
Shavenaugh			1.00 	Unstable excavation walls	1.00 	-	 1.00 0.50 0.13	
894062:	i	' 	i		i	' 	i	
Remus		Slope Frost action Shrink-swell	1.00 0.50 0.01	Slope Unstable excavation walls	1.00 0.01		 1.00 0.01 	
Spinks	:		11.00	Slope	1.00 1.00	 Very limited Slope Droughty Too sandy	 1.00 0.69 0.50	
894063:	 	l 	<u> </u>	I I	! !	 		
Remus		Slope Frost action	1.00 0.50 0.01	Slope Unstable excavation walls	1.00 0.01	•	 1.00 0.01 	
Spinks			1.00 	Unstable excavation walls	1.00 	-	 1.00 0.69 0.50	
894064: Fern	 50 	Depth to saturated zone Slope	 0.19 0.04 0.01	saturated zone Slope	1.00 0.04 0.01	Depth to saturated zone	 0.50 0.19 0.04	
Remus	 40 	Slope	 0.50 0.04 0.01	Slope Unstable excavation walls	0.04	Ī	 0.04 0.01 	
894065: Fern	 50 	· •	 0.19 0.01	saturated zone	1.00 0.01	Depth to	 0.50 0.19 	

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of	•	.d	 Shallow excavation	ons	 Landscaping 	
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
894065: Remus	 - 40	 Somewhat limited Frost action	•	 Somewhat limited Unstable	 0.01	 Somewhat limited Dusty	 0.01
	i i	Shrink-swell 	0.01 	excavation walls		i -	
894104:	Ì	l	İ	ĺ	ĺ	l	Ī
Mollineaux	- 50 	Very limited Slope 		Slope	1.00 0.01		 1.00 0.15
Remus	- 40	 Very limited	i	 Very limited	i	 Very limited	i
	 	Slope Frost action Shrink-swell 	1.00 0.50 0.01	Unstable excavation walls	1.00 0.01 0.01	Dusty 	1.00 0.01
894105:	1	ļ	!	!	!	 -	1
Mollineaux	 - 50 	 Very limited Slope 		Slope	1.00 0.01	•	 1.00 0.15
Remus	 - 40 	 Very limited Slope	 1.00	• •	 1.00	 Very limited Slope	 1.00
	 	Frost action Shrink-swell 	0.50 0.01	excavation walls	0.01 0.01	i -	0.01
894165: Spinks	 - 50 	 Very limited Slope 	 1.00 	Slope	1.00 1.00	•	 1.00 0.69 0.50
Tekenink, sandy substratum	 - 40 	 Very limited Slope Frost action 	 1.00 0.50	Slope	1.00 0.01	•	 1.00
899682:	1	<u> </u>		<u> </u>		<u> </u>	1
Kaleva	- 90 	Very limited Slope 	1.00	Slope	1.00 1.00	·	 1.00 0.69 0.50
899722: Goodharbor	 - 90 	 Not limited 	 	 Very limited Unstable excavation walls	11.00	 Somewhat limited Droughty Too sandy	 0.91 0.50
899731: Covert	 - 50 	 Very limited Low strength Depth to saturated zone	 1.00 0.19	saturated zone	 1.00 1.00	Too sandy	 0.79 0.50
	-	Sacurated zone	-	excavation walls		saturated zone	

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 ${\tt Table 9.-Roads \ and \ Streets, \ Shallow \ Excavations, \ and \ Landscaping-Continued}$

Map unit symbol	l Pct.	I Local roads an	d	 Shallow excavati	ons	Landscaping	
	of		-	I	i		
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	1	limiting features	<u> </u>	limiting features	1
899731:	 	 		 	 	 	
Pipestone	40	Verv limited	i	 Very limited	i	 Very limited	i
-	i	Depth to	11.00	Depth to	11.00	Depth to	11.00
	i	saturated zone		saturated zone	i	saturated zone	i
	İ	Frost action	0.50	Unstable	11.00	Droughty	10.60
	!	<u> </u>	!	excavation walls	I	Too sandy	10.50
899733:	 	 		 	 	 	1
Covert	50	Very limited	i	Very limited	i	Somewhat limited	i
	İ	Low strength	11.00	Depth to	11.00	Droughty	10.79
	I	Depth to	0.19	saturated zone	I	Too sandy	10.50
	1	saturated zone	1	Unstable	1.00	Depth to	0.19
	!		!	excavation walls	l .	saturated zone	Į.
Dair	I I 45	 Very limited	1	 Very limited	 	 Verv limited	1
	i	·	11.00	· -		· -	11.00
	i	Depth to	11.00	Depth to	11.00	Depth to	11.00
	İ	saturated zone	i	saturated zone	İ	saturated zone	İ
	İ	Frost action	0.50	Unstable	11.00	İ	İ
	I	I	1	excavation walls	I	I	1
899734:		 	1		1	1	1
Benzonia	1 90	ı Verv limited	<u> </u>	 Very limited	! !	 Very limited	<u> </u>
	1	Slope	11.00	· -	11.00	•	11.00
	i	<u>-</u> -	1		11.00	•	10.65
	i		i	excavation walls			10.50
	i		i		i	<u>.</u>	i

Table 10.—Sewage Disposal

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

	Pct.	•	4.	Sewage lagoons	
	of	' 		<u> </u>	
	-	Rating class and limiting features		Rating class and limiting features	
	Ī	<u>. </u>	i i	<u>. </u>	i i
190775:	I	I	1	l	I
Adrian	55	Very limited		Very limited	
	!	Ponding	1.00		11.00
	!	Depth to	11.00		1.00
	1	saturated zone Subsidence	 1.00	content Seepage	 1.00
	! !	Seepage, bottom	11.00		11.00
	! !	Seepage, Doctom	1	bepth to saturated zone	1
	i	rayer	i	Saturated Zone	i
Houghton	45	Very limited	i	Very limited	i
	I	Ponding	11.00	Ponding	1.00
	I	Depth to	1.00	Organic matter	11.00
	I	saturated zone	•	content	1
	I	Subsidence	1.00	· •	1.00
	I	Seepage, bottom	1.00		1
	!	layer	!	Seepage	11.00
190777:	!	l I	!	l İ	
Alcona	I I 55	 Somewhat limited	i	 Very limited	<u> </u>
11200114	1	Depth to	10.94	· -	11.00
	i	saturated zone	1	l	i
	i	Slow water	0.50	i I	i
i	ĺ	movement	Ì	l	Ì
		<u> </u>	!	<u> </u>	1
Richter	30	Very limited		Very limited	
	!	Depth to	11.00	· •	1.00
	!	saturated zone Slow water	I 10.50	saturated zone	 0.50
	! !	Slow water movement	10.50	Seepage 	10.50
	i		i		i
190778:	I	l	1	l	1
Alcona	65	Somewhat limited		Very limited	1
	I	Depth to	0.94		11.00
	!	saturated zone		Slope	10.32
	!	Slow water	10.50	<u> </u>	!
	!	movement	!	l İ	
Richter	ı I 25	 Very limited	<u> </u>	 Very limited	<u> </u>
	i	Depth to	11.00	•	11.00
	i	saturated zone	i	saturated zone	i
	ĺ	Slow water	10.50	Seepage	10.50
	I	movement	1	Slope	0.32
100000	!	<u> </u>	!	<u> </u>	1
190779:	l I an	 Very limited	1	 Very limited	1
Alpena	1 90 1	very limited Filtering	1	· -	11.00
	I	capacity	1	Seepage Slope	10.92
	<u>.</u>	Capacity Seepage, bottom	11.00	·	10.92
	i	layer	1		i
	:	<u></u> .	;		:

Table 10.—Sewage Disposal—Continued

	 Pct. of	Septic tank absorption fiel	.ds	Sewage lagoons		
				Rating class and	1770 1	
	map unit	limiting features		limiting features		
	i	<u> </u>	i 	<u> </u>	i 	
190780:	ĺ	Ì	Ì	İ	İ	
Au Gres	45	Very limited	1	Very limited	1	
	I	Depth to	1.00	Seepage	1.00	
	I	saturated zone	1	Depth to	1.00	
	I		1.00	saturated zone	1	
	!	layer		l	1	
	!	Filtering	11.00	! :	!	
	!	capacity	!	!	!	
Kalkaska	I I 35	 Very limited	1	 Very limited	!	
Rainaska	1 33	Seepage, bottom		_	11.00	
	i	layer	1	l	1	
	i	Filtering	11.00	i i	i	
	i	capacity	i	İ	i	
	ĺ	i	Ì	İ	Ì	
190781:	I	I	1	I	1	
Bach		Very limited		Very limited	1	
	!	Ponding	1.00	•	11.00	
	!	Depth to	:	Depth to	11.00	
	!	saturated zone Slow water	11 00	saturated zone	10 50	
	!	Slow water movement	11.00	Seepage	10.50	
	i	I movement	i	I	i	
190782:	i		i	i I	i	
Deer Park	100	Very limited	Ì	Very limited	Ì	
	I	Seepage, bottom	11.00	Seepage	11.00	
	I	layer	1	Slope	1.00	
	1	Filtering	1.00	I	1	
	!	capacity		!	1	
	!	Slope	10.63	 -	!	
190783:	!	1	!	 	!	
Deer Park	1 100	 Very limited	i .	 Very limited	i .	
2002 2021		Slope	11.00	_	11.00	
	i	· -	11.00	•	11.00	
	I	layer	1	l -	1	
	I	Filtering	1.00	I	1	
	1	capacity	1	ļ .		
100704	!	!	!	<u> </u>	!	
190784: Deer Park	1 70	 Very limited	!	 Very limited	!	
Deel Falk	1 70	•	11.00	_	11.00	
	i	layer	1	Slope	10.08	
	i	Filtering	11.00	•	i	
	ĺ	capacity	İ	İ	İ	
	I	I	1	I	1	
Roscommon		Very limited		Very limited	1	
	1	Ponding	11.00	•	11.00	
	!	Depth to	11.00		11.00	
	!	saturated zone	•	Depth to	1.00	
	!	Seepage, bottom layer	1.00 	saturated zone		
	i	layer Filtering	11.00	! 	<u> </u>	
	i	capacity	1		i	
	i		i		i	
190786:	1	I	1	I	1	
Dune land	100	Not rated	1	Not rated	1	
	I	I	1	I	1	

Table 10.—Sewage Disposal—Continued

and soil name	Pct. Of	absorption fiel		Sewage lagoor 	ns
		Rating class and limiting features		Rating class and limiting features	
190787: East Lake	 90 1 	 Very limited Seepage, bottom layer Filtering capacity		 Very limited Seepage Slope 	 1.00 0.08
190788: East Lake	 90 	 Very limited Seepage, bottom layer Filtering capacity Slope		 Very limited Seepage Slope 	 1.00 1.00
190789: East Lake	 90 	 Very limited Seepage, bottom layer Slope Filtering capacity	11.00	Seepage 	 1.00 1.00
190790: East Lake	 90 	 Very limited Slope Seepage, bottom layer Filtering capacity	11.00		 1.00 1.00
190791: Eastport	 93 	 Very limited Seepage, bottom layer Filtering capacity		 Very limited Seepage Slope 	 1.00 0.08
190792: Edwards Marl beds	 	1.00 1.00 1.00 1.00 1.00 1.00	Flooding Organic matter content Depth to saturated zone Seepage Very limited Ponding	 1.00 1.00 1.00 1.00 1.00 1.00	
190794: Emmet	 60 	Depth to saturated zone Slow water movement Very limited Seepage, bottom layer Slow water	1.00 	content Depth to saturated zone Very limited Seepage Slope	1.00 1.00 1.00 0.32

Table 10.—Sewage Disposal—Continued

		Septic tank absorption fiel	.ds	Sewage lagoor 	ıs
		Rating class and			IValue
	-	limiting features		limiting features	
190794:	1		!		!
Leelanau	1 30	 Very limited	i	 Very limited	i
Leelanau	1 30	Seepage, bottom		· -	11.00
		layer		Slope	10.32
	I	l	1	l	I
190795: Emmet	 60	 Very limited	1	 Very limited	
India C		Seepage, bottom	•	•	11.00
	i	layer	1		11.00
	i	·	0.50	•	i
	i	movement	i	İ	i
	1	Slope	10.04	ļ	ļ.
Leelanau	1 30	 Very limited	1	 Very limited	
Leelanau	1 30	Seepage, bottom		· -	11.00
	i			Slope	11.00
	i	·	0.04	•	i
	I	l	1	l	I
190796: Emmet	 50	 Very limited		 Very limited	1
Entitle C	1	· -		Slope	11.00
	i	Seepage, bottom		•	11.00
	i	layer	i		i
	I	Slow water	10.50	I	I
	!	movement	!	<u> </u>	!
Leelanau	I I 30	 Verv limited		 Verv limited	!
	i	Seepage, bottom		_	11.00
	İ	layer		Seepage	11.00
	!	Slope	11.00	! :	!
190797:		 		 	!
Emmet	i i 50	 Very limited	i	 Very limited	i
				Slope	11.00
	I	Seepage, bottom	11.00	Seepage	1.00
	I	layer	1	I	I
	!	Slow water movement	10.50		!
	 	movement		 	<u> </u>
Leelanau	30	Very limited	i	Very limited	i
	I	Slope	11.00	Slope	1.00
	I	Seepage, bottom	1.00	Seepage	1.00
		layer	!	<u> </u>	!
190799:		! 	i	! 	i
	45	Very limited	i	Very limited	i
		Slope	11.00	Slope	11.00
	1		11.00	Seepage	11.00
		layer	10.50		!
	I I	Slow water movement	0.50 	I 	
	i		i	I	i
Leelanau	30	Very limited		Very limited	1
	1	Slope	1.00	•	1.00
	1	Seepage, bottom	1.00	Seepage	1.00
	1	layer	1	I	1

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of	Septic tank absorption fiel	.ds	Sewage lagoon 	wage lagoons	
	map	Rating class and limiting features	Value	_		
190801:	 	 	 	 	 	
Emmet	70 	Seepage, bottom layer	11.00	Slope	 1.00 1.00	
Mancelona	•	 Very limited Seepage, bottom layer 		 Very limited Seepage Slope 	 1.00 1.00	
190803: Emmet		Slope Seepage, bottom layer	11.00	I	 1.00 1.00 	
Mancelona		·	11.00	 Very limited Slope Seepage 	 1.00 1.00	
190805: Emmet	50 	Seepage, bottom layer		Seepage Slope	 1.00 0.32	
Omena		 Very limited Seepage, bottom layer 		 Very limited Seepage Slope 	 1.00 0.32	
190806: Emmet	 50 	Seepage, bottom layer	•	Slope 	 1.00 1.00 	
Omena	 45 	 Very limited Seepage, bottom layer Slope 	 1.00 0.04	Slope	 1.00 1.00	
190807: Emmet	50 51 1 1	 Very limited Slope Seepage, bottom layer Slow water movement	 1.00 1.00 0.50	Seepage 	 1.00 1.00 	
Omena	 45 	 Very limited Slope Seepage, bottom layer 	1.00 1.00 	·	 1.00 1.00	

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	 Pct. of	 Septic tank absorption fiel	.ds	 Sewage lagoon 	rage lagoons	
	map	Rating class and	Value	Rating class and limiting features	•	
	I I I 50	 Very limited	 1.00 1.00	 - Very limited Slope Seepage	 1.00 1.00 	
Omena		· -	11.00	 Very limited Slope Seepage 	 1.00 1.00	
190809: Emmet		Slope Seepage, bottom layer	11.00	I	 1.00 1.00 	
Omena		·	11.00	Slope	 1.00 1.00	
190811:	i	' 	i	i İ	i	
Hettinger		Ponding Depth to saturated zone	1.00 1.00	Depth to saturated zone	 1.00 1.00 	
Muck		Ponding Depth to saturated zone	1.00 1.00 0.73	Organic matter content	 1.00 1.00 1.00 1.00	
190812: Hettinger	45 	 Very limited Ponding Depth to saturated zone Slow water movement	 1.00 1.00 1.00	Depth to saturated zone	 1.00 1.00 	
Tonkey	 30 	 Very limited Ponding Depth to saturated zone Filtering capacity Seepage, bottom layer	1.00 1.00	Seepage Depth to saturated zone 	 1.00 1.00 1.00 	

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. Of		ds	 Sewage lagoon 	ıs
		Rating class and limiting features		Rating class and limiting features	Value
190814: Kalkaska	 85 	 Very limited Seepage, bottom layer Filtering capacity	 1.00 1.00	 Very limited Seepage Slope 	 1.00 0.08
190815: Kalkaska	 85 	 Very limited Seepage, bottom layer Filtering capacity Slope	 1.00 1.00 0.04	 Very limited Seepage Slope 	 1.00 1.00
190816: Kalkaska	 90 	 Very limited Seepage, bottom layer Slope Filtering capacity	 1.00 1.00 1.00	 Very limited Slope Seepage 	 1.00 1.00
190817: Kalkaska	 90 	 Very limited Slope Seepage, bottom layer Filtering capacity	 1.00 1.00 1.00	 Very limited Slope Seepage 	 1.00 1.00
190818: Kalkaska	 	 Very limited Slope Seepage, bottom layer Filtering capacity	 1.00 1.00 1.00	 Very limited Slope Seepage 	 1.00 1.00
190819: Kalkaska	 55 	 Very limited Seepage, bottom layer Filtering capacity	 1.00 1.00	Slope	 1.00 0.08
East Lake	 35 	 Very limited Seepage, bottom layer Filtering capacity 	 1.00 1.00 	 Very limited Seepage Slope 	 1.00 0.08
190820: Kiva	 65 	 Very limited Filtering capacity Seepage, bottom layer	 1.00 1.00	Slope	 1.00 0.32
Mancelona	 30 	 Very limited Seepage, bottom layer 	 1.00 	 Very limited Seepage Slope 	 1.00 0.32

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of	Septic tank absorption fiel	.ds	Sewage lagoons 		
	map	Rating class and limiting features	Value	•		
190821:		 	 	 	1	
Kiva		capacity Seepage, bottom layer	1.00 1.00 0.04	Seepage Slope 	 1.00 1.00 	
Mancelona	 - 30 	Seepage, bottom layer	11.00	Slope	 1.00 1.00	
190823:	i	' 	i	' 	i	
Kiva	1	• •	 1.00	Seepage 	 1.00 1.00 	
Mancelona		=	1.00	Slope	 1.00 1.00	
190824: Lake beaches	 - 100 	 Not rated 	 	 Not rated 	 	
190825: Lake bluffs	 - 100 	 Not rated 	 	 Not rated 	 	
190826: Leelanau		 Very limited Seepage, bottom layer	11.00	 Very limited Seepage Slope	 1.00 0.08	
East Lake	 - 30 	Seepage, bottom layer	 1.00 1.00	Slope	 1.00 0.08	
190827: Leelanau	 - 65 	 Very limited Seepage, bottom layer Slope		Slope	 1.00 1.00	
East Lake	 - 25 	 Very limited Seepage, bottom layer Filtering capacity Slope	 1.00 1.00 0.04	Slope 	 1.00 1.00 	
190828: Leelanau	 - 65 	 Very limited Seepage, bottom layer Slope 	1.00 1.00	Seepage	 1.00 1.00	

Table 10.—Sewage Disposal—Continued

	Pct. Of	 Septic tank absorption fiel	.ds	 Sewage lagoon 	ıs
	map	Rating class and	Value	Rating class and	
	lunit	limiting features	 	limiting reatures	
190828:	i	' 	i	' 	i
East Lake	25	Very limited		Very limited	I
	!	Seepage, bottom		_	1.00
	1	layer Slope	 1.00	Seepage 	11.00
	i	Filtering	11.00	! 	i
	ĺ	capacity	İ	l	İ
190829:		 		 	1
Leelanau	50	 Very limited	i	 Very limited	i
	I	Slope	1.00	Slope	11.00
	I	Seepage, bottom	1.00	Seepage	1.00
		layer	1	 	
East Lake	35	 Very limited	i	 Very limited	
	I	Slope	1.00	•	1.00
	!	Seepage, bottom		Seepage	11.00
	!	layer Filtering	1]]	!
	i	capacity	1	! 	i
190830:	1] !	1	 -	!
Leelanau	50	 Very limited	i	 Very limited	i
	I	Slope	11.00	·	11.00
		Seepage, bottom layer	11.00	Seepage	1.00
	i	 rayer	i	! 	i
East Lake	35	· -		Very limited	1
	!	Slope	1.00	·	1.00
	1	Seepage, bottom layer	11.00	Seepage 	11.00
	i	Filtering	11.00	! 	i
	İ	capacity	İ	İ	İ
190831:	 	 		 	
	60	Very limited	i	Very limited	i
	I	Ponding	•	Ponding	11.00
	!	Depth to	1.00		1.00
	1	saturated zone Subsidence	11.00	content Depth to	11.00
	i	Seepage, bottom		· -	•
	İ	layer	İ	Seepage	11.00
Markey	I I 30	 Verv limited		 Very limited	1
	i	Ponding	11.00	_	11.00
	I	Depth to	1.00		1.00
	!	saturated zone		content	
	!	Subsidence Seepage, bottom	1.00 1.00		1.00 1.00
	<u>'</u>	Seepage, Doctom	1	saturated zone	1
	Ì	Filtering	11.00		İ
		capacity	1	 -	1
190832:		! 		! 	
Mancelona	90	Very limited		Very limited	I
		Seepage, bottom	1.00		11.00
	!	layer		Slope	0.08

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of	Septic tank absorption fiel	ds	Sewage lagoons	
T:	map	Rating class and limiting features	Value		
190833: Mancelona	 90 	Seepage, bottom layer		Slope	 1.00 1.00
190834: Mancelona		 Very limited Seepage, bottom layer	11.00	 Very limited Seepage Slope	 1.00 0.08
East Lake		Seepage, bottom layer	11.00	Slope	 1.00 0.08
190835: Mancelona		Seepage, bottom layer		Slope	 1.00 1.00
East Lake	•	Seepage, bottom layer	•	Slope 	 1.00 1.00
190836: Mancelona	 50 	Seepage, bottom layer		Seepage	 1.00 1.00
East Lake	 30 	Seepage, bottom layer Slope		Seepage 	 1.00 1.00
190837: Mancelona	 45 	Slope		·	 1.00 1.00
East Lake	 30 	 Very limited Slope Seepage, bottom layer Filtering capacity	 1.00 1.00 1.00	Seepage 	 1.00 1.00
190838: Mancelona	 	 Very limited Slope Seepage, bottom layer 	1.00 1.00 	·	 1.00 1.00

Table 10.—Sewage Disposal—Continued

Pct. of	Septic tank absorption fiel	.ds	Sewage lagoon 	ıs
map	Rating class and	Value	_	
unit	limiting features	<u>!</u>	limiting features	!
 	 	1	 	<u> </u>
30	Very limited	i	Very limited	i
I	Slope		•	11.00
1		_	Seepage	1.00
! 	·	•	 	<u> </u>
İ	capacity	i	i	i
	 	1	 	!
70	 Very limited	i	 Very limited	i
İ	·		•	11.00
!	layer	!	Slope	10.08
l I 25	 Verv limited	1	l Verv limited	!
	Depth to		· -	11.00
I	saturated zone	1	saturated zone	1
I	Slow water			10.50
 	movement		Slope	10.08
İ		i	' 	i
90	•	•		1
	•	1.00	Slope	10.32
! 	Movement	i	 	<u> </u>
İ	I	i	I	i
90	•		•	
!	•	11.00	Slope	1.00
! 	Slope	0.04	 	i
ĺ	Ī	İ	l	İ
	 Tame limited	1	 Tom: limited	!
1 90 1	•		•	11.00
İ	movement	i	i İ	i
!	Slope	11.00		!
 	 	1	l I	1
90	Very limited	i	Very limited	i
!	Slow water	11.00	Slope	11.00
 	•	I I1 00	l I	
	 	1	! 	i
Ι	I	1	I	1
90	-			11 00
l I	•	11.00	l stobe	11.00
i	Slope	11.00	İ	i
		1	1	!
I I 100	 Not rated	1	 Not rated	
====		i		i
!	<u> </u>	1	<u> </u>	I
	_		•	 1.00
<u> </u>	·		· -	1
İ	Slow water			0.50
!	movement	!	 -	!
I I 4∩	 Somewhat limited	1	l Verv limited	1
, 20	,			
	Slow water	10.50	Seepage	1.00
	map unit 30 30 1 1 30 1 1 1 70 1 1 90 1 90 1 90 1 1 90 1 1 1 1 1 1 1 1 1 1	map Rating class and unit limiting features	map	map

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct.	· •	ds	Sewage lagoon 	ıs
	-	Rating class and limiting features		Rating class and limiting features	
190848:	 	1	1	1	1
Richter	- 45	Very limited	i	Very limited	i
	1	Depth to	11.00	Depth to	11.00
	I	saturated zone	1	saturated zone	1
	1	Slow water movement	0.50 	Seepage Slope	0.50 0.32
31	 - 40	 	İ		į
Alcona	1 40	Somewhat limited Slow water	10.50	Very limited Seepage	11.00
	i	movement	1	Slope	10.32
190849:	1] 	1	 	1
Roscommon	- - j 50	 Very limited	i	Very limited	i
	Ì	Ponding	11.00	Ponding	11.00
	1	Depth to	1.00	Seepage	1.00
	I	saturated zone	1	Depth to	1.00
		Seepage, bottom layer	1.00 	saturated zone 	1
	İ	Filtering	11.00	l	İ
	1	capacity	1	 -	1
Markey	- 30	 Very limited	i	 Very limited	i
-	Ì	Ponding	11.00	Ponding	11.00
	1	Depth to	11.00	Organic matter	1.00
	1	saturated zone	1	content	I
	!	Subsidence	1.00		11.00
	!	Seepage, bottom	1.00	· -	1.00
	-	layer Filtering	 1.00	saturated zone	!
	į	capacity		' 	į
190850:		 		 	
Sanilac	- 90	Very limited	1	Very limited	1
		Flooding	11.00	•	11.00
	!	Depth to	11.00	· -	11.00
		saturated zone Slow water	11 00	saturated zone Seepage	 0.50
	i	movement	1.00 	Slope	10.50
190851:	1	 	1	 	1
Tonkey	- 40	' Very limited	i	Very limited	i
	1	Ponding	1.00	Ponding	1.00
		Depth to	11.00		11.00
	!	saturated zone		Depth to	11.00
		Filtering	1.00	saturated zone	1
		capacity Seepage, bottom	 1.00	l I	
	i	layer	1	' 	i
Munuscong	l -1 25	 Very limited		 Very limited	1
	i	Ponding	11.00	_	11.00
	1	Depth to	11.00	Seepage	1.00
	1	saturated zone	1	Depth to	1.00
	1	Slow water movement	1.00 	saturated zone 	1
Toggo		 Vorus limited	i	 Vorus limited	1
Iosco	- 1 25 I	Very limited Depth to	 1.00	Very limited Seepage	1 1.00
	i	bepth to saturated zone	11.00 I	Seepage Depth to	11.00
		,		,	,
	i	Slow water	1.00	saturated zone	1

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct.	Septic tank absorption fiel	.ds	Sewage lagoor 	ıs
		Rating class and		' 	IValue
	-	limiting features		limiting features	
100050	!	!	!	[!
190852: Tonkey	I I 35	 Very limited		 Very limited	
Tonkey	1 22	•		Ponding	11.00
	:	Depth to		Seepage	11.00
	:	saturated zone		Depth to	11.00
	<u> </u>	Filtering	•	saturated zone	1
	i	capacity	1	l Sacaracea zone	i
	i	Seepage, bottom	•	i i	i
	į	layer		į	į
Munuscong	 30	 Very limited		 Very limited	1
		•		Ponding	11.00
	i	Depth to		Seepage	11.00
	İ	saturated zone	İ	Depth to	11.00
	1	Slow water	1.00	saturated zone	1
	!	movement	!	 -	1
Iosco	20	 Very limited		 Very limited	<u> </u>
	i	Depth to		Seepage	11.00
	i	saturated zone		Depth to	11.00
	1	Slow water	1.00	saturated zone	1
	1	movement	1	Slope	0.08
190853:	1	 Not rated	!	 - Not motod	
Water	1 100	Not rated 		Not rated 	-
190854:		!	1	!	ļ.
Wallace	50	Very limited		Very limited	
	!	Depth to		Depth to	11.00
	!	cemented pan		cemented pan	1 00
	!		11.00	Seepage	11.00
		layer 		Slope 	1.00
Kalkaska	45	Very limited	i	Very limited	i
	1	Seepage, bottom	1.00	Seepage	1.00
	1	layer	1	Slope	11.00
	1	Filtering	1.00	I	1
	1	capacity	1	 	1
190855:	i	İ	i	İ	i
Wind eroded land	100	•		Very limited	1
	I	Seepage, bottom	11.00		1.00
	I	layer	•	Slope	10.92
	 	Filtering capacity	1.00 	 	
190856:	1	_ 	1	 -	1
Wind eroded land	1 100	 Very limited	1	 Very limited	
"THE STORES TAILS"	1	•	11.00	_	11.00
	i	layer	1	Stope Seepage	11.00
	i	Slope	11.00		1
	i	Filtering	11.00		i
	į	capacity		İ	į
193236:	1 	I 	1	 	1
Beaches	100	Not rated	1	Not rated	1
	1	I	I	I	1

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct.	Septic tank absorption fiel	ds	Sewage lagoor	ns
and soll name		Rating class and		' 	I Value
	-	limiting features		limiting features	
193237:	1	<u> </u>	1	 -	1
Thompsonville	i i 50	 Very limited	i	 Very limited	i
-	İ	Depth to	11.00	Seepage	11.00
	1	saturated zone		Depth to	11.00
	1	Slow water movement	1.00 	saturated zone	
	i		i	i İ	i
Milnichol		· -		Very limited	
	1	Depth to saturated zone		Seepage Depth to	1.00 1.00
	i .	Slow water	•	saturated zone	1
	i	movement	i	İ	i
193255:	1	<u> </u>	1	 -	1
	1 50	 Very limited	i	 Very limited	i
-	i	Seepage, bottom		_	11.00
	1	layer	•	Slope	10.08
	1	Filtering capacity	11.00	 	!
	i	capacity	i	' 	i
Coloma	40	Very limited	•	Very limited	1
	1	Seepage, bottom	1.00		1.00 0.08
	<u> </u>	layer Filtering	11.00	Slope 	10.08 I
	i	capacity	i	İ	i
193256:	1	<u> </u>	1	 -	1
Spinks	1 50	 Very limited	i	 Very limited	i
-	i	Seepage, bottom		_	11.00
	!	layer	•	Slope	11.00
	!	Filtering capacity	1.00 	 	!
	i	Slope	0.04	' 	i
0.1			!		!
Coloma	40 	Very limited Seepage, bottom		Very limited Seepage	1
	i	layer	1	Slope	11.00
	1	•	1.00	l	I
		capacity Slope	 0.04	<u> </u>	1
		Slope	0.04 	! 	i
193257:	!	!	1	!	1
Spinks	55		 1.00	Very limited	 1.00
	i .	Seepage, bottom layer	1	Slope Seepage	11.00
	i	Slope	11.00		i
	1	Filtering	11.00	!	1
	I	capacity 		 	1
Coloma	35	 Very limited	i	 Very limited	i
	1	Seepage, bottom	11.00	•	11.00
	1	layer	11 00	Seepage	1.00
	1	Slope Filtering	1.00 1.00		1
	i	capacity	:	 	i
	1	- I	1	İ	1

Table 10.—Sewage Disposal—Continued

	 Pct. of	· •		Sewage lagoons		
	map		Value	Rating class and limiting features		
193258: Spinks	 50 	 Very limited Slope Seepage, bottom layer Filtering capacity	1.00	Seepage 	 1.00 1.00 	
Coloma	 40 	 Very limited Slope Seepage, bottom layer Filtering capacity	11.00	Seepage 	 1.00 1.00 	
193260: Copemish	 95 	 Very limited Depth to cemented pan Seepage, bottom layer	1.00 	 Very limited Depth to cemented pan Seepage Slope	 1.00 1.00 1.00	
193262: Kaleva	95 	 Very limited Seepage, bottom layer Filtering capacity		Slope	 1.00 0.08 	
193263: Kaleva	 95 	 Very limited Seepage, bottom layer Filtering capacity Slope		Slope 	 1.00 1.00 	
193265: Grattan	 95 	 Very limited Seepage, bottom layer Filtering capacity		Slope	 1.00 0.08 	
193266: Grattan	95 	 Very limited Seepage, bottom layer Filtering capacity Slope	 1.00 1.00 1.00	Slope	 1.00 1.00 	
193267: Grattan	 95 	 Very limited Seepage, bottom layer Slope Filtering capacity	 1.00 1.00 1.00	Seepage 	 1.00 1.00 	

Table 10.—Sewage Disposal—Continued

	Pct. of	Septic tank absorption fiel	.ds	Sewage lagoons		
		Rating class and		Rating class and	Value	
	_	limiting features		limiting features		
	I	!	1	<u> </u>	I	
193269:	l 0-		!		!	
Grattan	J 95	Very limited		Very limited	1 1.00	
	! !	Slope Seepage, bottom	11.00	•	11.00	
	<u> </u>	layer	1	l beepage	1	
	i		11.00	i	i	
	İ	capacity	i	İ	i	
	!	!	1	<u> </u>	1	
193270:	 an	 Vom: limited		 Von: limited		
Covert	1 90 1	Very limited Depth to	1 1.00	Very limited Seepage	11.00	
	! !	saturated zone	1		11.00	
	i			saturated zone	1	
	i	layer	i	Slope	0.08	
	I	Filtering	11.00	I	1	
	l	capacity	1	l	1	
100071	!	 -	!		1	
193271: Pipestone	I I 90	l Very limited	1	 Very limited	!	
ripescone	1 30 1	Depth to	11.00	-	11.00	
	i	saturated zone	•		11.00	
	İ	Seepage, bottom		· -	i	
	I	layer	1	l	1	
	I	Filtering	1.00	I	1	
		capacity	!		!	
193272:	 	l 1	1	l 1		
Dair	, 90	 Very limited	i	Very limited	i	
	I	Ponding	1.00	Ponding	1.00	
	I	Depth to	1.00	Organic matter	1.00	
	I	saturated zone		content		
	!	Seepage, bottom		Seepage	1.00	
	! !	layer Filtering	 1.00	Depth to saturated zone	1.00 	
	' 	capacity	1	Saturated Zone	i	
	ĺ	l	İ	l	Ì	
193277:			!		!	
Benona	1 90 1	Very limited Seepage, bottom	•	Very limited Seepage	11.00	
	<u> </u>	layer	1	Slope	10.08	
	i		11.00	·	i	
	ĺ	capacity	Ì	l	Ì	
		!	1	!	1	
193278:	l		!		!	
Benona	1 90	_		Very limited	1	
	! !	Seepage, bottom layer	1	Seepage Slope	11.00	
	i	Filtering	11.00	·	1	
	i	capacity	i	i I	i	
	l	Slope	0.04	l	1	
102070	!	<u> </u>	!	 -	1	
193279: Benona	l I an	 Very limited	I	 Very limited	1	
Denona	, 30 	=	1	=	11.00	
	:	layer		Siope Seepage	11.00	
	ı					
	 	Slope	11.00		i	
	 	_		I	 	

Table 10.—Sewage Disposal—Continued

	 Pct. of	, Septic tank absorption fiel	.ds	Sewage lagoon 	s
				Rating class and	Value
		limiting features		limiting features	
100004	!	<u> </u>	!	<u> </u>	!
193284:		 	!		!
Udorthents	1 22	Very limited Slow water	 1.00	Very limited Slope	1 1.00
	<u> </u>	movement	1	l siope	1
	i	Slope	11.00		i
	I	I -	1	I	1
Udipsamments	35	Very limited		Very limited	I
	I	Slope	11.00	· •	11.00
	!	Seepage, bottom	11.00	Seepage	11.00
	!	layer	1 00	 	!
	!	Filtering	11.00] 	!
	<u> </u>	capacity 	i	! 	i
193285:	i	I	i		i
Lumley	55	Very limited	Ì	Very limited	I
	I	Ponding	1.00		1.00
	1	Depth to	11.00		11.00
	!	saturated zone		content	1 00
	!	Subsidence	11.00	Depth to saturated zone	1.00
		Seepage, bottom layer	11.00	Seepage	 1.00
	i	l rayer	i	Seepage 	1
Makinen	40	Very limited	i	Very limited	i
	I	Ponding	11.00	Ponding	1.00
	I	Depth to	1.00	Organic matter	1.00
	I	saturated zone	1	content	1
	!	Seepage, bottom			11.00
	!	layer Subsidence	 1.00	Depth to saturated zone	1.00
		Subsidence	11.00	Saturated zone	!
193286:	i	! 	i	! 	i
Histosols	55	Very limited	İ	Very limited	İ
	I	Ponding	11.00	Ponding	1.00
	1	Depth to	1.00		1.00
	!	saturated zone		content	
	!	Seepage, bottom	1.00		1.00
	!	layer Subsidence	11.00	Depth to saturated zone	1.00
	<u> </u>	Subsidence	1	Saturated zone	!
Aquents	45	 Very limited	i	Very limited	i
-	ĺ	Ponding	11.00		11.00
	I	Depth to	11.00	Seepage	1.00
	1	saturated zone	•	Depth to	1.00
	1	Seepage, bottom	11.00	saturated zone	1
	!	layer		<u> </u>	!
	!	Filtering capacity	11.00	l I	!
	<u> </u>	Capacity	<u> </u>	! 	<u> </u>
193287:	i	I	i	I	i
Dune land	55	Not rated	1	Not rated	I
]	!		!
Quartzipsamments	40			Very limited	11 00
	I I	Slope Seepage, bottom	1.00 1.00	•	1.00 1.00
	 	seepage, bottom layer	11.00	l seebade	1
	i	Filtering	11.00	İ	i
	İ	capacity	i		İ
	I	i	Ì	I	1

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of	· -	lds	Sewage lagoons 	
	map			Rating class and	Value
	unit	limiting features	1	limiting features	<u> </u>
102000	!		!		1
193288: Udipsamments	I I 100	 Very limited		 Very limited	!
ourpsamments	1 100	Seepage, bottom	11.00	_	11.00
	i	layer	1	Slope	0.08
	i	Filtering	11.00		i
	I	capacity	1	I	1
	!	<u> </u>	1		1
193342: Gorvan	1 25	 Very limited	1	 Very limited	!
GOLVAII	1 33	Flooding	11.00	_	11.00
	i	Ponding	11.00	-	11.00
	i	Depth to	11.00		11.00
	i	saturated zone	i	Depth to	11.00
	1	Slow water	11.00	saturated zone	1
	1	movement	1	I	1
		Seepage, bottom	11.00	<u> </u>	
		layer	!	1	!
Houghton	ı ·I 30	 Very limited	i	 Very limited	i
	i	Flooding	11.00	_	11.00
	Ì	Ponding	11.00	Flooding	11.00
	1	Depth to	11.00	Organic matter	1.00
	I	saturated zone	1	content	1
	!	Subsidence	1.00	•	11.00
	!	Seepage, bottom	11.00	•	11 00
	1	layer 	!	Seepage 	11.00
Glendora	20	Very limited	i	Very limited	i
	1	Flooding	11.00	Ponding	1.00
	1	Ponding	11.00	Flooding	1.00
	I	Depth to	1.00		11.00
	!	saturated zone		Depth to	11.00
		Seepage, bottom	1.00	saturated zone	!
		layer Filtering	11.00	1	
	i	capacity	1		i
	i	i -	i	i İ	i
193349:	1	l	1	l	1
Spinks	50	Very limited		Very limited	1 00
	!	Slope	1.00	-	1.00 1.00
		Seepage, bottom laver	1.00 	Seepage 	11.00
	i	Filtering	11.00	! 	i
	i	capacity	i	i İ	i
	1	l	1	l	1
Coloma	40	Very limited		Very limited	
	!	Slope	1.00	-	1.00
	!	Seepage, bottom layer	1.00	Seepage	1.00
	<u> </u>	Tayer Filtering	11.00] 	<u> </u>
	i	capacity	1	· 	i
	1	- <u>-</u>	I	I	1
193351:		<u> </u>	1	<u> </u>	1
Benona	95	Very limited		Very limited	
	I	Slope	11.00	-	11.00
		Seepage, bottom layer	11.00	Seepage 	11.00
	i	Tayer Filtering	11.00	! 	i
	i	capacity	1		i

Table 10.—Sewage Disposal—Continued

	Pct. of	Septic tank absorption fiel	ds	Sewage lagoons 	
	map			Rating class and	Value
	-	limiting features		limiting features	
	ī	l	ī	l	ī
193354:	I	I	1	I	1
Dune land	50	Not rated	1	Not rated	1
0	1 40	 Tom: limited	1	 Tom: limited	!
Quartzipsamments	4±0 	Seepage, bottom		Very limited Seepage	11.00
	i	layer		Slope	11.00
	i	Filtering	11.00	·	i
	I	capacity	1	l	I
	I	Slope	10.63	l	1
	!	<u> </u>	1	<u> </u>	1
193357:	 0E	 Tome limited	1	 Tom: limited	!
Shavenaugh	1 00	Slope	1 1.00	Very limited Slope	11.00
	i	· •	11.00	·	11.00
	i	layer	1	l	i
	Ì	Filtering	11.00	l	İ
	I	capacity	1	I	1
100050	!	 -	1	 -	!
193359:	 0E	 Very limited	1	 Tom: limited	!
Shavenaugh	1 00	Seepage, bottom		Very limited Seepage	11.00
	i	layer		Slope	11.00
	i	Filtering	11.00	·	i
	I	capacity	1	l	I
	1	Slope	10.04	<u> </u>	1
193360:	!		1	 	!
	I I 85	 Very limited	<u> </u>	 Very limited	!
ona v chaagh	1	Seepage, bottom		_	11.00
	i	layer		Slope	0.08
	I	Filtering	1.00	l	1
	!	capacity	1	 -	!
193362:	!	 	1	 	!
Benzonia	I 90	 Verv limited	i	 Very limited	i
	i	Slope	11.00	_	11.00
	I	Seepage, bottom	1.00	Seepage	1.00
	I	layer	1	l	1
	!	Filtering	11.00	 -	!
	!	capacity	1	l I	!
193363:	:	! 	<u> </u>	! 	i
Benzonia	90	 Very limited	i	 Very limited	i
	i	•	11.00	_	11.00
	I	layer	1	Seepage	1.00
	1	Slope	11.00		1
	!	Filtering	11.00		!
	 	capacity 	1	I I	1
193364:	i		i		i
Benzonia	90	Very limited	I	Very limited	I
	I	Seepage, bottom	11.00		11.00
	!	layer		Slope	11.00
	1	Filtering capacity	1.00] 	1
	! 	Capacity Slope	1 0.04	! 	
	i	 		I	i

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of	Septic tank _ absorption field	Sewage lagoons ds		
	_	Rating class and limiting features		Rating class and limiting features	
193365: Benzonia	 90 	Seepage, bottom layer Filtering	1.00 1.00	Slope	 1.00 0.08
193371: Dair	 50 	Ponding Depth to saturated zone Seepage, bottom layer	1.00 1.00 1.00	Organic matter content Seepage	 1.00 1.00 1.00 1.00 1.00
Pipestone		Depth to saturated zone Seepage, bottom layer	1.00 	 Very limited Seepage Depth to saturated zone 	 1.00 1.00
193372: Access Denied		 Not rated 	 	 Not rated 	
193423: Benona	 95 	Slope Seepage, bottom layer	11.00	Seepage 	 1.00 1.00
193484: Pits, sand and gravel		 Not rated	 	 Not rated	
193494: Nordhouse		Slope Seepage, bottom layer	 1.00 1.00 1.00	Seepage 	 1.00 1.00
193496: Nordhouse	 95 	layer Filtering capacity	 1.00 1.00 	Slope 	 1.00 1.00
193497: Nordhouse	95 	layer	1.00 1.00 	Slope	 1.00 0.08

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of	Septic tank absorption fiel	.ds	 Sewage lagoon 	ıs
	map	Rating class and	Value	Rating class and	Value
	unit	limiting features	1	limiting features	1
193498:		 	1	 	1
Nordhouse	I I 40	 Verv limited	i	 Very limited	<u> </u>
	i	Seepage, bottom		•	11.00
	İ	layer		Slope	0.08
	I	Filtering	1.00	l	1
	!	capacity	!	<u> </u>	1
Platteriver	 35	 Verv limited		 Very limited	
11466611761		·		Seepage	11.00
	i	saturated zone		Depth to	11.00
	i	•		saturated zone	i
	ĺ	layer	İ	l	İ
	I	Filtering	1.00	I	1
	!	capacity	!	<u> </u>	1
Dair	 25	 Very limited	1	 Very limited	
Dair		·		Ponding	11.00
	i	-		Organic matter	11.00
	i	saturated zone	•	content	i
	I	Seepage, bottom	1.00	Seepage	1.00
	I	layer	1	Depth to	1.00
	I		1.00	saturated zone	I
	!	capacity	!		!
193503:	 	 		 	1
	50	Very limited	i	Very limited	i
-	ĺ	Seepage, bottom	11.00	Seepage	11.00
	I	layer	1	Slope	10.08
	I		1.00	I	I
		capacity	!	1	!
Shavenaugh	I I 40	l Verv limited		 Very limited	1
biiaveilaugii		Seepage, bottom		•	11.00
	i	layer	1	Slope	10.08
	İ	•	11.00	•	i
	l	capacity	I	l	I
102504		1	!	1	!
193504: Spinks	I I 50	 Very limited	1	 Very limited	1
Spinks	1	Seepage, bottom			11.00
	i	layer	i	Slope	11.00
	ĺ	Filtering	11.00	i - I	İ
	I	capacity	1	I	1
	!	Slope	10.04	<u> </u>	1
Shavenaugh	I I 40	 Very limited	1	 Von: limited	
Snavenaugn	4±0 	Seepage, bottom	11.00	Very limited Seepage	11.00
	i	layer	1	Slope	11.00
	i	Filtering	11.00	•	1
	ĺ	capacity	İ	l	İ
	I	Slope	0.04	l	1
102505.			!	1	!
193505: Spinks	I I 50	 Very limited	1	 Very limited	1
obines	, Ju	Seepage, bottom	11.00	•	11.00
	i	layer	1	Seepage	11.00
		Slope	11.00		i
	ı	l probe	1		
	 	Filtering	11.00		i

Table 10.—Sewage Disposal—Continued

	 Pct. of	Septic tank absorption fiel	ds	Sewage lagoons		
	map			Rating class and	Value	
	-	limiting features		limiting features		
	ı	I	ī	I	ī	
193505:		1	1	1	1	
Shavenaugh	40	Very limited		Very limited		
	!	Seepage, bottom		_	1.00	
	!	layer	11 00	Seepage	1.00	
		Slope Filtering	1.00 1.00	1 1	!	
	<u> </u>	capacity	1	! 	i	
	l	!	!	!	1	
193506: Spinks	 50	 Very limited	1	 Very limited		
Spinks	1 30	Slope	11.00	_	11.00	
	<u> </u>	•	11.00	•	11.00	
	i	layer	1	l scopage	1	
	i	Filtering	11.00	i	i	
	İ	capacity	i	İ	i	
Shavenaugh	l 1 40	 Very limited	1	 Very limited		
Silavellaugii		Slope	11.00	_	11.00	
	i	Seepage, bottom		•	11.00	
	i	layer	i	l	i	
	ĺ	Filtering	11.00	Ì	İ	
	1	capacity	!	!	1	
193507:	l I	 	1	 		
Spinks	50	Very limited	i	Very limited	i	
	I	Slope	11.00	Slope	11.00	
	I	Seepage, bottom	1.00	Seepage	1.00	
	1	layer		1	1	
	 	Filtering capacity	11.00	 	1	
	i		i	İ	i	
Shavenaugh	40	Very limited		Very limited	1	
	!	Slope	1.00	•	11.00	
	!		1.00	Seepage	1.00	
	!	layer Filtering	11.00	 	!	
	<u> </u>	capacity	1	! 	i	
100500	!	!	!	!	1	
193508: Madaus	I I 90	 Very limited	1	 Very limited	1	
		Ponding	11.00	=	11.00	
	i	Depth to	11.00	Organic matter	11.00	
	ĺ	saturated zone	İ	content	İ	
	I	Slow water	11.00	Seepage	11.00	
	I	movement	I	Depth to	1.00	
		 	1	saturated zone		
193509:	i	i I	i	i I	i	
Boyer	50	Very limited		Very limited	1	
		Seepage, bottom	11.00		1.00	
	l I	layer	1	Slope	10.08	
Shavenaugh	40	 Very limited	i	 Very limited	1	
_	İ	Seepage, bottom	11.00	•	11.00	
	l	layer	1	Slope	10.08	
	l	Filtering	11.00	l	I	
	I	capacity	I	<u> </u>	1	
	I	I	I	I	1	

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct.	· -		Sewage lagoons		
	map		Value	Rating class and limiting features		
193510:	 	 	 	 	1	
Boyer	50 	Very limited Seepage, bottom layer Slope		Slope	 1.00 1.00	
Shavenaugh	 40 	 Very limited Seepage, bottom layer Filtering capacity Slope		Slope	 1.00 1.00 	
193511:		 		 		
Boyer	50 	Very limited Slope Seepage, bottom layer	11.00	•	 1.00 1.00	
Shavenaugh	 40 	 Very limited Slope Seepage, bottom layer Filtering capacity	11.00	•	 1.00 1.00 	
193513:		! 		! 		
Dair	50 	Very limited Ponding Depth to saturated zone Seepage, bottom layer Filtering capacity	1.00 1.00 	Organic matter content Seepage Depth to	 1.00 1.00 1.00 1.00	
Adrian	 45 	 Very limited Ponding Depth to saturated zone Subsidence Seepage, bottom layer	1.00 1.00 1.00 1.00	 Very limited Ponding Organic matter content Seepage Depth to saturated zone	 1.00 1.00 1.00 1.00	
193514:		 		I 		
Platteriver	55 	Very limited Depth to saturated zone Seepage, bottom layer Filtering capacity	 1.00 1.00 1.00	Depth to saturated zone 	 1.00 1.00 	
Pipestone	40 	 Very limited Depth to saturated zone Seepage, bottom layer Filtering capacity	 1.00 1.00 1.00	Depth to saturated zone 	 1.00 1.00 	

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of	-	.ds	Sewage lagoons 		
	-	Rating class and limiting features		Rating class and limiting features		
202010:] 	1] 	1	
Houghton	55	Very limited	i	Very limited	i	
_	I	Ponding	1.00	Ponding	1.00	
	I	Depth to	1.00	Organic matter	1.00	
	1	saturated zone		content		
	!	Subsidence	1.00		1.00	
	!	Seepage, Dottom laver	11.00	saturated zone Seepage	 1.00	
	i	l rayer	i	Seepage 	1	
Adrian	40	Very limited	i	Very limited	i	
	I	Ponding	1.00	Ponding	1.00	
	I	Depth to	1.00	Organic matter	1.00	
	I		1	content	1	
	!	Subsidence		Seepage	1.00	
	!	Seepage, bottom	11.00	Depth to saturated zone	1.00	
	!	layer 	1	Saturated zone	!	
202016:	i	! 	i	! 	i	
Spinks	50	Very limited	İ	Very limited	İ	
	I	Seepage, bottom	1.00	Seepage	1.00	
	I	layer	1	Slope	10.08	
	!	Filtering	11.00	!	!	
	!	capacity	!	 	1	
Tekenink, sandy	i	! 	i	! 	i	
substratum	40	Very limited	i	Very limited	i	
	I	Seepage, bottom	11.00	Seepage	1.00	
	1	layer	1	Slope	10.08	
631170:	!	 	1	 	1	
	i i 50	 Very limited	i	 Very limited	i	
	i	Slope	11.00	•	11.00	
	I	Seepage, bottom	1.00	Seepage	1.00	
	I	layer	1	!	1	
Benzonia	1 40	 Very limited	!	 Very limited	!	
Belizoliia	1 40	Slope	11.00	•	11.00	
	i	Seepage, bottom	•	•	11.00	
	i	layer	i	İ	i	
	I	Filtering	1.00	l	1	
	!	capacity	!	<u> </u>	!	
631171:	!	 	1	 	1	
	50	 Very limited	i	Very limited	i	
33	i	Slope	11.00		11.00	
	I	Seepage, bottom	1.00	Seepage	1.00	
	!	layer	!	!	1	
Benzonia	1 40	 Very limited	1	 Very limited	1	
Belizolita	1 40	Slope	 1.00	•	11.00	
	i	•	11.00	•	11.00	
	i	layer	i	İ	i	
	I	Filtering	1.00	I	I	
	1	capacity	!		!	
631172:	1] 	1	 		
		 Very limited	i	 Very limited	i	
Fogg	50					
Fogg	50 	Slope	11.00	_	11.00	
Fogg	50 	Slope		Slope	1.00 1.00	

Table 10.—Sewage Disposal—Continued

	 Pct. of	Septic tank absorption fiel	lds	Sewage lagoons 		
				Rating class and	Value	
	-	limiting features		limiting features		
C011E0	!	!	!	!	!	
631172:	1 40	 	!		!	
Benzonia	1 40	•		Very limited		
	!	Seepage, bottom		_	11.00	
	!	layer	•	Seepage	11.00	
	!	Slope	1.00		!	
	 	Filtering capacity	1.00 	 	1	
	i		i	İ	i	
631173:			1		!	
Fogg	1 50	Very limited		Very limited	1 00	
	!	Seepage, bottom			1.00	
	!	layer	•	Slope	11.00	
	!	Slope	0.04 	 	!	
Benzonia	40	 Very limited	•	 Very limited	i	
	İ	Seepage, bottom		_	11.00	
	I	layer	1	Slope	1.00	
	I	Filtering	1.00	Ī	1	
	I	capacity	1	I	1	
	!	Slope	10.04	<u> </u>	1	
631174:	<u> </u>	! 	1	! 	1	
Fogg	50	Very limited	i	Very limited	i	
	I	Seepage, bottom	1.00	Seepage	1.00	
	I	layer	1	Slope	10.08	
Dannania		177 1::			!	
Benzonia	1 40	Very limited		Very limited	11 00	
	!	Seepage, bottom layer		Seepage Slope	1.00 0.08	
		Tayer Filtering	11.00	•	10.00	
	i	capacity	1	 	i	
	1	ļ.	1	ļ	1	
680939: Fern	l 1 50	 Very limited		 Very limited	!	
rem	1	Depth to		Seepage	11.00	
	i	saturated zone		Depth to	11.00	
	i	Slow water		saturated zone	1	
	i	movement		Slope	0.92	
		1	1	<u> </u>	1	
Spinks	40	Very limited		Very limited		
	!	Seepage, bottom			1.00	
	!	layer	 1.00	Slope	1.00	
	!	Filtering	:	 	1	
	i	capacity Slope	 0.04	! 	i	
	i	İ	İ	İ	i	
680943:			!		!	
Milnichol	90	Very limited		Very limited	1 00	
	!	Depth to	1.00		1.00	
	!	saturated zone	11 00	Depth to saturated zone	1.00	
	<u> </u>	Slow water movement	1.00 	saturated zone	i	
	i	i	i	İ	i	
680945:		<u> </u>	!	l	!	
Fern	90	Very limited		Very limited		
	!	Depth to	1.00	·	1.00	
	1	saturated zone	11 00	Depth to	1.00	
	!	Slow water	1.00		11 00	
	!	movement Slope	 0.04	Slope	1.00 	

Table 10.—Sewage Disposal—Continued

	 Pct. of	-	 Septic tank absorption fields		 Sewage lagoons 		
	-	Rating class and limiting features		•			
680946: Fern		saturated zone	1.00 	 Very limited Seepage Depth to saturated zone Slope	 1.00 1.00 		
680971: Nessen	 50 51 1 1	Slope Seepage, bottom layer	11.00	Seepage 	 1.00 1.00 		
Kaleva		Seepage, bottom layer	11.00	Seepage 	 1.00 1.00 		
680972: Nessen	 50 	•		Seepage 	 1.00 1.00 		
Kaleva	 40 	•	11.00	Seepage 	 1.00 1.00 		
680973: Nessen	 50 51 		1.00 1.00	Slope 	 1.00 1.00 		
Kaleva	40 40 	 Very limited Seepage, bottom layer Filtering capacity Slope	 1.00 1.00 0.04	Slope 	 1.00 1.00 		
680974: Nessen	50 51 1 1	 Very limited Seepage, bottom layer Filtering capacity	 1.00 1.00	Slope	 1.00 0.08 		

Table 10.—Sewage Disposal—Continued

		absorption fiel	Las	Sewage lagoons	
·	lman			Rating class and	Value
	_	limiting features		limiting features	
	ī	l	ı	<u> </u>	ī
680974:	I	I	1	I	1
Kaleva	40	· -		Very limited	1
	!	Seepage, bottom			11.00
	!	layer	•	Slope	10.08
	!	Filtering	1.00	 	!
	!	capacity	1	 	1
893251:	i	 	i		i
Boyer	50	Very limited	i	 Very limited	i
	I	Seepage, bottom	11.00	Slope	1.00
	I	layer	1	Seepage	1.00
	I	Slope	1.00	I	I
Chh	1 40		!		!
Shavenaugh	1 40	Seepage, bottom		Very limited	11.00
	i	layer		Stope Seepage	11.00
	i	Slope	11.00		1
	i	Filtering	11.00		i
	i	capacity	i	i I	i
	I	l	1	l	1
894062:			1		1
Remus	1 50	Very limited		Very limited Slope	11 00
	:	Slow water movement	•	Siope Seepage	1.00 0.27
	i .	Slope	11.00		10.27
	i		:		i
Spinks 4	40	Very limited	1	Very limited	1
	I	Slope		Slope	1.00
	!	Seepage, bottom		Seepage	11.00
	!	layer	11 00	 	!
	!	Filtering capacity	1.00 	 	1
	i		i	! 	i
894063:	İ	Ī	İ	Ī	Ì
Remus		Very limited		Very limited	1
	!	Slow water	11.00	•	1.00
	!	movement Slope	 1.00	Seepage	10.27
	<u> </u>	l probe	1	! 	<u> </u>
Spinks	40	Very limited	i	Very limited	i
	I	Seepage, bottom	11.00	Slope	11.00
	I	layer	1	Seepage	1.00
	I	Slope	11.00		I
	!	Filtering	11.00	<u> </u>	!
	!	capacity	1	 	
894064:		! 	i	! 	i
	50	' Very limited	i	Very limited	i
	I	Depth to	11.00	Seepage	11.00
	I	saturated zone	1	Depth to	1.00
	1	Slow water	11.00		
	1	movement	10.04	Slope	1.00
	I I	Slope	10.04	 	1
Remus	40	 Very limited	i	 Very limited	i
	i	Slow water	11.00	_	11.00
	I	movement	1	Seepage	10.27
	I	Slope	0.04	l	1

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of	Septic tank absorption fiel	ds	Sewage lagoon 	s
		Rating class and		Rating class and	Value
	_	limiting features		limiting features	
004065	!	!	!	!	!
894065: Fern	I I 50	 Very limited		 Very limited	1
rem	1 30	Depth to		Seepage	11.00
	i	saturated zone		Depth to	11.00
	i	Slow water		saturated zone	1
	İ	movement	İ	Slope	0.08
_			!		!
Remus	•	Very limited		Somewhat limited	10 07
	!	Slow water movement		Seepage Slope	0.27 0.08
	 		i	Slope 	10.00
894104:	i	İ	i	i İ	i
Mollineaux	50	Very limited	1	Very limited	1
	I	Slope		Slope	1.00
	I	Seepage, bottom	1.00	Seepage	1.00
	!	layer		! :	!
	!		1.00	!	
		movement	1	 	1
Remus	1 40	 Very limited	i	 Very limited	i
		•		Slope	11.00
	I	movement	1	Seepage	0.27
	1	Slope	11.00	<u> </u>	1
894105:			1		!
Mollineaux	I 50	 Verv limited	<u> </u>	 Very limited	i .
	i	Seepage, bottom		_	11.00
	i	layer		Seepage	11.00
	I	Slope	1.00	I	1
	I	Slow water	1.00	I	1
		movement	1		1
Remus	I 40	 Very limited	i	 Very limited	i .
	i	Slow water		Slope	11.00
	I	movement	1	Seepage	0.27
	1	Slope	11.00	<u> </u>	1
894165:	 	 	1	 	1
Spinks	I 50	 Very limited	i	 Very limited	i
-	i	•	11.00	•	11.00
	I	Seepage, bottom	1.00	Seepage	1.00
	I	layer	1	I	1
	!	: .	11.00	<u> </u>	!
	 	capacity	1	 	!
Tekenink, sandy	i	!]	i	! 	i
substratum	40	Very limited	İ	Very limited	İ
	I	Slope	1.00	-	1.00
	I	Seepage, bottom	1.00	Seepage	1.00
		layer	I	 -	1
899682:	i I	! 	i	! 	i
Kaleva	90	 Very limited	i	 Very limited	i
	l	Slope	1.00	Slope	11.00
	I		1.00	Seepage	1.00
	!	layer		<u> </u>	!
	l I	Filtering	1.00	 	1
	 	capacity 	1	 	1
				•	

Table 10.—Sewage Disposal—Continued

Map unit symbol	Pct.	·		Sewage lagoons	
and soil name	of	·		<u> </u>	
	map unit	Rating class and limiting features		Rating class and limiting features	
	Ī	<u> </u>	Ī.	<u> </u>	Ī
899722: Goodharbor	1 00	 Very limited	!	 Very limited	!
GOOGHALDOL	1	Seepage, bottom	11.00	·	11.00
	i	layer	1	Slope	10.92
	i	Filtering	11.00	· •	i
	Ì	capacity	İ	l	İ
899731:		 	1	 	
Covert	· 50	 Very limited	i	 Very limited	i .
33.323	:	Depth to	11.00	·	11.00
	i	saturated zone	i	Depth to	11.00
	1	Seepage, bottom	11.00	saturated zone	1
	1	layer	1	Slope	10.08
	1	Filtering	1.00	I	I
	1	capacity	!		!
Pipestone	I ·I 40	 Very limited	1	 Very limited	:
	1	Depth to	11.00	_	11.00
	i	saturated zone		Depth to	11.00
	İ	Seepage, bottom	11.00	saturated zone	İ
	1	layer	1	l	1
	1	Filtering	1.00	I	I
		capacity	1		!
899733:	i	 	i	 	i
Covert	50	Very limited	Ì	 Very limited	İ
	1	Depth to	1.00	Seepage	11.00
	I	saturated zone	•	Depth to	1.00
	!	Seepage, bottom	11.00	•	
	!	layer	•	Slope	10.08
	1	Filtering capacity	1.00 	 	1
	i		i	İ	i
Dair	45	Very limited		Very limited	1
	!	Ponding	11.00	-	11.00
	!	Depth to	1.00 	Organic matter content	11.00
	!	saturated zone Seepage, bottom	1 1.00	•	11.00
	i .	layer		Depth to	11.00
	i	Filtering	11.00	•	1
	i	capacity	i	l	i
000724.	1	<u> </u>	!		1
899734: Benzonia	I ·I 90	 Very limited	1	 Very limited	1
	1	Slope	11.00		11.00
	i	Seepage, bottom	11.00	-	11.00
	i	layer	i		i
	1	Filtering	11.00	1	I

Table 11.-Source of Gravel and Sand

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The ratings given for the thickest layer are for the thickest layer above and excluding the bottom layer. The numbers in the value columns range from 0.00 to 0.99. The greater the value, the greater the likelihood that the bottom layer or thickest layer of the soil is a source of sand or gravel. See text for further explanation of ratings in this table)

	 Pct. of			Sand source		
		Rating class and limiting features		Rating class and limiting features		
190775:	1	<u> </u>	Ī	 	Ī	
Adrian	•	 Poor Bottom layer Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.00 0.64	
Houghton		 Poor Bottom layer Thickest layer Organic matter content	10.00	 Poor Bottom layer Thickest layer Organic matter content	 10.00 0.00 0.00	
190777:	i	! 	i	! 	i	
Alcona	55 	Poor Bottom layer Thickest layer	•	Fair Bottom layer Thickest layer	 0.12 0.24	
Richter	 30 	 Poor Bottom layer Thickest layer	0.00	 Fair Bottom layer Thickest layer	 0.07 0.13	
190778:	i	! 	i	! 	i	
Alcona	65 	Poor Bottom layer Thickest layer	 0.00 0.00	•	 0.12 0.24	
Richter	 25 	 Poor Bottom layer Thickest layer	•	 Fair Bottom layer Thickest layer	 0.07 0.13	
190779: Alpena	 90 	•	•	 Fair Bottom layer Thickest layer	 0.61 0.72	
190780:	! 	 		I 		
Au Gres	•	Poor Bottom layer Thickest layer	•	Fair Bottom layer Thickest layer	 0.72 0.99	
Kalkaska	•	 Poor Bottom layer Thickest layer	•	 Fair Bottom layer Thickest layer	 0.64 0.91	
190781:	! 	! 		! 		
Bach	90 	Poor Bottom layer Thickest layer 	 0.00 0.00	•	 0.00 0.00	
190782: Deer Park	i I	 Poor Bottom layer Thickest layer 	10.00	•	 0.64 0.99	

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of			 Sand source 		
	map	Rating class and limiting features		Rating class and limiting features		
190783: Deer Park	 100 	·	0.00		 0.64 0.99	
190784: Deer Park		Bottom layer	0.00	· -	 0.64 0.99	
Roscommon	25 	Bottom layer	0.00	•	 0.64 0.99	
190786: Dune land	 100	 Not rated 	! 	 Not rated 	 	
190787: East Lake	 90 	Thickest layer	0.00	·	 0.58 0.61	
190788: East Lake	•	Thickest layer	0.00	-	 0.58 0.61	
190789: East Lake		Thickest layer	0.00	·	 0.58 0.61	
190790: East Lake	 90 	•	0.00	·	 0.58 0.61	
190791: Eastport	 93 	Bottom layer			 0.86	
190792: Edwards	 70 			·	 0.00 0.00	
Marl beds	20 	Bottom layer		•	10.00	
190794: Emmet	 60 	·	10.00	•	 0.03 0.09	
Leelanau	1 30 	·	 0.00 0.00 	•	 0.10 0.23	

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of	 Gravel source 		 Sand source 		
	-	Rating class and limiting features		•		
190795:	 	 	 	 		
Emmet	60	Poor	I	Fair	1	
	I			Bottom layer	10.03	
	1	Thickest layer	10.00	Thickest layer	10.09	
Leelanau	30	Poor	i	 Fair	i	
	I	Bottom layer	0.00	Bottom layer	0.10	
	l	Thickest layer	10.00	Thickest layer	10.23	
190796:	 	 	 	 		
Emmet	50	Poor	ĺ	Fair	Ì	
	I	Bottom layer	0.00	Bottom layer	10.03	
	1	Thickest layer	10.00	Thickest layer	0.09	
Leelanau	I 30	 Poor	! 	 Fair	i	
				Bottom layer	0.10	
	ĺ			Thickest layer	0.23	
190797:	 	 	 	 	1	
	, 50	 Poor	i	 Fair	i	
			0.00	Bottom layer	0.03	
	!	Thickest layer	10.00	Thickest layer	10.09	
Leelanau	I 30	 Poor	 	 Fair	1	
				Bottom layer	0.10	
	ĺ	Thickest layer	0.00	Thickest layer	0.23	
190799:		 	1	 	1	
Emmet	1 45	Poor	i	 Fair	i	
	:	•	•	Bottom layer	0.03	
	l	Thickest layer	10.00	Thickest layer	10.09	
Leelanau	I I 30	 Poor	 	 Fair	1	
	•	•		Bottom layer	0.10	
	İ			Thickest layer	0.23	
190801:		 -	1	 -	1	
	1 70	 Poor	i	। Fair	i	
	i	Bottom layer	0.00	Bottom layer	0.03	
	l	Thickest layer	10.00	Thickest layer	10.09	
Mancelona	l l 25	 Poor	 	 Fair	1	
	•	•	•	•	0.39	
	I	Bottom layer	10.00	Bottom layer	0.61	
190803:	 	 	1	 		
Emmet	60	Poor	i	 Fair	i	
	ĺ	Bottom layer	0.00	Bottom layer	0.03	
	1	Thickest layer	10.00	Thickest layer	10.09	
Mancelona	I I 30	 Poor	 	 Fair	1	
		•	0.00		10.39	
	İ	=	0.00	· -	0.61	
190805:	l I]] 	I	
Emmet	50	 Poor	i	 Fair	i	
	I		0.00	Bottom layer	0.03	
	Į.	Thickest layer	10.00	Thickest layer	10.09	
Omena	l I 45	 Poor	 	 Fair		
	, <u>1</u> 3	•	0.00		10.03	
	I	· -	0.00	· -	0.09	
	I	I	I	I	I	

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name		ct. Gravel source of		Sand source		
		Rating class and limiting features				
190806:	 	 	 	 	 	
Emmet	•	Bottom layer Thickest layer	10.00	-	 0.03 0.09	
Omena	i	Poor Bottom layer	10.00	-	 0.03 0.09	
190807:	 	 	 	 		
Emmet	İ	Poor Bottom layer Thickest layer	0.00		 0.03 0.09	
Omena		Bottom layer	0.00		 0.03 0.09	
190808:	 	 	 	 		
Emmet	İ	Poor Bottom layer Thickest layer	10.00	Fair Bottom layer Thickest layer	 0.03 0.09	
Omena	i	Bottom layer			 0.03 0.09	
190809: Emmet		 Poor Bottom layer		 Fair Bottom laver	 0.03	
					0.09	
		Bottom layer	0.00	-	 0.03 0.09	
190811:	 	I 	 	I 		
Hettinger	•	Bottom layer	0.00	·	 0.00 0.00	
Muck	 30 	Bottom layer	0.00	 Poor Bottom layer Thickest layer 	 0.00 0.00	
190812: Hettinger	 45 			 Poor Bottom layer Thickest layer	 0.00 0.00	
Tonkey	 30 	· -	•	 Fair Bottom layer Thickest layer	 0.03 0.09	
190814: Kalkaska	 85 	Thickest layer	10.00	 Fair Bottom layer Thickest layer 	 0.64 0.91	

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of			 Sand source 	
	-	Rating class and limiting features		•	
190815: Kalkaska	•	 Poor Bottom layer Thickest layer	10.00	 Fair Bottom layer Thickest layer	 0.64 0.91
190816: Kalkaska	•	 Poor Bottom layer	 0.00	 Fair	 0.64
190817: Kalkaska	į	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.64 0.91
190818: Kalkaska		Bottom layer	0.00	·	 0.64 0.91
190819: Kalkaska		 Poor Bottom layer Thickest layer		 Fair Bottom layer Thickest layer	 0.64 0.90
East Lake	•	 Poor Thickest layer Bottom layer 	0.00	·	 0.58 0.61
190820: Kiva		Bottom layer	0.00	·	 0.20 0.36
Mancelona	 30 	 Poor Thickest layer Bottom layer	0.00	·	 0.39 0.61
190821: Kiva	 50 	 Poor Bottom layer Thickest layer	0.00	 Fair Bottom layer Thickest layer	 0.20 0.36
Mancelona	 30 	Thickest layer	0.00	 Fair Thickest layer Bottom layer 	 0.39 0.61
190823: Kiva	 50 	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.20 0.36
Mancelona	 30 	Thickest layer	0.00	 Fair Thickest layer Bottom layer 	 0.39 0.61
190824: Lake beaches	 100	 Not rated 	 	 Not rated 	
190825: Lake bluffs	 100 	 Not rated 	 	 Not rated 	

Table 11.-Source of Gravel and Sand-Continued

	 Pct. of				Sand source		
	-	Rating class and limiting features		•			
190826:	 	 	 	 			
Leelanau	60	Poor	I	Fair	1		
	:	Bottom layer Thickest layer 		_	0.10 0.23		
East Lake	30	 Poor	i	 Fair	i		
	•	·		Thickest layer Bottom layer	0.58		
190827:		 	 	 			
Leelanau				Fair	1		
		Bottom layer		·	10.10		
		Thickest layer	10.00	Thickest layer	10.23		
East Lake	25	 Poor	i	 Fair	i		
	İ	Thickest layer	0.00	Thickest layer	10.58		
	1	Bottom layer	10.00	Bottom layer	0.61		
190828:		! 	<u> </u>	! 			
Leelanau				Fair	1		
	!	Bottom layer Thickest layer	10.00	Bottom layer	0.10		
	 	Thickest Layer	10.00	Thickest layer 	0.23 		
East Lake	25	Poor	į	 Fair	i		
	•	- <u>-</u>		·	10.58		
	1	Bottom layer	10.00	Bottom layer	0.61 		
190829:	i	i İ	i	i İ	i		
Leelanau				Fair			
		Bottom layer Thickest layer		Bottom layer Thickest layer	0.10 0.23		
	I		i	l	i		
East Lake	•	•	•	Fair	 		
	 	·		Thickest layer Bottom layer	0.58 0.61		
	i		İ		i		
190830: Leelanau		 	<u> </u>	 Enim	1		
Leelanau	•	Bottom layer	•	Fair Bottom laver	0.10		
	i			Thickest layer	0.23		
Foot John	25	 	<u> </u>	 Enim	1		
East Lake	35 	•		Fair Thickest layer	I 10.58		
	i	Bottom layer	0.00	:	0.61		
100021.	1		<u> </u>		1		
190831: Lupton	I I 60	 Poor	! 	 Poor			
	i	•	0.00	•	0.00		
	I	- <u>-</u>	10.00	·	10.00		
	 	Organic matter content	0.00 	Organic matter content	0.00 		
	i	İ	İ	 	i		
Markey	30	Poor	•	Fair	1		
	1	· -	0.00 0.00	·	0.00 0.64		
	i						
190832:		 Page		 Tain	1		
Mancelona	1 90 1	Poor Thickest layer	 0.00	Fair Thickest layer	 0.39		
	i		10.00	·	0.61		
	I	Ī		i -	i		

Table 11.-Source of Gravel and Sand-Continued

	•	Pct. Gravel source of		 Sand source 		
	_	Rating class and limiting features		Rating class and limiting features		
190833: Mancelona	 90 	·	0.00	 Fair Thickest layer Bottom layer	 0.39 0.61	
190834: Mancelona	 60 	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.51 0.61	
East Lake	:	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.58 0.61	
190835: Mancelona		Thickest layer	0.00	•	 0.51 0.61	
East Lake		Thickest layer	0.00	 Fair Thickest layer Bottom layer 	 0.58 0.61	
190836: Mancelona	:	Thickest layer	0.00	•	 0.51 0.61	
East Lake	:	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.58 0.61	
190837: Mancelona	 45 	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.51 0.61	
East Lake	 30 	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.58 0.61	
190838: Mancelona	 50 	 Poor Thickest layer Bottom layer	 0.00 0.00	·	 0.51 0.61	
East Lake	 30 	 Poor Thickest layer Bottom layer 	 0.00 0.00		 0.58 0.61	
190839: Mancelona	 70 	 Poor Thickest layer Bottom layer	 0.00 0.00		 0.39 0.61	
Richter	 25 	 Poor Bottom layer Thickest layer 	 0.00 0.00	·	 0.07 0.13	

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of	Pct. Gravel source of		 Sand source 		
	_	Rating class and limiting features		_		
190840: Nester		 Poor Bottom layer Thickest layer	0.00	-	 0.00 0.00	
190841: Nester	:	Bottom layer	0.00	· <u>-</u>	1 1 1 0.00 1 0.00	
190842: Nester		 Poor Bottom layer Thickest layer 	0.00		 0.00 0.00	
190843: Nester	•	Bottom layer	0.00	-	 0.00 0.00	
190844: Nester	:	 Poor Bottom layer Thickest layer	0.00	· <u>-</u>	 0.00 0.00	
190846: Pits, gravel	 100	 Not rated 	 	 Not rated 	i !	
190847: Richter	 45 	 Poor Bottom layer Thickest layer	 0.00 0.00	 Fair Bottom layer Thickest layer	 0.07 0.13	
Alcona	•	Bottom layer	0.00	·	 0.12 0.24	
190848: Richter	 45 	Bottom layer	0.00		 0.07 0.13	
Alcona	 40 	Bottom layer	•	 Fair Bottom layer Thickest layer 	 0.12 0.24	
190849: Roscommon	 50 	· -	 0.00 0.00	·	 0.64 0.99	
Markey	1 30 	· -	 0.00 0.00	·	 0.00 0.64	
190850: Sanilac	 90 	Thickest layer	10.00	·	10.00	

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of	 Gravel source 		Sand source			
	map	Rating class and limiting features					
190851: Tonkey		 Poor Bottom layer Thickest layer		 Fair Bottom layer Thickest layer	 0.03 0.09		
Munuscong		 Poor Bottom layer Thickest layer	10.00		 0.00 0.00		
Iosco		 Poor Bottom layer Thickest layer 	İ	 Poor Bottom layer Thickest layer	 0.00 0.00		
190852: Tonkey	İ	Bottom layer Thickest layer	10.00	-	 0.03 0.09		
Munuscong	İ	 Poor Bottom layer Thickest layer	10.00	-	10.00		
Iosco		Poor Bottom layer	0.00	·	10.00		
190853: Water	 100	 Not rated 	 	 Not rated 	 		
190854: Wallace	İ	Bottom layer Thickest layer	10.00				
Kalkaska		Poor Bottom layer	0.00	· <u>-</u>	 0.64 0.91		
190855: Wind eroded land	•			 Fair Bottom layer Thickest layer	 0.64 0.99		
190856: Wind eroded land	 100 	Bottom layer	 0.00 0.00	·	 0.64 0.99		
193236: Beaches	1 100	 Not rated	 	 Not rated			
193237: Thompsonville	 50 	Bottom layer	 0.00 0.00		 0.00 0.15		
Milnichol	 40 	· -	 0.00 0.00 	· -	 0.00 0.10		

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of			 Sand source 		
		Rating class and limiting features				
193255:	 	 	 	 	 	
Spinks	50	Poor	I	Fair	1	
	 	·	0.00 0.00	•	0.75 0.95	
Coloma	I I 40	l Poor	! !	। Fair	<u> </u>	
	•	Bottom layer	0.00	Bottom layer Thickest layer	0.15 0.99	
193256:	 	! 	i	! 	i	
Spinks	50	 Poor	i	Fair	i	
	 	·		Bottom layer Thickest layer	0.75 0.95	
Coloma	40	Poor	i	 Fair	i	
	 	·		Bottom layer Thickest layer	0.15 0.99	
193257:	<u>'</u>	' 	i	' 	i	
Spinks	55	Poor	I	Fair	1	
	l .	·		Bottom layer	10.75	
		Thickest layer	10.00	Thickest layer	10.95	
Coloma	1 35	 Poor	İ	 Fair	i	
	•	•	•	Bottom layer	0.15	
	l	Thickest layer	0.00	Thickest layer	0.99	
193258:			1		1	
Spinks	I I 50	 Poor	! !	। Fair	<u> </u>	
SP====5		•	•	Bottom layer	0.75	
	I	Thickest layer	0.00	Thickest layer	0.95	
Calama	1 40	 	1	 Enim	1	
Coloma	40 	•	•	Fair Bottom layer	I 0.15	
	i	·		Thickest layer	0.99	
102060	!		1	<u> </u>	!	
193260: Copemish	l I 95	 Poor	 	l IGood	1	
COPC.MIDII	•	•	0.00	•	0.99	
	I	Thickest layer	0.00		I	
193262:		 	1	 	1	
Kaleva	ı I 95	 Poor	i	। Good	i	
	i		0.00	•	i	
	l	Thickest layer	10.00	<u>!</u>	1	
193263:		 	1	 	1	
	ı I 95	 Poor	i	। Good	i	
	i	Bottom layer	0.00		i	
	I	Thickest layer	10.00	<u> </u>	1	
193265:			1	<u> </u>	!	
Grattan	ı I 95	 Poor	i	। Good	i	
	i	•	0.00		0.93	
	I	Thickest layer	10.00	ļ	1	
193266:	1	 	I	 	1	
	I 95	 Poor	i I	। Good		
			0.00		0.93	
	I	Thickest layer	0.00	I	I	
	I	I	I	I	1	

Table 11.-Source of Gravel and Sand-Continued

	 Pct. of			 Sand source 		
		Rating class and limiting features				
193267: Grattan	•	- <u>-</u>		·	 0.93	
193269: Grattan	:	Bottom layer	•	 Good Bottom layer 	 0.93 	
193270: Covert	İ	·		 Good Bottom layer 	 0.75 	
193271: Pipestone	i	Bottom layer	 0.00 0.00		 	
193272: Dair	•	 Poor Bottom layer Thickest layer	0.00	 Fair Bottom layer Thickest layer	 0.75 0.99	
193277: Benona	 90 	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.38 0.99	
193278: Benona		- <u>-</u>	0.00	 Fair Bottom layer Thickest layer	 0.38 0.99	
193279: Benona	•	Bottom layer	0.00	•	 0.38 0.99	
193284: Udorthents	:		•		 0.00 0.07	
Udipsamments	 35 	Bottom layer	 0.00 0.00	 Good Bottom layer 	10.00	
193285: Lumley	 55 	Thickest layer	 	Thickest layer	 0.00 0.00 0.00	
Makinen	 40 	·	 0.00 0.00 	•	 0.00 0.67 	

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of			Sand source		
	map	Rating class and limiting features		Rating class and limiting features		
193286:]] 	 	
Histosols	55	Poor	i	 Fair	i	
	•	-		Thickest layer Bottom layer	0.00 0.75	
Aquents	•	Bottom layer		 Good Bottom layer 	10.00	
193287:	i	i İ	İ	i İ	i	
Dune land	55 	Not rated	 	Not rated 		
Quartzipsamments	40	Poor	i	 Good	i	
-	 	-	0.00 0.00 	Bottom layer 	0.00 	
193288:		<u> </u>	I		1	
Udipsamments		Bottom layer	•	Good Bottom layer 	 0.00 	
193342:	İ	 	i	' 	i	
Gorvan	35		•	Fair		
	 	-		Thickest layer Bottom layer	0.09 0.75	
Houghton		 	•	 Poor	!	
noughton				Bottom layer	0.00	
	İ	-		Thickest layer	0.00	
	 	Organic matter content	0.00 	Organic matter content	0.00 	
Glendora	l l 20	 Poor	 	 Fair	1	
Grendord				Bottom layer	0.51	
	1	Thickest layer	10.00	Thickest layer	10.92	
193349:	İ	! 		! 		
Spinks	50		•	Fair		
	! 			Bottom layer Thickest layer	0.75 0.95	
Coloma	l I 40	 Poor	 	 Fair	1	
00_0				Bottom layer	0.15	
	 		0.00 		0.99 	
193351:	i	İ	i	İ	i	
Benona	95	Poor Bottom layer	 0.00	Fair Bottom layer	 0.38	
		-	10.00	•	10.99	
193354:	 	 	 	 		
Dune land	50	Not rated		Not rated		
Quartzipsamments	40	 Poor	<u>'</u>	। Good		
	 	·	0.00 0.00	•	0.00 	
193357:	i	i I	i	i I	i	
Shavenaugh			•	Fair Thickest lawer	 0.96	
		•	0.00 0.25	•	10.96	
	İ	İ	İ		İ	

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of			 Sand source 		
	map	Rating class and limiting features		Rating class and limiting features		
193359: Shavenaugh	 85 	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.96 0.97	
193360: Shavenaugh	 85 	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.96 0.97	
193362: Benzonia	•	·	0.00	 Fair Bottom layer Thickest layer	 0.11 0.93	
193363: Benzonia		Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.11 0.93	
193364: Benzonia	 90 	·	0.00	 Fair Bottom layer Thickest layer	 0.11 0.93	
193365: Benzonia	 90 	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.11 0.93	
193371: Dair	 50 	Bottom layer	•	 Fair Bottom layer Thickest layer	 0.75 0.99	
Pipestone	 40 	Bottom layer	 0.00 0.00		 	
193372: Access Denied	 100	 Not rated	 	 Not rated	į	
193423: Benona	 95 	Bottom layer		 - Fair Bottom layer Thickest layer 	 0.38 0.99	
193484: Pits, sand and gravel	 100	 Not rated 	 	 Not rated 	 	
193494: Nordhouse	 100 	Bottom layer	 0.00 0.00	 Good 	 	
193496: Nordhouse	 95 	Thickest layer	 0.00 0.00			

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of			 Sand source 		
	_	Rating class and limiting features		Rating class and limiting features	Value 	
193497: Nordhouse	 95 	Bottom layer	 0.00 0.00		 	
193498: Nordhouse	 40 	Bottom layer	 0.00 0.00		 	
193498: Platteriver		Bottom layer	 0.00 0.00		 	
Dair	 25 	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.75 0.99	
193503: Spinks	 50 	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.75 0.95	
Shavenaugh	 40 	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.96 0.97	
193504: Spinks	 50 	Bottom layer	•	 Fair Bottom layer Thickest layer	 0.75 0.95	
Shavenaugh	 40 	Thickest layer	•	 Fair Thickest layer Bottom layer	 0.96 0.97	
193505: Spinks	 50 	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.75 0.95	
Shavenaugh	 40 	Thickest layer	 0.00 0.25	•	 0.96 0.97	
193506: Spinks	 50 	Bottom layer	 0.00 0.00	•	 0.75 0.95	
Shavenaugh	 40 	Thickest layer	 0.00 0.25	•	 0.96 0.97	
193507: Spinks	 50 	·	 0.00 0.00	•	 0.75 0.95	

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of			 Sand source 	
	-	Rating class and limiting features		Rating class and limiting features	
193507: Shavenaugh		Thickest layer	 0.00 0.25	· -	 0.96 0.97
193508: Madaus	 90 	Bottom layer	0.00	 Poor Bottom layer Thickest layer	 0.00 0.00
193509: Boyer	 50 	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.23 0.75
Shavenaugh	•	Thickest layer	0.00	 Fair Thickest layer Bottom layer 	 0.96 0.97
193510: Boyer	 50 	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.23 0.75
Shavenaugh		Thickest layer	0.00	 Fair Thickest layer Bottom layer 	 0.96 0.97
193511: Boyer	 50 	Thickest layer	0.00	 Fair Thickest layer Bottom layer	 0.23 0.75
Shavenaugh		Thickest layer	0.00	 Fair Thickest layer Bottom layer 	 0.96 0.97
193513: Dair	 50 	Bottom layer		 Fair Bottom layer Thickest layer	 0.75 0.99
Adrian	 45 	Bottom layer	 0.00 0.00	_	 0.00 0.67
193514: Platteriver	 55 	Bottom layer	 0.00 0.00		
Pipestone	 40 	Bottom layer	 0.00 0.00 		
202010: Houghton	 55 	Thickest layer	0.00 0.00 0.00	Thickest layer	 0.00 0.00 0.00

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	 Pct. of			Sand source 	
	-	Rating class and limiting features		-	
202010:	 	 	 	 	
Adrian	40 	Bottom layer	0.00	•	 0.00 0.67
202016: Spinks	 50 	Bottom layer	0.00	•	 0.75 0.95
Tekenink, sandy substratum	•	Bottom layer	0.00	•	 0.14 0.75
631170:	<u> </u>				
Fogg		Bottom layer		•	 0.88
Benzonia	:	Bottom layer	0.00		 0.11 0.93
631171: Fogg	•	Bottom layer	•	•	 0.88
Benzonia	40 	Bottom layer	0.00	•	 0.11 0.93
631172: Fogg	1	Bottom layer	•	_	 0.88
Benzonia	 40 	Bottom layer	0.00	 Fair Bottom layer Thickest layer 	 0.11 0.93
631173: Fogg	 50 	_	 0.00 0.00	_	 0.88
Benzonia	 40 	Bottom layer		 Fair Bottom layer Thickest layer 	 0.11 0.93
631174: Fogg	 50 	•	 0.00 0.00	•	1 10.88
Benzonia	 40 	•	10.00	 Fair Bottom layer Thickest layer 	 0.11 0.93

Table 11.—Source of Gravel and Sand—Continued

	 Pct. of			 Sand source 	
	_	Rating class and limiting features		Rating class and limiting features	
680939: Fern	:	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.00 0.04
Spinks	:	-	0.00	 Fair Bottom layer Thickest layer	 0.75 0.95
680943: Milnichol	•	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.00 0.10
680945: Fern	:	=	0.00	 Fair Bottom layer Thickest layer	 0.00 0.04
680946: Fern	 90 	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.00 0.04
680971: Nessen	 50 	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.38 0.90
Kaleva	:	-	 0.00 0.00		
680972: Nessen	 50 	Bottom layer	•	 Fair Bottom layer Thickest layer	 0.38 0.90
Kaleva	 40 	•	 0.00 0.00		
680973: Nessen	 50 	 Poor Bottom layer Thickest layer	10.00	-	1 10.38 10.90
Kaleva	 40 	 Poor Bottom layer Thickest layer	10.00		
680974: Nessen	 50 	 Poor Bottom layer Thickest layer	 0.00 0.00	_	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1
Kaleva	 40 	 Poor Bottom layer Thickest layer 	 0.00 0.00		

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of	 Gravel source 		 Sand source 	
		Rating class and limiting features			
893251:	 	 	 	 	
Boyer				Fair	1
	1	Thickest layer Bottom layer	10.00	Thickest layer	0.23
	1	Bottom layer	0.00	Bottom layer	0.75
Shavenaugh			i	 Fair	
	1	Thickest layer	0.00	Thickest layer	0.96
	!	Thickest layer Bottom layer	0.25	Bottom layer	0.97
894062:		! 		 	
Remus				Fair	1
	1	Bottom layer	10.00	Bottom layer	0.00
		Thickest layer			10.05
Spinks	 - 40	 Poor	 	 Fair	
_	1			Bottom layer	10.75
	İ		10.00	Thickest layer	10.95
894063:		 	 	 	
Remus	50			Fair	i
	1	Bottom layer	10.00	Bottom layer	0.00
	!	Bottom layer Thickest layer	10.00	Thickest layer	10.05
Spinks	I · 40	 Poor		 Fair	
-	İ		10.00	Bottom layer	0.75
		-	10.00	Thickest layer	10.95
894064:	1	 	 	 	1
Fern	50	Poor	İ	Fair	i
	1	Bottom layer	0.00	Bottom layer	0.00
	!	Thickest layer	0.00	Thickest layer	0.04
Remus	 40	 Poor		 Fair	
	1	Bottom layer	10.00	Bottom layer	10.00
	!	Thickest layer	10.00	Thickest layer	10.05
894065:		! 			
Fern	50	Poor	1	Fair	1
	1	Bottom layer	10.00	Bottom layer	0.00
	1			Thickest layer	0.04
Remus	 40	 Poor	<u> </u>	 Fair	
	1	Bottom layer	10.00	Bottom layer	0.00
	!	Thickest layer	0.00	Thickest layer	10.05
894104:		! 		 	
Mollineaux	· 50	Poor	I	Fair	1
	1	Bottom layer	10.00	Thickest layer	10.09
	1	Thickest layer	10.00	Bottom layer	10.75
Remus	 40	 Poor	i	। Fair	<u> </u>
	1	Bottom layer	0.00	Bottom layer	0.00
	!	Thickest layer	10.00	Thickest layer	10.05
894105:		! 		 	
Mollineaux	50	Poor	I	Fair	1
	1	Bottom layer	0.00	Thickest layer	0.09
	!	Thickest layer	0.00	_	0.75
Remus	I · 40	 Poor	I 	 Fair	1
	i	•	0.00	•	0.00
	i	_	10.00	·	0.05

Table 11.—Source of Gravel and Sand—Continued

	Pct. Of	•		Sand source	
	map	Rating class and limiting features		Rating class and limiting features	
894165: Spinks	 50 	Bottom layer	0.00	 Fair Bottom layer Thickest layer	 0.75 0.95
Tekenink, sandy substratum	 40 	Bottom layer	0.00	 Fair Thickest layer Bottom layer	 0.14 0.75
899682: Kaleva	 90 	Bottom layer	 0.00 0.00	•	
899722: Goodharbor	 90 	·	•	 Good Bottom layer 	 0.75
899731: Covert	•	Bottom layer	•	 Good Bottom layer 	 0.75
Pipestone	 40 	Bottom layer	1 10.00		
899733: Covert	•	Bottom layer	•	 Good Bottom layer 	 0.75
Dair	 45 	Bottom layer	0.00	 Fair Bottom layer Thickest layer 	 0.75 0.99
899734: Benzonia	 90 	Bottom layer	0.00	 - Fair Bottom layer Thickest layer 	 0.11 0.93

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.00 to 0.99. The smaller the value, the greater the limitation. See text for further explanation of ratings in this table)

Map unit symbol and soil name	Pct. of	•	rial	 Roadfill sourc	e	Topsoil sourc 	ee
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190775:	I	<u> </u>]	<u> </u>	Ī	 	1
Adrian	1 55	l Poor	:	 Poor	<u> </u>	 Poor	<u> </u>
Adlian	1 22	Wind erosion	10.00	•	10.00	•	10.00
	!	Low content of	10.13	•	10.80	•	10.00
	;	organic matter	•	Dusty 	10.00	content high	10.00
	<u> </u>	Too acid	10.97		i	concent night	i
	1	ļ.	ļ	ļ.	I	l	1
Houghton			•	Poor	•	Poor	
	1	Wind erosion	10.00		10.00	•	10.00
	I	I	1	Dusty	10.80		10.00
					!	content high	1
190777:	<u> </u>	! 		! 	i	 	i
Alcona	I 55	 Fair	i	l Good	i	 Fair	i
	İ	Low content of	0.13	İ	İ	Too sandy	0.40
	İ	organic matter	İ	İ	i	_ 	İ
	I	Too sandy	0.40	I	I	I	I
Richter	1 30	 Fair	1	 Fair		 Fair	1
Kichter	1 30	Low content of	10.13	•	10.01	•	10.01
	;	organic matter		Wechess	10.01	Too sandy	10.01
	i	Too sandy	0.98	! 	i	l 100 sandy	1
	İ	Ī	Ì	Ì	İ	l	İ
190778:		 Tain	1	104	1	 Talina	!
Alcona	1 65	•	•	Good	!	Fair	1 40
	!	Low content of	0.13	!	!	Too sandy	10.40
	1	organic matter Too sandy	 0.40	1	1] 	1
	;	100 Sandy	10.40 I	! !	<u> </u>	! 	i .
Richter	I 25	Fair	i	Fair	i	' Fair	i
	i	Low content of	0.13	Wetness	0.01	Wetness	10.01
	i	organic matter	i	İ	i	Too sandy	0.98
	İ	Too sandy	0.98	Ì	İ	Ī	İ
190779:			1		1		!
Alpena	I I 90	 Poor	<u> </u>	l Good	<u> </u>	ı Poor	i
•	i		0.00	I	i	Too sandy	10.00
	i		0.00		i	Rock fragments	10.00
	i	·	0.13		i	•	0.68
	İ	organic matter	Ì	İ	İ	(rock fragments)	İ
190780:	1		I		1	 -	1
190780: Au Gres	I I 45	 Poor		 Fair		 Poor	1
va Area	1 -23	Wind erosion	10.00	•	0.01	• • •	10.00
	;	Too sandy	10.00		1	Wetness	0.01
	i	Low content of	0.13		i	Rock fragments	10.01
	i	organic matter	1	i	i		
		<u> </u>	!	l	!	I	!
Kalkaska	35	•		Good	!	Poor	1
	!	Wind erosion	10.00		!	Too sandy	10.00
	!	Too sandy	[0.00		!	<u> </u>	!
i	i	Droughty	0.11	I	1	ı	1

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct.		rial	Roadfill sourc	e	 Topsoil sourc	e
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190781:	 	 	 	 	 	 	1
Bach	- 90	Fair	1	Poor	1	Poor	1
	1	Low content of	0.13	Wetness	0.00	Wetness	[0.00
	1	organic matter	1	Dusty	10.94	I	1
	İ	-	0.90	· <u>-</u>	i	İ	i
190782:		 	 	 		 	1
Deer Park	i 100	l Poor	i	Good	i	Poor	i
	i	•	0.00	•	i	Too sandy	10.00
	i	•	0.00	•	i	Slope	10.37
	i	•	10.00		i	blope	1
100702	!		!	!	!	<u> </u>	!
190783: Deer Park	 - 100	 Poor	!	 Poor		 Poor	1
	i	•	•	•	0.00	•	10.00
	i	· -	0.00	•	1	Too sandy	10.00
	i	•	10.00		i	Too samay 	1
100704	!		!	<u> </u>	!	<u> </u>	!
190784: Deer Park	I -1 70	l Poor	1	l Good		 Poor	1
Deer rurn	1 /0		0.00	•	i	Too sandy	10.00
	-	·	10.00		:	ı 100 sanay	10.00
	i		10.00	•	i	! 	i
	1		1	ļ	1	ļ	1
Roscommon	- 25	•	•	Poor		Poor	1
	1	Too sandy	10.00	Wetness	10.00	Wetness	10.00
	1	Wind erosion	10.00	I	1	Too sandy	10.00
	1	Low content of	0.13	I		I	1
	!	organic matter	!	!	!	!	!
190786:				 		 	
Dune land	- I 100	Not rated	!	Not rated	!	Not rated	!
190787:	1	 	1	 	1	 	1
East Lake	- i 90	Poor	i	Good	i	Fair	i
	i		0.00	•	i	Too sandy	10.03
	i		0.03		i	Hard to reclaim	•
	i .	·	10.13		i	(rock fragments)	
	i	organic matter	1	 	i	Rock fragments	0.26
	İ		İ	İ	İ	į	İ
190788: East Lake	 - 90	 Poor	!	 Good	!	 Fair	
nabe name	1	•	0.00	•	i	Too sandy	10.03
	;	•	10.03	•	;	·	0.18
	-	_	0.13		1	(rock fragments)	
	<u> </u>	organic matter	U.13	! 	<u> </u>	Rock fragments	10.26
	İ		İ	İ	İ	_	İ
190789: East Lake	 - 90	 Poor	1	 Good		 Poor	
Tabe Take	, 30 		10.00	•	;	Slope	10.00
	i		10.03		i	Too sandy	10.03
	;	Low content of	0.13		;	Hard to reclaim	10.18
	i	organic matter	1	! 	i	(rock fragments)	•
100700.	!		!	<u> </u>	!	<u> </u>	1
190790: East Lake	 90	l Poor	1	 Fair		 Poor	1
	1	•	0.00		0.18		0.00
	i	Too sandy	10.03	•	1	Too sandy	10.03
	1	· -	0.03		1	Hard to reclaim	0.03
	-	organic matter	10.13	! !	i	(rock fragments)	

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of	•	rial	 Roadfill sourc 	e	 Topsoil sourc 	е
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	1
100701	!	<u> </u>	Į.	!	1	<u> </u>	1
190791: Eastport	.i 93	 Poor	 	 Good	!	 Poor	
павероге	1		10.00	•	<u> </u>	Too sandy	10.00
	i	· -	0.00	•	i	Rock fragments	10.97
	i		0.08		į.	i	i
	1	I	I	I	I	I	I
190792:	!	<u> </u>	!	!	!	<u> </u>	1
Edwards	70	•	•	Poor	•	Poor	1
	!	•	10.00	•	10.00		10.00
		Carbonate content	10.00	•	0.00 0.80	•	10.00
	i	! !	! !	l Duscy	10.00	Carbonate content	10 97
	i	I	i	i i	i	l	1
Marl beds	20	Poor	i	Poor	į	Poor	i
	1	Wind erosion	0.00	Wetness	0.00	Carbonate content	10.00
	1	Carbonate content	00.01	Low strength	0.00	Wetness	10.00
	I	I	I	Dusty	0.80	I	I
100504	!	!	!	!	!	!	!
190794: Emmet	1 60	 Fair	1	l IGood	!	l IGood	!
Emme	1 00	Low content of		•	i	1	i
	i	organic matter	•	i	i	i	i
	i	Carbonate content	•	i	i	i	i
	Ì	Too acid	0.95	Ì	ĺ	İ	İ
	1	I	I	I	I	I	1
Leelanau	30	•	•	Good	1	Fair	I
	1	•	10.00	•	1	Too sandy	10.30
	!	•	0.13		!	Rock fragments	10.95
	!	organic matter			!	! !	!
		Too sandy	0.30 	! !		! !	:
190795:	i	i I	i i	i I	i	i I	i
Emmet	60	 Fair	i	Good	i	Fair	i
	1	Low content of	0.13	I	I	Slope	10.96
	1	organic matter	I	I	1	I	1
	I	Carbonate content			1	I	1
	!	Too acid	10.95	!	!	!	!
Leelanau	1 30	l Boom	1	 Good		 Fair	1
Leelanau	1 30		10.00	•		Too sandy	10.30
	i		0.13		i	Rock fragments	10.95
	i	organic matter		i	i	Slope	0.96
	Ì	Too sandy	0.30	Ì	ĺ	i -	İ
	1	I	I	I	I	I	1
190796:		<u> </u>	1	ļ	1	<u> </u>	!
Emmet	50	•		Good	1	Poor	10.00
	1	•	0.13	 	1	Slope	10.00
		organic matter Carbonate content		I I	I I	 	1
	i		10.95		<u> </u>	! 	i
	i		•		i	I	i
Leelanau	30	Poor	I	Good	I	Poor	I
	1		0.00	I	I	Slope	0.00
	I		0.13		I	Too sandy	10.30
	!	•		•	!	Rock fragments	10.95
		Too sandy	0.30				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	 Pct. of	•	rial	 Roadfill source 	е	 Topsoil sourc 	е
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190797: Emmet	 50 	Low content of organic matter Carbonate content	0.13 	- 	 0.18 	 Poor Slope 	 0.00
Leelanau	•	Wind erosion Low content of organic matter	0.00 0.13	- 	 0.18 	 Poor Slope Too sandy Rock fragments 	 0.00 0.30 0.95
190799: Emmet		Low content of organic matter Carbonate content	0.13 	- 	 0.00 	 Poor Slope 	 0.00
Leelanau	 30 	Wind erosion Low content of organic matter	0.00 0.13	- 	 0.00 	•	 0.00 0.30 0.95
190801: Emmet	•	Low content of organic matter Carbonate content	0.13 	 	 	 Fair Rock fragments 	 0.91
Mancelona	 25 	Low content of organic matter Droughty	0.13	 	 	•	 0.00 0.18 0.26
190803: Emmet	 60 	Low content of organic matter Carbonate content	0.13 	i I	 0.00 	•	 0.00 0.91
Mancelona	 30 	Low content of organic matter Droughty	 0.13 0.15 0.26	- 	 0.00 	Rock fragments	 0.00 0.00 0.18
190805: Emmet	 50 	organic matter Carbonate content Too acid	0.13 0.92 0.95	 	 	 Good 	

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	Pct. Of	•	rial	 Roadfill sourc 	e	 Topsoil sourc 	e
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190805:	 	 	 	 	 	 	
Omena	45	Fair	I	Good	I	Fair	1
	I	Low content of	0.13	I	1	Rock fragments	0.97
	I	organic matter	l	I	1	I	1
	I	Carbonate content	0.92	I	1	I	1
100006	!	!	!	!	!	!	!
190806:	I =0	 	!		!	 The dist	!
Emmet	1 20	rair Low content of	•	Good	!	Fair Slope	1 10.96
	!	organic matter		! !		l slobe	10.90
	<u> </u>	Carbonate content		I	<u> </u>	! !	i
	i	•	10.95	•	i	i I	i
	i	i	 I	i	i	i	i
Omena	45	Fair	ĺ	Good	İ	Fair	İ
	I	Low content of	0.13	I	1	Slope	0.96
	I	organic matter	I	I	1	Rock fragments	0.97
	I	Carbonate content	0.92	I	I	I	1
	I	I	I	I	I	I	1
190807:	!	!	!	!	!	<u> </u>	!
Emmet	50	•	•	Good	!	Poor	1
	!	Low content of		!	!	Slope	[0.00
	!	organic matter Carbonate content		! !	!	! !	!
	!		10.92	•	!	! !	
	;	l 100 acid	U. 33 	! !	<u> </u>	! !	<u> </u>
Omena	I 45	' Fair	i	 Good	i	Poor	i
	i	Low content of	•	•	i	Slope	0.00
	i	organic matter	•	i i	i	Rock fragments	0.97
	Ì	Carbonate content	0.92	İ	İ	i	İ
	I	I	I	I	I	I	1
190808:	I	I	I	I	I	I	1
Emmet	50	•	•	Fair	•	Poor	1
	!	Low content of		Slope	0.18	Slope	10.00
	!	organic matter		!	!	!	!
	!	Carbonate content Too acid	10.92 10.95	•	!	 	!
	!	100 acid	10.95	! !		! !	
Omena	I 45	 Fair	<u>.</u>	 Fair	i	Poor	i
	i	•	0.13	•	0.18	•	0.00
	i	organic matter		i -	i	Rock fragments	0.97
	I	Carbonate content	0.92	I	I	l -	1
	I	I	I	I	I	I	1
190809:	I	I	I	I	I	I	1
Emmet	50					Poor	1
	!	Low content of		Slope	10.00	Slope	10.00
	!	organic matter		!	!	!	!
	!	Carbonate content Too acid	•	•	!	!	!
	!	Too acid	0.95	! !	!	! !	1
Omena	1 45	' Fair	I	 Poor	i	 Poor	i
	. 15	Low content of			10.00		0.00
	i	organic matter	•	i	i	Rock fragments	0.97
	I	Carbonate content		I	I	l	1
	1	I	I	I	I	I	1
190811:	I	l	I	l	I	l	1
Hettinger	45			Poor	•	Poor	1
	1	Low content of			10.00		10.00
	1	organic matter			10.00		10.85
	!	Carbonate content		-	0.87		!
		Water erosion	0.90	ı	1	I	1

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of	•	rial	Roadfill sourc 	е	Topsoil sourc	e
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	•
190811:		 	 	 	 	 	
Muck	- 30	Poor	I	Poor	I	Poor	1
	1	Wind erosion	0.00	Wetness	0.00	Wetness	10.00
	1	Low content of	0.13	Dusty	0.80	I	1
	1	organic matter	I	I	1	I	1
	1	Too acid	0.97	I	1	l	1
	1	I	1	I	1	I	I
190812:		<u> </u>	1	<u> </u>	1	<u> </u>	1
Hettinger	- 45		•	Poor	•	Poor	1
	!	•	0.13	•	10.00	•	10.00
	!	organic matter	•	-	10.00		10.85
	!	Carbonate content Water erosion	10.88	· <u>-</u>	0.87	 	!
	!	water erosion	10.90	! !	!] 	1
Tonkey	-1 30	l IPair	 	 Poor	!	 Poor	1
Tollkey	1 30		•	•	10.00	•	0.00
	i	organic matter	1	l Hedness	1	l Hedness	1
	i		i	i	i	i I	i
190814:	i	i I	i	i i	i	i i	i
Kalkaska	- 85	Poor	i	 Good	i	Poor	i
	İ	Wind erosion	0.00	İ	İ	Too sandy	10.00
	1	Too sandy	0.00	I	I	- I	1
	1	Droughty	0.11	I	I	I	1
	1	l	I	I	I	I	1
190815:	1	I	I	I	1	I	I
Kalkaska	- 85	•	•	Good	I	Poor	1
	!	•	10.00	•	!	Too sandy	10.00
	!	·	10.00		!	Slope	10.96
	!	Droughty	0.11	<u> </u>	!	 	!
190816:	!	 		! !	!] 	!
Kalkaska	-1 90	l Poor	i	l Good	<u> </u>	 Poor	i
ra radia	1	•	0.00	•	i	Too sandy	10.00
	i	•	0.00	•	i	Slope	10.00
	i	·	0.11		i	i -	i
	İ	i	ĺ	İ	İ	l	İ
190817:	1	l	I	I	I	I	1
Kalkaska	- 90	•	•	Fair	•	Poor	I
	1		10.00	•	0.18	•	10.00
	!	·	10.00		!	Too sandy	10.00
	!	Droughty	0.11	!	!	 	!
190818:	!	 		! !	!] 	!
Kalkaska	-1 90	l Poor	 	 Poor	i	 Poor	1
Raikaska	1		0.00		0.00		0.00
	i		10.00	•	1	Too sandy	10.00
	i	·	0.11		i	, <u>-</u>	i
	i	i i	i	İ	i	i I	i
190819:	1	l	I	I	I	I	1
Kalkaska	- 55	•		Good	I	Poor	1
	1		10.00		I	Too sandy	10.00
	1		10.00		1	<u> </u>	1
			0.13	<u> </u>	1	<u> </u>	1
	1	organic matter	I		!	1	!
East Taba	 25	 Doom	I	 Cood	1	 Enim	1
East Lake	- 35 	•		Good	1	Fair	10 03
	1		10.00		1	Too sandy Hard to reclaim	0.03 0.18
	1	·	0.03 0.13		1	hard to reclaim (rock fragments)	
		low content of organic matter	, v . ± 3	' 	1	Rock fragments	10.26
	1	, organizo maccer		•	•	, -took rragments	, 0.20

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct.	•	rial	Roadfill sourc	e	Topsoil sourc 	e
	-	Rating class and		-		-	
	I	limiting features	 	limiting features	 	limiting features	
190820:	i		i		i		i
Kiva	65	Fair	1	Fair	1	Poor	1
	1	Low content of	0.13	Cobble content	0.99	Hard to reclaim	0.00
	I	organic matter	1	I	1	(rock fragments)	1
	1	Droughty	10.23	I	1	Rock fragments	0.01
	1	Too sandy	10.36	I	1	Too sandy	0.36
	1	I	1	I	1	I	I
Mancelona	•	•	•	Good	1	Poor	1
	I	Low content of	•	•	1		10.00
	I	organic matter			1	Hard to reclaim	
	I		0.15	•	1	(rock fragments)	
	!	Too sandy	10.26	!	1	Too sandy	10.26
100001	!	!	!	!	!	!	!
190821: Kiva	1 50	l IEnim	!	 Fair	1	 Poor	!
KIVA	1 30	•	•	Cobble content	1 10.99	•	10 00
	!	organic matter	•	•	10.99	(rock fragments)	
	:	-	10.23	•	!		10.01
	!		10.23	•		•	10.36
	i	l 100 sandy	10.30	! !	i	ı 100 sandy I	10.30
Mancelona	1 30	Fair	i	 Good	i	 Poor	i
Hancerona	1	•	10.13	•	i	•	10.00
	i	organic matter	•	•	i	Hard to reclaim	
	i	•	0.15	•	i	(rock fragments)	
	i		10.26		i		0.26
	i		1	i	i	l	1
190823:	Ì	Ì	Ì	Ì	İ	İ	İ
Kiva	50	Fair	1	Fair	1	Poor	1
	1	Low content of	0.13	Slope	0.18	Slope	10.00
	1	organic matter	1	Cobble content	0.99	Hard to reclaim	10.00
	1		0.23		1	<pre>(rock fragments)</pre>	1
	1	Too sandy	10.36	I	1	Rock fragments	0.01
	1	I	•	I	1	I	1
Mancelona	30	•	•	Fair	•	Poor	
	1	Low content of		-	0.18	•	10.00
	!	organic matter			!		10.00
	!		0.15		!	Hard to reclaim	
	!	Too sandy	10.26	!	1	(rock fragments)	!
190824:	!	I I	!	1	1	 	!
Lake beaches	I I 100	Not rated		 Not rated	1	 Not rated	!
Take Deaches	1 100	l	i	l	i	l	i
190825:	i	I	i	i i	i	! 	i
Lake bluffs	100	Not rated	i	Not rated	i	Not rated	i
	i	1	i	1	i	I	i
190826:	i	İ	İ	· 	İ	· I	İ
Leelanau	60	Poor	I	Good	1	 Fair	I
	I	Wind erosion	0.00		I	Too sandy	0.30
	I	Low content of	0.13		1	Rock fragments	0.95
	I	organic matter	I	I	1	I -	1
	I	Too sandy	10.30	I	1	I	1
	I	Ī	I	I	1	I	I
East Lake	30	Poor	I	Good	1	Fair	I
	1	Wind erosion	10.00	I	1	Too sandy	10.03
	1	Too sandy	10.03	I	1	Hard to reclaim	0.18
	1	Low content of	0.13	I	1	(rock fragments)	I
	1	organic matter	1	l .	1	Rock fragments	0.26
	•			•			

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	Pct. of	reclamation mate		Roadfill sourc		Topsoil sourc	e
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190827:	 	 	 	 	 	 	
Leelanau	65	Poor	1	Good	1	Fair	1
	1	Wind erosion	10.00	I	1	Too sandy	10.30
	1	Low content of	0.13	I	1	Rock fragments	0.95
	1	organic matter	1	I	1	Slope	10.96
	1	Too sandy	[0.30		!	<u> </u>	!
East Lake	I I 25	 Poor	<u> </u>	 Good		 Fair	<u> </u>
	i	Wind erosion	10.00	i	i	Too sandy	10.03
	İ	Too sandy	0.03	İ	ĺ	Hard to reclaim	0.18
	İ	Low content of	0.13	İ	İ	(rock fragments)	İ
	Ì	organic matter	İ	Ì	İ	Rock fragments	10.26
190828:		 	1	 	1	 	1
Leelanau	65	 Poor	i	Good	i	Poor	i
	I	Wind erosion	10.00	I	I	Slope	10.00
	I	Low content of	0.13	I	I	Too sandy	10.30
	I	organic matter	I	I	I	Rock fragments	0.95
	I	Too sandy	10.30	I	I	l	I
East Lake	l l 25	 Poor	!	 Good		 Poor	
Last Lake	1 23	Wind erosion	0.00	•	i .	•	0.00
	i	Too sandy	10.03		i .	•	10.03
	i	Low content of	10.13		i .	· -	10.18
	i	organic matter	1	i	i	(rock fragments)	•
100000	!	<u> </u>	!	!	!	<u> </u>	!
190829: Leelanau	I I 50	 Poor	1	 Fair	1	 Poor	1
	•	Wind erosion	0.00	•	0.18		0.00
	i	Low content of	0.13	•	i	· -	0.30
	i	organic matter	:	i	i	· -	10.95
	İ	Too sandy	0.30		i	İ	i
East Lake	1 32	 Boom	1	 Fair		 Poor	1
East Dake	1 33	Wind erosion	0.00	•	0.18	•	0.00
	!	Too sandy	10.00	•	10.10	· -	10.03
	;	Low content of	0.13		<u> </u>	· -	10.18
	i	organic matter	1		i	(rock fragments)	•
100000	!	 -	!	!	Į.	!	!
190830: Leelanau	I I 50	 Poor	!	 Poor		 Poor	
	i	Wind erosion	0.00	•	10.00	•	0.00
	i	Low content of	0.13	·	i	Too sandy	0.30
	i	organic matter	i	i	i	Rock fragments	0.95
	I	Too sandy	10.30	I	I	I	I
East Lake	 35	 Poor	1	 Poor		 Poor	1
Dasc Dake	1 33	Wind erosion	0.00	•	0.00	•	0.00
	i	Too sandy	10.03	•	1	•	10.03
	i	Low content of	0.13		i	-	10.18
	i	organic matter	i	İ	i	(rock fragments)	•
100021.	1		!		!		1
190831: Lupton	60	 Poor		 Poor		 Poor	
-	İ	Wind erosion	0.00	•	0.00		0.00
	İ	i I	İ	Dusty	0.80	Organic matter	0.00
	!	<u> </u>	!	!	l	content high	!
Markey	I 30	 Poor	1	 Poor	I I	 Poor	
	1	Wind erosion	0.00	•	0.00	•	0.00
						,	
	i				10.80	Organic matter	
	i 	Low content of organic matter	0.13 		0.80 	Organic matter content high	0.00 I

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of		rial	Roadfill source		Topsoil sourc 	e
	map unit	Rating class and limiting features		Rating class and V limiting features		Rating class and limiting features	
190832:	Ţ] 	I I			 	Ī
Mancelona	. 1 90	Fair	i		ï	 Fair	i
	1	Low content of	0.13	•	ï	•	10.04
	i	organic matter	•	1	ï	Hard to reclaim	•
	i	•	0.22	•	i	(rock fragments)	
	i	·	10.26		i		0.26
10000	!	<u> </u>	!	! !	!		!
190833:	1	 == : :	1	1		 	!
Mancelona	.1 90	•	•	Good		Fair	1004
	!		0.13	•			10.04
	!	organic matter		! !		•	0.18
	!	Droughty	10.22			(rock fragments)	
	!	Too sandy 	10.26	1		Too sandy 	10.26
190834:	i	 	i	i i			i
Mancelona	60	Poor	İ	Good	į	Fair	İ
	1	Wind erosion	10.00	I I	1	Rock fragments	0.04
	1	Too sandy	10.08	I I	1	Too sandy	10.08
	1	Low content of	0.13	I I	1	Hard to reclaim	0.18
	I	organic matter	1	I I	I	(rock fragments)	1
T	1	 Table	!	101	l		!
East Lake	•	•	•	Good		Fair	1
	!	Wind erosion	10.00	•			10.03
	!	· -	10.03			Hard to reclaim	
	!		0.13	!!!		(rock fragments)	•
	!	organic matter		;		Rock fragments	10.26
190835:	i	i İ	i	i i	i	İ	i
Mancelona	55	Poor	1	Good	1	Fair	1
	1	Wind erosion	10.00	I I	- 1	Rock fragments	0.04
	1	Too sandy	10.08	1	- 1	Too sandy	10.08
	1	Low content of	0.13	I I	- 1	Hard to reclaim	0.18
	1	organic matter	!	! !		(rock fragments)	!
East Lake	 35	 Poor	!			 Fair	!
Labe Lake	1	Wind erosion	0.00	•	i	•	0.03
	i		10.03	•	i	·	10.18
	i	· -	10.13	•	i	(rock fragments)	•
	i	organic matter	1	i i	i		0.26
	1	ļ	1	1			1
190836: Mancelona	.I 50	 Poor	I		l	 Poor	1
Manceiona	.1 20	Wind erosion	10.00	•		•	10.00
	!	•	•	•		· -	
	!	Too sandy Low content of	0.08 0.13			Rock fragments Too sandy	0.04 0.08
	i	organic matter	10.13 I			100 Sandy 	10.08
	Ì	l	İ	i i	i	İ	İ
East Lake	30	Poor	1	Good	- 1	Poor	1
	I	Wind erosion	10.00		I	· -	10.00
	I	Too sandy	10.03	·	I	·	10.03
	I	Low content of	0.13	I I	I	•	0.18
	1	organic matter	1		ļ	(rock fragments)	
190837:	I I	I I	1			 	I I
Mancelona	· · 45	 Poor	i	 Fair		 Poor	i
	I	Wind erosion	0.00		0.18		0.00
	I	Too sandy	0.08	· •	i	Rock fragments	0.04
	I	Low content of	0.13		i	•	10.08
	I	organic matter	i	i i	i	- I	I

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	Pct. Of	Source of reclamation mate	rial	Roadfill sourc 	е	Topsoil sourc 	e
	map	Rating class and	Value	Rating class and			
	unit	limiting features	<u> </u>	limiting features	<u>!</u>	limiting features	<u>!</u>
190837:	!	 		 		 	1
East Lake	•	•	! !	 Fair	1	 Poor	1
	i	•	•	•	0.18	•	0.00
	i	•	0.03	•	i	· •	0.03
	İ	Low content of	0.13	İ	İ	Hard to reclaim	0.18
	I	organic matter	I	I	I	(rock fragments)	I
	1	<u>l</u>	1	!	1]	1
190838:	I =0	l Doom		 Deem	!	 	!
Mancelona	•	•	•	Poor Slope	10.00	Poor Slope	10.00
	i		10.08	•	10.00	Rock fragments	10.04
	i	· •	0.13		i	Too sandy	10.08
	i			i	i		
	İ	ĺ	İ	İ	İ	İ	İ
East Lake				Poor	•	Poor	1
	1	•	•	•	10.00	•	10.00
	!	· •	10.03		!	· -	10.03
	!		0.13	!	!	Hard to reclaim	•
	!	organic matter	 	! !		(rock fragments)	1
190839:	i	i I	i i	i I	i	! 	i
Mancelona	70	 Fair	i	Good	i	Poor	i
	İ	Low content of	0.13	İ	İ	Rock fragments	0.00
	I	organic matter	I	I	I	Hard to reclaim	0.18
	1	Droughty	0.15	I	I	(rock fragments)	1
	!	Too sandy	10.26	!	!	Too sandy	10.26
Pichtor	1 25	 Paim	1	 Paim	1	 Paim	1
Richter			•	Fair Wetness	1 10.01	Fair Wetness	10.01
	i	organic matter	•	•	10.01	Too sandy	10.98
	i	-	0.98	•	i	l	1
	İ	Ī	İ	İ	İ	İ	İ
190840:	I	I	I	I	I	l	1
Nester	90	•	•	Poor	•	Fair	
	!	•	0.13		10.00	·	0.51
	!	organic matter Carbonate content		•	0.80 0.87		!
	;		10.08		10.67	! !	1
	i	l	1	i	i	i İ	i
190841:	i	i İ	i	i İ	i	i I	i
Nester	90	Fair	I	Poor	I	Fair	1
	I				10.00		0.51
	1	organic matter		Dusty	10.80	•	10.96
	!	Carbonate content			10.87	<u> </u>	!
	!	Too clayey	10.78] 	!] 	!
190842:	;	! !	! !	! !		! !	1
Nester	i 90	' Fair	i	 Poor	i	 Poor	i
	i	•	0.13	•	0.00		0.00
	İ	organic matter	İ	=	0.80	=	0.51
	1	Carbonate content	0.68	Shrink-swell	0.87	l	1
	1	Too clayey	10.78	!	!	!	1
100043	!	 -	I		1]	1
190843: Nester	1 00	 Fair	I I	 Poor	1	 Poor	I
Meacer	, 90 I	•	I 0.13	•	10.00		10.00
	i	organic matter	:		0.18	· •	10.51
	i	Carbonate content	•	•	10.80		1
	i		0.78	_			i
	1	 I		İ	1	ı	

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	 Pct. of		rial	 Roadfill sourc 	е	 Topsoil sourc 	e
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190844: Nester	 90 	Low content of organic matter Carbonate content	0.13 	Low strength Dusty	 0.00 0.00 0.80	Too clayey	 0.00 0.51
190846: Pits, gravel	 100	 Not rated 	 	 Not rated 	 	 Not rated 	
190847: Richter	 45 	Low content of organic matter	0.13	I	 0.01 	 Fair Wetness Too sandy 	 0.01 0.98
Alcona	 40 	Low content of organic matter	0.13	i I	 	 Fair Too sandy 	 0.40
190848:		 	 	 		 	
Richter	45 	Low content of organic matter	0.13	i I	 0.01 	Fair Wetness Too sandy 	 0.01 0.98
Alcona	 40 	Low content of organic matter	0.13	i I	 	 Fair Too sandy 	 0.40
190849: Roscommon	 50 	Too sandy Wind erosion	•	i I	 0.00 	 Poor Wetness Too sandy 	 0.00 0.00
Markey	 30 	Wind erosion	0.00 0.13	 Poor Wetness Dusty 	 0.00 0.80 	•	 0.00 0.00
190850: Sanilac	 90 	Low content of organic matter	0.13	Dusty	•	 Fair Wetness 	 0.04
190851: Tonkey	 40 	 - Fair Low content of organic matter	•	 Poor Wetness 	•	 Poor Wetness 	 0.00
Munuscong	 25 	 Fair Low content of organic matter Carbonate content	0.13 	Low strength		ĺ	 0.00

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct.	•	rial	Roadfill sourc 	е	Topsoil sourc 	e
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	•
190851: Iosco	 25 	Wind erosion	0.00 0.13	Wetness Shrink-swell	 0.00 0.01 0.99	Rock fragments	 0.01 0.99
190852: Tonkey	 35 		 0.13	 Poor Wetness 	 0.00	 Poor Wetness 	 0.00
Munuscong	 30 		0.13	Low strength	 0.00 0.00 0.57	i I	 0.00
Iosco	20 	Wind erosion	0.00 0.13	Wetness Shrink-swell	•		 0.01 0.99
190853: Water	 100	 Not rated	 	 Not rated	 	 Not rated	
190854: Wallace	i I	 Poor Too sandy Wind erosion	 0.00	 Poor Depth to cemented pan	 0.00	 Poor Depth to cemented pan	 0.00 0.00 0.88
Kalkaska	 45 	Wind erosion Too sandy	 0.00 0.00 0.11	ĺ	 	 Poor Too sandy 	 0.00
190855: Wind eroded land	 100 	Too sandy Wind erosion	 0.00 0.00 0.35	ĺ	 	 Poor Too sandy Rock fragments 	 0.00 0.97
190856: Wind eroded land	 100 	Too sandy Wind erosion		Ī	 0.00 	 Poor Too sandy Slope Rock fragments	 0.00 0.00 0.97
193236: Beaches	1 100	 Not rated	 	 Not rated	 	 Not rated	<u>.</u>
193237: Thompsonville	 50 	Too sandy Wind erosion Too acid	0.00 0.00 0.16	İ	 0.14 	 Poor Too sandy Wetness Too acid	 0.00 0.14 0.98

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of		rial	Roadfill sourc		Topsoil sourc	
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193237: Milnichol	 40	 Poor	 	 Poor	•	 Poor	
	 	Wind erosion	0.00 0.00 0.13	Low strength	0.00 0.00 		0.00 0.00
193255:	i	! 	i	! 	i	! 	i
Spinks	50 	Wind erosion Too sandy	 0.00 0.00 0.13	ĺ		Poor Too sandy 	 0.00
Coloma	 40 	Wind erosion Too sandy	 0.00 0.00 0.13	ĺ	 	 Poor Too sandy 	 0.00
193256:	i .	İ	i	İ	i	i	i
Spinks	50 	Wind erosion Too sandy	 0.00 0.00 0.13	İ		Poor Too sandy Slope 	 0.00 0.96
Coloma	40 	Too sandy	 0.00 0.00 0.13	ĺ		 Poor Too sandy Slope 	 0.00 0.96
193257:		 		 		 	
Spinks	55 	Wind erosion Too sandy	 0.00 0.00 0.13	ĺ	 	Poor Too sandy Slope 	 0.00 0.00
Coloma	 35 	Wind erosion Too sandy	 0.00 0.00 0.13 	İ	 	 Poor Slope Too sandy 	 0.00 0.00
193258:	i .	İ	i	İ	i	i	i
Spinks	50 	Too sandy	 0.00 0.00 0.13	I	 0.00 	Poor Slope Too sandy 	 0.00 0.00
Coloma	40 	Too sandy	 0.00 0.00 0.13	Ī	 0.00 	 Slope Too sandy 	 0.00 0.00

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of	reclamation mate		Roadfill sourc		Topsoil sourc	:e
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	Value
193260: Copemish	 95 	 Poor Too sandy Wind erosion Droughty 	 0.00 0.00 0.00	cemented pan	 0.00 	 Poor Depth to cemented pan Too sandy Too acid	 0.00 0.00 0.02
193262: Kaleva	 95 	Too sandy	 0.00 0.00 0.13	İ	 	 Poor Too sandy 	 0.00
193263: Kaleva	:	Wind erosion	 0.00 0.00 0.13	İ	 	 Poor Too sandy Slope 	 0.00 0.96
193265: Grattan	 95 	Too sandy	 0.00 0.00 0.13	İ	 	 Poor Too sandy Too acid 	 0.00 0.99
193266: Grattan	 95 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	İ	! ! ! ! !	 Poor Too sandy Slope Too acid	 0.00 0.96 0.99
193267: Grattan	 95 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	İ	 	 Poor Too sandy Slope Too acid 	 0.00 0.00 0.99
193269: Grattan	 - 95 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	Slope 	 0.00 	 Poor Slope Too sandy Too acid 	 0.00 0.00 0.99
193270: Covert	 90 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	İ	 0.53 	 Poor Too sandy Wetness Too acid 	 0.00 0.53 0.96
193271: Pipestone	 90 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	İ	 0.00 	 Poor Wetness Too sandy Too acid 	 0.00 0.00 0.97

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct.		rial	 Roadfill sourc 	e	, Topsoil sourc 	e
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	1	limiting features	1
100000	!	!	!	!	!	<u> </u>	!
193272: Dair	1 00	I Daam	!	I Daam	!	 Deem	!
Dair	.1 20	Poor Too sandy	•	Poor Wetness	10.00	Poor Wetness	10.00
	!	Low content of	10.13		10.00	Wethess Too sandy	10.00
	;	organic matter	•	•	;	ı 100 sandy	10.00
	i	Too acid	0.84		i	i I	i
	i		i	i	i	i İ	i
193277:	I	I	1	I	1	I	1
Benona	90	•		Good	I	Poor	I
	I	Too sandy	10.00		1	Too sandy	10.00
	1	Wind erosion	10.00		!	Too acid	10.96
	!	Too acid	10.00		!		!
193278:	!	 	1	 	!	 	1
Benona	90	Poor	i	 Good	i	 Poor	i
	i	Too sandy	0.00	•	i	Too sandy	0.00
	i	Wind erosion	0.00		i	Slope	0.96
	Ì	Too acid	10.00	Ì	İ	Too acid	10.96
	I	I	1	I	1	l	I
193279:		<u> </u>	!		!	<u> </u>	!
Benona	90	•	•	Good	!	Poor	1
	!	Too sandy	10.00		!	Too sandy	10.00
	!	Wind erosion	10.00		!	Slope	10.00
	!	Too acid	10.00	 	!	Too acid	10.96
193284:	i	! 	i	i I	i	! 	i
Udorthents	· 55	Fair	i	Poor	i	Poor	i
	I	Too acid	10.99	Slope	10.00	Slope	10.00
	I	I	•	I	•	l	I
Udipsamments	. 35			Poor		Poor	
	!	Too sandy		-	[0.00	•	10.00
	!	Wind erosion	10.00		!	Too sandy	10.00
	!	Too acid	10.84	 	!	 	!
193285:	i	! 	i	i I	i	! 	i
Lumley	55	Fair	i	 Poor	i	Poor	i
-	İ	Too acid	10.50	Wetness	0.00	Wetness	10.00
	I	I	1	Dusty	0.80	Organic matter	10.00
	1	l	1	I	1	content high	1
		<u> </u>	!	!	!	<u> </u>	!
Makinen	40	•	•	Poor		Poor	1
	!	Low content of	0.13	•		Wetness	10.00
	!	organic matter	1	Dusty	10.80	Organic matter content high	10.00
	i	! 	i	! 	i	content might	i
193286:	İ	i İ	İ	i İ	İ	İ	i
Histosols	55	•	•	Poor		Poor	1
	I	Too acid	10.97	•	10.00		10.00
	1	!	1	Dusty	0.80	•	10.00
	!		I		1	content high	!
Aquents	 15	 Poor	I	 Poor	I	 Poor	1
vdnemes	1 43 1	Too sandy	10.00	•	10.00		10.00
	i	Low content of	0.13		1	We chess Too sandy	10.00
	i	organic matter	10.13		i	, 100 banay	1
	i	Droughty	0.72		i	I	i
			–	•	•	•	•

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	Pct. of		rial	Roadfill sourc	e	Topsoil sourc	e
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193287: Dune land	 55	 Not rated	 	 Not rated	 	 Not rated	
Quartzipsamments		Too sandy Wind erosion Low content of	 0.00 0.00 0.01 	İ	 0.00 	 Poor Slope Too sandy 	 0.00 0.00
193288: Udipsamments	100 	Too sandy Wind erosion	 0.00 0.00 0.84	İ	 	 Poor Too sandy 	 0.00
193342: Gorvan	 35 	Low content of organic matter	0.13	Dusty	 0.00 0.80	•	 0.00
Houghton	 30 	 Good 	 	•	0.00	 Poor Wetness Organic matter content high	 0.00 0.00
Glendora	20 	Too sandy Low content of organic matter	0.00 0.13	 	 0.00 	Poor Wetness Too sandy 	 0.00 0.00
193349: Spinks		Wind erosion Too sandy	•	i -	 0.00 	 Poor Slope Too sandy 	 0.00 0.00
Coloma	 40 	Wind erosion Too sandy	 0.00 0.00 0.13 	i -	 0.00 	 Poor Slope Too sandy 	 0.00 0.00
193351: Benona	95 	Too sandy Wind erosion Too acid	 0.00 0.00 0.00	i -	 0.00 	 Poor Slope Too sandy Too acid	 0.00 0.00 0.96
193354: Dune land	 50	l	İ	 Not rated 	 	 Not rated	!
Quartzipsamments	40 	Too sandy Wind erosion	0.00 0.00 0.01	Ì	 	 Poor Too sandy Slope 	 0.00 0.37

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of	•	rial	Roadfill source 		Topsoil sourc 	e
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	Value
193357:	 	 		 	 	 	
Shavenaugh	- 85	Poor	1	Poor	1	Poor	1
	1	Too sandy	10.00	Slope	0.00	Slope	00.01
	1	Wind erosion	10.00	I	1	Too sandy	00.01
	1	Low content of	0.13	I	1	Hard to reclaim	0.00
	1	organic matter	1	l	1	(rock fragments)	I
193359:	1	 -		 -	1	 	
Shavenaugh	I I 85	l Poor	1	। Good	1	 Poor	<u> </u>
biiaveilaugii		Too sandy	10.00	•	i	•	10.00
	;	· •	10.00	•	<u> </u>	· •	10.00
	i	Low content of	10.13		i	(rock fragments)	•
	i	organic matter	1	! !	i	Slope	10.96
	i	Organic maccer	İ	! 	i	Siope	10.30
193360:	i	İ	i	İ	i	İ	İ
Shavenaugh	- 85		•	Good	1	Poor	1
	1	Too sandy	10.00	•		Too sandy	10.00
	!	Wind erosion	10.00	•	!	•	10.00
	!	Low content of	0.13	 	1	(rock fragments)	!
	i .	organic matter 	<u> </u>	! 	<u> </u>	! 	<u> </u>
193362:	i	i I	i	i I	i	' 	i
Benzonia	- 90	Poor	1	Poor	1	Poor	I
	1	Too sandy	10.00	Slope	0.00	Slope	0.00
	1	Wind erosion	0.00	I	1	Too sandy	0.00
	1	Low content of	0.13	I	1	Too acid	0.98
	1	organic matter	1	!	1	<u> </u>	1
193363:	!				1		!
Benzonia	I - I 90	l IPoor	1	। Good		 Poor	
2011201124	1	Too sandy	0.00	•	i	Too sandy	10.00
	i	Wind erosion	10.00	•	i	· •	10.00
	i	Low content of	10.13		i	•	10.98
	i	organic matter	1	i İ	i		
	1	l	1	l	1	l	I
193364:	1	 	!		!	 B	!
Benzonia		•	•	Good	!	Poor	1
	!	Too sandy	10.00	•	!	•	10.00
	!	Wind erosion Low content of	0.00		!	· •	10.96
	<u> </u>	organic matter	0.13 	! 	1	l 100 acid	0.98
	i		i	' 	i	' 	i
193365:	1	l	1	l	1	l	I
Benzonia	- 90			Good	1	Poor	
	1	Too sandy	10.00		1		10.00
	1		10.00			Too acid	10.98
	!	Low content of organic matter	0.13 	 	1	 	
	i	Organic maccer	1	! 	i	! 	<u> </u>
193371:	i	İ	i	İ	i	İ	i
Dair	- 50	•	•	Poor		Poor	I
	1	Too sandy	10.00	Wetness	10.00	Wetness	10.00
	1	Low content of	0.13	I	1	Too sandy	10.00
	!	•	•	!	!	<u> </u>	!
	1	Too acid 	0.84 	 	1	 	
Pipestone	40	 Poor	•	 Poor	i	 Poor	i
•		Too sandy	0.00		0.00		0.00
	1	Wind erosion	0.00	I	1	Too sandy	0.00
			10 10			t management	10 07
	1	Low content of	0.13	l	1	Too acid	0.97

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of		rial	Roadfill source	е	Topsoil sourc	e
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193372:	 	 	 	 	 	 	1
Access Denied	100	Not rated	İ	Not rated	İ	Not rated	İ
193423:				! 	 	 	
Benona	- 95	•	•	Poor	•	Poor	1
	1	·	10.00	-	10.00	· -	10.00
	1	Wind erosion Too acid	10.00		 	Too sandy Too acid	10.00
100404	į		į	į	į	į	į
l93484: Pits, sand and	1	 	1	 	 	 	1
gravel	1 100	 Not rated	i	Not rated	i	Not rated	i
-	i	l	i	İ	i	İ	i
L93494:	1		1	<u> </u>	I	1	1
Nordhouse	100		•	Poor	•	Poor	1
	!	· -	10.00	•	10.00	Slope Too sandy	[0.00 [0.00
	i	Too acid	10.00		i	Too acid	10.79
100406	!		!	!	!	!	!
193496: Nordhouse	 - 95	 Poor	1	 Good	1	 Poor	!
NOT CLIFF CONTROL OF C	1	•	0.00	•	i	Too sandy	0.00
	i	· -	0.00		i	Slope	0.37
	!	Too acid	10.00	!	Į.	Too acid	0.79
193497:	1	 	1	 	 	 	1
Nordhouse	95	Poor	i	Good	i	Poor	i
	1	·	10.00	I	I	Too sandy	10.00
	!		10.00		1	Too acid	10.79
	1	Too acid 	0.00 	 	1	 	1
193498:	i		i	İ	i	i	i
Nordhouse	- 40	•	•	Good	1	Poor	
	!	· -	0.00 0.00			Too sandy Too acid	10.00
	i .	•	10.00		i	l 100 acid	10.79
	i		Ī	İ	i	İ	i
Platteriver	- 35	•	•	Fair	•	Poor	1
	!	·			0.14	· -	10.00
	!		0.00 0.13		1	Wetness Too acid	0.14 0.52
	i		1	İ			
Dain		l Doom	1	 	I	 	
Dair	1 23	Too sandy			 0.00	Poor Wetness	10.00
	i	Low content of	0.13			Too sandy	10.00
	İ	organic matter	İ	İ	ĺ	Ī	İ
		Too acid	10.84	1	1	1	
193503:				' 		 	i
Spinks	· 50			Good	I	Poor	<u> </u>
	!	Wind erosion	10.00		I	Too sandy	10.00
	!	Too sandy Low content of	0.00 0.13		1	1	!
	i	organic matter	1	İ			i
Charranaugh		 Door		 Cood		 Poor	
Shavenaugh	, - <u>4</u> ∪ 	Poor Too sandy	10.00	Good 	i I	Too sandy	10.00
	i	Wind erosion	10.00		i	·	10.00
	i	Low content of	0.13		İ	(rock fragments)	
	1	organic matter	1	i .	1	I .	1

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	 Pct. of		rial	 Roadfill source 	e	 Topsoil sourc 	e
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193504: Spinks	 50 	Wind erosion Too sandy	 0.00 0.00	İ	 	=	 0.00 0.96
Shavenaugh	 40 	Too sandy Wind erosion	 0.00 0.00 0.13 	İ	 	Hard to reclaim (rock fragments)	 0.00 0.00 0.96
193505: Spinks	 50 	Too sandy	 0.00 0.00 0.13 	İ	 	· -	 0.00 0.00
Shavenaugh	40 	Too sandy Wind erosion Low content of	 0.00 0.00 0.13 	İ	 	Slope	 0.00 0.00 0.00
193506:	l	<u> </u>	l	<u> </u>	I	!	I
Spinks	50 	Wind erosion Too sandy	 0.00 0.00 0.13	İ	 0.00 	=	 0.00 0.00
Shavenaugh	 40 	Too sandy Wind erosion	 0.00 0.00 0.13	Ī	 0.00 	Too sandy	 0.00 0.00 0.00
193507: Spinks	 50 	Wind erosion Too sandy	 0.00 0.00 0.13	•	 0.00 	· •	 0.00 0.00
Shavenaugh	 40 	Too sandy Wind erosion Low content of	 0.00 0.00 0.13 	İ	 0.00 	Too sandy	
193508: Madaus	 90 	Carbonate content Cont	•	Dusty 	 0.00 0.80 	•	 0.00 0.00

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of	•	rial	 Roadfill sourc 	e	 Topsoil sourc 	e
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	Value
193509:	 	 	 	 	 	 	
Boyer	50 	Fair Low content of organic matter Too acid	 0.13 0.99	İ	 	Poor Rock fragments Hard to reclaim (rock fragments)	 0.00 0.94
Shavenaugh	 40 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	İ	 	 Poor Too sandy Hard to reclaim (rock fragments) 	 0.00 0.00
193510:	i	! 	i	! 		! 	i
Boyer	50 	Fair Low content of organic matter Too acid 	 0.13 0.99	İ	 	Poor Rock fragments Hard to reclaim (rock fragments) Slope	 0.00 0.94 0.96
Shavenaugh	 - 40 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	İ	 	 Poor Too sandy Hard to reclaim (rock fragments) Slope	 0.00 0.00 0.96
193511:		 		 	 	 	
Boyer	50 	Fair Low content of organic matter Too acid 	 0.13 0.99	Ī	 0.00 	Rock fragments	 0.00 0.00 0.94
Shavenaugh		 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	İ	 0.00 	Too sandy	 0.00 0.00 0.00
193513:	i	! 		! 	! 	I 	
Dair	50 	Poor Too sandy Low content of organic matter Too acid	 0.00 0.13 0.84	 	 0.00 	Poor Wetness Too sandy 	 0.00 0.00
Adrian	 45 	 Fair Low content of organic matter 	0.13	•	 0.00 0.80 	•	
193514:	i	' 	i	' 	İ	! 	i
Platteriver	55 	Too sandy Wind erosion Low content of	•	İ	 0.14 	Poor Too sandy Wetness Too acid 	 0.00 0.14 0.52
Pipestone	 40 	Too sandy Wind erosion Low content of	•	İ	 0.00 	 Poor Wetness Too sandy Too acid 	 0.00 0.00 0.97

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	Pct. of		rial	Roadfill sourc	e	Topsoil sourd 	ce
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
202010: Houghton	 55 	 Fair Too acid 	 0.97 	 Poor Wetness Dusty 	 0.00 0.80	•	 0.00 0.00
Adrian	 40 	Low content of	 0.13 	 Poor Wetness Dusty 	 0.00 0.80		 0.00 0.00
202016: Spinks	 50 	Wind erosion Too sandy	 0.00 0.00 0.13	İ		 Poor Too sandy 	 0.00
Tekenink, sandy substratum	 40 41 1	Wind erosion	 0.00 0.41 0.84	İ	 	 Fair Too sandy 	 0.41
631170: Fogg	 50 	Wind erosion Too sandy Low content of	 0.00 0.00 0.13	Ī	 0.00 	 Poor Slope Too sandy Too acid 	 0.00 0.00 0.99
Benzonia	 40 	Too sandy	 0.00 0.00 0.13	Ī	 0.00 	 Poor Slope Too sandy Too acid 	 0.00 0.00 0.98
631171:	! 	! 		! 		! 	
Fogg	50 	Wind erosion Too sandy Low content of	0.00 0.00 0.13	- 	 0.00 	Poor Slope Too sandy Too acid 	 0.00 0.00 0.99
Benzonia	 40 	Too sandy	•	Ī	 0.00 	 Poor Slope Too sandy Too acid 	 0.00 0.00 0.98
631172:	! 	 		! 		! 	
Fogg	50 	Low content of	 0.00 0.00 0.13	ĺ	 	Poor Too sandy Slope Too acid 	 0.00 0.00 0.99
Benzonia	40 40 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13 	İ	 	 Poor Too sandy Slope Too acid 	 0.00 0.00 0.98

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of		rial	Roadfill sourc	e	 Topsoil sourc 	e
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
631173:	 	 		 	 	 	
Fogg	- 50	Poor	1	Good	I	Poor	1
	1	Wind erosion	10.00	I	I	Too sandy	10.00
	1	Too sandy	10.00	I	1	Slope	10.96
	1	Low content of organic matter	0.13 	 	 	Too acid 	0.99
Benzonia	 - 40	I		 Good	İ	 Poor	İ
Delizonia	:	Too sandy	10.00	•	<u> </u>	Too sandy	10.00
	i	Wind erosion	10.00	•	i	Slope	10.96
	i	Low content of	0.13		i	Too acid	10.98
	į	organic matter		į	į		
631174:		I 		 	 	I 	
Fogg	- 50	Poor	1	Good	1	Poor	1
	1	Wind erosion	10.00		I	Too sandy	10.00
	1	•	10.00		1	Too acid	10.99
		Low content of organic matter	0.13 	 	 	 	
Benzonia	I - 1 40	 Poor		 Good		 Poor	1
Delizonia	1 -20	Too sandy	10.00	•	i i	Too sandy	10.00
	i	Wind erosion	10.00		i	Too sandy Too acid	10.98
	i	Low content of	10.13		i	i	i
	į	organic matter	į	İ	į	 -	į
680939:		 		 	 	 	
Fern	- 50	•	•	Fair	•	Fair	I
	1	Wind erosion	•	•	10.53	•	10.53
	!	Low content of	10.13	:	0.98	<u> </u>	!
	!	•	•	1	1	 	!
	1	Too acid 	0.84 	! 	! !	! 	i
Spinks	- i 40	 Poor	i	 Good	i	 Poor	i
-	Ì	Wind erosion	10.00	İ	İ	Too sandy	10.00
	1	Too sandy	10.00	I	I	Slope	10.96
	1	Low content of	0.13	I	I	I	1
	1	organic matter	1	 	 	 	1
680943:	i	 -	į	<u>i_</u>	į	 -	į
Milnichol	- 90	•	•	Poor	•	Poor	10.00
	1	Too sandy Wind erosion	10.00		0.00 0.00		0.00 0.00
	i	Low content of	0.13	•	1	100 sandy 	1
	1	organic matter	1	 	 	 	1
680945:	İ		į		į		į
Fern				Fair	•	Fair	10 53
	1	Wind erosion Low content of	•	•	10.53	Wetness Slope	0.53 0.96
	1	organic matter			10.30 I	l probe	10.90
	į	Too acid	0.84	•	į		į
680946:	 	 	1	 	 	 	1
Fern	- 90	•		Fair	•	Fair	1
	I		10.00		10.53		10.53
	1				10.98	1	1
	1	organic matter Too acid	 0.84		I I] 	1

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	 Pct. of	•	rial	Roadfill sourc	e	Topsoil sourc	e
	map	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
	1		'				†
680971:	l	l	I	I	I	I	I
Nessen	50	•	•	Poor		Poor	1
	I	· -	10.00	•	10.00	· -	10.00
	!		10.00		!	Too sandy	10.00
	!	•	0.13	!	!	Hard to reclaim	•
	l	organic matter	1	!	!	(rock fragments)	!
Kaleva	I I 40	l Boom	1	Poor	!	 Poor	!
Raieva	1 -10	Too sandy	10.00	•	10.00		10.00
	<u>'</u>	· <u>=</u>	10.00	•	10.00	Too sandy	10.00
	<u>'</u>	Low content of	10.13	•	:	I 100 Sandy	10.00
	<u>'</u>		1	i	i	i	i
	i		i	i	i	i	i
680972:	i	i i	i	i	i	i	i
Nessen	50	Poor	i	Good	i	Poor	i
	ĺ	Too sandy	0.00	İ	İ	Too sandy	0.00
	I	Wind erosion	0.00	I	I	Slope	0.00
	I	Low content of	0.13	1	I	Hard to reclaim	0.92
	l	organic matter	1	I	I	<pre>(rock fragments)</pre>	1
	I	I	1	I	I	I	1
Kaleva	40	Poor	•	Good	I	Poor	1
	I		10.00	I	I	Too sandy	10.00
	!		10.00	•	!	Slope	10.00
	!	Low content of	0.13	!	!	!	!
	l	organic matter	!	!	!	!	!
680973:	1] 	1	1	!	1	!
Nessen	I I 50	l Poor	1	 Good	!	Poor	1
Nessell	1 30	•	10.00	•	!	Too sandy	10.00
	<u> </u>	· -	10.00	•	i	•	10.92
	i	•	10.13		i	(rock fragments)	•
	i	organic matter	i	i	i	Slope	0.96
	i	i	i	i	i	i	i
Kaleva	40	Poor	İ	Good	İ	Poor	İ
	I	Too sandy	0.00	I	I	Too sandy	10.00
	l	Wind erosion	0.00	I	I	Slope	10.96
	I	Low content of	0.13	I	I	I	1
	I	organic matter	1	I	I	I	1
	I	<u> </u>	1	1	1	1	1
680974:	I	 Barana	!	l Const	!	I Danie	!
Nessen	50	Poor	•	Good	!	Poor	1
	1	Too sandy	10.00		!	Too sandy	10.00
	1	Wind erosion	0.00	1	!	Hard to reclaim	
	1	Low content of organic matter	0.13		!	(rock fragments)	1
	<u>'</u>	Olganic maccel	;	;	:	;	;
Kaleva	1 40	l Poor	i	Good	i	Poor	i
1141614	1	Too sandy	0.00	•	i	Too sandy	0.00
	i	=	0.00		i	1	1
	i	Low content of	0.13		i	i	i
	I	organic matter	1	I	I	I	I
	I	- I	1	I	I	I	I
893251:	l	I	I	I	I	I	I
Boyer	50	Fair	1	Good	I	Poor	I
	I	Low content of	0.13	I	I	Slope	10.00
	I	•	1	I	I	Rock fragments	10.00
	I	Too acid	10.99	I	I		0.94
	I	!	1	!	!	(rock fragments)	1
	I	I	I	I	I	I	I

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

	Pct. of		rial	Roadfill sourc	e	Topsoil sourc	e
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
893251:]] 	1	[
Shavenaugh	40	Poor	i	Good	i	Poor	i
2	i		0.00	İ	i	Too sandy	0.00
	İ	Wind erosion	0.00	İ	ĺ	Slope	10.00
	I	Low content of	0.13	I	1	Hard to reclaim	10.00
	1	organic matter	1	!	I	(rock fragments)	1
894062:	 	 	1	 	 	 	1
Remus	50	Fair	İ	Poor	ĺ	Poor	İ
	1	Low content of	0.13	Slope	0.00	Slope	10.00
	I	organic matter		•	0.98	I	1
	I		10.99		I	l	1
		Water erosion	10.99	 			1
Spinks	40	 Poor	•	Poor	i	 Poor	i
_	İ	Wind erosion	0.00	Slope	0.00	Slope	0.00
	1	Too sandy	0.00	I -	I	Too sandy	10.00
	I	Low content of	0.13	I	1	l	1
	!	organic matter	!	!	1		!
894063:	 	 	1	 		 	1
Remus	50	 Fair	i	 Fair	i	Poor	i
	1	Low content of	0.13	Shrink-swell	0.98	Slope	10.00
	1	organic matter	1	I	1	l	1
	1	Too acid	0.99	I	1	l	1
		Water erosion	10.99				1
Spinks	40	 Poor	i	 Good	i	 Poor	i
-	İ	Wind erosion	0.00	İ	ĺ	Too sandy	0.00
	I	Too sandy	0.00	I	1	Slope	10.00
	1	Low content of	0.13	I	1	l	1
	1	organic matter	!	<u> </u>	1		!
894064:		 		! 	i i	 	
Fern	50	•	•	Fair	•	Fair	1
	I				0.53		0.53
	1	•	•		0.98	Slope	10.96
		organic matter Too acid	I I0.84	 			1
	<u> </u>	100 aciu	U. U. 4	! 	i	! 	i
Remus	40	•	•	Fair	•	Fair	1
	1	Low content of	0.13	•	0.98	Slope	10.96
	!	organic matter	•	!	!		!
	!		10.99		!		!
	 	Water erosion 	0.99 	 		 	1
894065:	İ	l	İ	İ	İ		İ
Fern	50	•		Fair		Fair	
	!					•	10.53
	1			•	0.98		1
	I I	organic matter Too acid	 0.84	•	1	 	I
	i	İ	1		i	I	i
Remus	40	•	10.10	•	•	Good	!
	!	Low content of	•	•	0.98		1
	1	organic matter				 	I
	1		0.99 0.99		1	l I	1
	I	water erosion	10.99 I		!	<u> </u>	1

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. Of		rial	 Roadfill sourc 	e	 Topsoil sourc 	e
	_	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
894104: Mollineaux	 50 	Wind erosion Too sandy	 0.00 0.02 0.13	Low strength	 0.00 0.22 	•	 0.00 0.02
Remus	 40 	organic matter Too acid	0.13	Shrink-swell	 0.00 0.98 	•	 0.00
894105: Mollineaux	 50 	Wind erosion Too sandy	 0.00 0.02 0.13	ĺ	 0.22 	 Poor Slope Too sandy 	 0.00 0.02
Remus	 40 	Low content of organic matter Too acid	0.13	 	 0.98 	 Poor Slope 	 0.00
894165: Spinks	 50 	Wind erosion Too sandy	 0.00 0.00 0.13	i -	 0.00 	 Poor Slope Too sandy 	 0.00 0.00
Tekenink, sandy substratum	 40 	•	•	İ	 0.00 	 Poor Slope Too sandy 	 0.00 0.41
899682: Kaleva	 90 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	İ	 0.00 	 Poor Slope Too sandy 	 0.00 0.00
899722: Goodharbor	 90 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	Ì	 	 Poor Too sandy 	 0.00
899731: Covert	; 50 	 Poor Too sandy Wind erosion Low content of organic matter	 0.00 0.00 0.13	İ	 0.53 	 Poor Too sandy Wetness Too acid 	 0.00 0.53 0.96

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Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol	 Pct.	Source of		ı Roadfill sourc	•	Topsoil source	10
and soil name	l of		rial	l Koadiiii sodic	-	l lopsoil sould	
and boll name	map	,		Rating class and	I Va l 11e	Rating class and	IValue
		limiting features		limiting features		limiting features	
899731:	 	 	1	 	1	 	1
	1 40	 Poor	i	' Poor	i	 Poor	i
	i	Too sandy	0.00	•	0.00	•	10.00
	i	Wind erosion	10.00	•	1	Too sandy	10.00
	i	l Low content of	0.13	•	i	Too acid	10.97
	i	organic matter	I	İ	i	İ	i
899733:			1	 -	!		!
Covert	I 50	 Poor		ı Fair		 Poor	1
COVELC	1 30	Too sandy	10.00	•	10.53	•	10.00
	<u> </u>	•	10.00	•	1	Wetness	10.53
	<u> </u>	,	10.13	•	<u> </u>	Too acid	10.96
	i	organic matter	1	' 	i		1
	ĺ	ĺ	Ì	l	İ	Ì	İ
Dair	45	Poor	1	Poor	1	Poor	1
	1	Too sandy	10.00	Wetness	0.00	Wetness	[0.00
	1	Low content of	0.13	I	1	Too sandy	[0.00
	I	organic matter	1	I	1	I	1
	I	Too acid	0.84	ļ	1	!	1
899734:	 	 	1	 	!	 	!
Benzonia	i 90	 Poor	i	' Poor	i	 Poor	i
	1	Too sandy	0.00	•	0.00	•	0.00
	i	Wind erosion	10.00		1	Too sandy	10.00
	i	Low content of	0.13		i	Too acid	10.98
	i	organic matter	1	I	i	1	1
	i		i	I	i	i	i

Table 13.-Ponds and Embankments

(Onsite investigation may be needed to validate the interpretations in this table and to confirm the identity of the soil on a given site. The numbers in the value columns range from 0.01 to 1.00. The larger the value, the greater the limitation. See text for further explanation of ratings in this table)

	Ī	<u> </u>		I			
Map unit symbol	Pct.	•	reas	Embankments, dikes	, and	-	_
and soil name	of	· 	177- 1	levees	177-7	excavated pond	
	map	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
	1		'		:	<u>9</u>	i
190775:	i	i İ	i	İ	i	İ	i
Adrian	55	Very limited	I	Very limited	1	Very limited	I
	I	Seepage	1.00	•	1.00	•	1.00
	!	<u> </u>	!	Depth to	11.00	excavation walls	!
	!] 	!	saturated zone Seepage	 1.00	 	!
	<u> </u>	I I		Seepage Hard to pack	11.00	•	
	i	i I	i	Dusty	10.01		i
	i	i I	i	, <u>.</u>	İ	i İ	i
Houghton	45	Very limited	I	Very limited	1	Somewhat limited	I
	1	Seepage	11.00		11.00	•	10.10
	!	l	!	content	1 00	excavation walls	!
	!] 	!	Ponding Depth to	1.00 1.00	•	!
	i	! 	<u> </u>	saturated zone	11.00 I	! !	i
	i	i i	i	Seepage	11.00	i	i
	I	I	I	Hard to pack	1.00	I	I
	1	<u> </u>	1	<u> </u>	1	<u> </u>	1
190777:			!	 Not limited	!		!
Alcona	1 22	•	I 0.70		1	Very limited Depth to water	11.00
	i	l seepage	10.70	! 	i	l pebcu co macei	1
Richter	30	Somewhat limited	i	Very limited	i	Very limited	i
	I	Seepage	0.70	Depth to	1.00	Unstable	1.00
	I	I	I	saturated zone	1	excavation walls	•
	!	<u> </u>	!	Dusty	0.01	Slow refill	10.30
190778:	!] 	!	 	1] 	!
	ı I 65	 Somewhat limited	i	 Not limited	<u> </u>	 Very limited	i
	i	•	0.70	•	i	-	11.00
	İ	Slope	0.08	I	İ	Ī	Ì
	1	l	I	l	1	l	I
Richter	25	•		Very limited		Very limited	
	!		0.70 0.08	· •	1.00	Unstable excavation walls	1.00
	i	l Siope	10.00	Dusty	0.01	•	10.30
	i	i İ	i			i	
190779:	I	I	I	I	I	I	I
Alpena	90	· =		Very limited		Very limited	I
	!		11.00		11.00	Depth to water	11.00
	1	Slope	0.68 	 	1	 	
190780:	i	 	i	! 	i	! 	i
Au Gres	45	Very limited	i	Very limited	i	Very limited	i
	I		11.00	Depth to	11.00	Unstable	11.00
	1	<u> </u>	I	saturated zone		excavation walls	!
	1	1	ļ .	Seepage	11.00		!
Kalkaska	 35	 Very limited	 	 Very limited	1	 Very limited	1
MAINASNA	, J5	=	 1.00	=	1	_	1 1.00
	:	,		,	• •	,	

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct.		reas	Embankments, dikes levees	, and	_	ls
	-	Rating class and		-		-	
	lunit	limiting features	<u> </u>	limiting features	 	limiting features	<u> </u>
190781: Bach	 - 90 	 - Somewhat limited Seepage - - -	 0.03 	Depth to saturated zone Piping		Slow refill	 1.00 0.30
	1	I	l	I	1	I	1
190782: Deer Park	 - 100 	Seepage	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
190783:	1	 	 	! 	1	I I	
Deer Park	- 100 	Seepage	 1.00 1.00		 1.00 	Very limited Depth to water 	 1.00
190784:	i	i İ	i	İ	i	i i	i
Deer Park	- 70 	=	 1.00	Very limited Seepage 		Very limited Depth to water	 1.00
Roscommon	 - 25 	•	 1.00 	Depth to saturated zone		İ	1.00
190786:	i	' 	i		i	' 	i
Dune land	- 100	Not rated	l	Not rated	1	Not rated	I
190787:	-	 	 	 	1	 	1
East Lake	- i 90 I	•	 1.00	Very limited Seepage 		Very limited Depth to water	 1.00
190788: East Lake	 - 90 	Seepage	 1.00 1.00			 Very limited Depth to water 	 1.00
190789:		! 		! 		! 	
East Lake	- 90 	Seepage	 1.00 1.00	Seepage		Very limited Depth to water 	 1.00
190790: East Lake	 - 90 	Seepage	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
190791:	1	 		 	1	 	
Eastport	- 93 		11.00	Very limited Seepage	11.00	 Very limited Depth to water	11.00
190792: Edwards	 - 70 	Carbonate content		Depth to saturated zone Seepage	1.00 1.00 1.00	 	 0.10
		 	 	Hard to pack Dusty	1.00 0.01 		

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct.	•	reas	Embankments, dikes levees	, and	=	ls
	-	Rating class and		-		-	
	lunit	limiting features	<u>!</u>	limiting features	<u>!</u>	limiting features	<u>!</u>
190792: Marl beds	 - 20 	 Very limited Carbonate content 		Ponding Depth to	1.00 1.00	 Somewhat limited Unstable excavation walls	
	 	 	 	Hard to pack	 1.00 0.03 	•	
190794:	1	l	I	l	I	l	1
Emmet	- 60 	Seepage		·		Very limited Depth to water 	 1.00
Leelanau	- 30 	Seepage				 Very limited Depth to water 	 1.00
190795:	i	i İ	i	İ	i	İ	i
Emmet	- 60 	Seepage Slope	•	Dusty		Very limited Depth to water 	 1.00
Leelanau		 Very limited Seepage Slope	İ	Seepage	•	 Very limited Depth to water 	11.00
190796:	i .	 	! 	! 		! 	i
Emmet	- 50 	Seepage		Dusty		Very limited Depth to water 	 1.00
Leelanau	 - 30 	Seepage				 Very limited Depth to water 	 1.00
190797:	1	 	! !	! 		! 	i
Emmet	- 50 	Seepage		Dusty		 Very limited Depth to water 	 1.00
Leelanau		Seepage		Seepage	•	 Very limited Depth to water 	 1.00
190799:	1	 	! !	! 		! 	i
Emmet	- 4 5 	Seepage	 1.00 1.00	•	 0.01 	 Very limited Depth to water 	 1.00
Leelanau	 - 30 	Seepage	 		 0.93 	 Very limited Depth to water 	 1.00
190801: Emmet	 - 70 	Seepage		 Somewhat limited Dusty 	 0.01	 Very limited Depth to water 	1 1.00
Mancelona	 - 25 	Seepage				 Very limited Depth to water 	 1.00

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of		reas	Embankments, dikes levees		Aquifer-fed excavated pond	ls
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	lunit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	<u> </u>
190803:	1		!		!		!
Emmet	। -। 60	 Verv limited	i	 Somewhat limited	<u> </u>	 Verv limited	<u> </u>
		· •		Dusty		_	11.00
	İ	Slope	11.00	Ī	Ì	Ī	Ì
		<u> </u>	1	<u> </u>	!	<u> </u>	I
Mancelona	•			Very limited Seepage		Very limited Depth to water	1 1.00
	i		11.00		1	Depth to water	1
	i	i -	İ	İ	i	İ	i
190805:			1		!		!
Emmet		· •		Somewhat limited		Very limited	11 00
			10.08	Dusty	10.01	Depth to water	11.00
	i	· •	1	! 	i	! 	i
Omena	- 45	Very limited	i	Somewhat limited	i	Very limited	i
	1	Seepage	1.00	Dusty	0.01	Depth to water	1.00
	1	Slope	10.08	<u> </u>	!	<u> </u>	I
190806:	1	 	1	 	1	 	1
Emmet	- j 50	Very limited	i	 Somewhat limited	i	Very limited	i
	1	Seepage	1.00	Dusty	0.01	Depth to water	11.00
	1	Slope	11.00	!	1	!	1
Omena		 Tom: limited	!	 Somewhat limited	!	 Tom: limited	
Omena		· •	•	Dusty		Very limited Depth to water	11.00
	i		11.00	•	1	l sepen co macer	1
	İ	Ī	İ	l	Ì	l	Ì
190807:			1		!		1
Emmet		· •		Somewhat limited Dusty		Very limited Depth to water	1
	1		11.00	· -	10.01	Depth to water	1
	i	i	i	i İ	i	İ	i
Omena		· •		Somewhat limited		Very limited	1
	!			Dusty	[0.01	Depth to water	11.00
	<u> </u>	Slope 	1.00 	! 	i	! 	<u> </u>
190808:	i	İ	i	İ	i	İ	i
Emmet	- 50	· •	•	Somewhat limited		Very limited	1
	!			Dusty	0.01	Depth to water	1.00
	1	Slope 	11.00	 	1	 	I I
Omena	- 45	Very limited	i	Somewhat limited		Very limited	i
	1	Seepage		Dusty	0.01	Depth to water	1.00
	!	Slope	11.00	 -	!	 -	!
190809:	1	 	1	 	1	 	I I
Emmet	- 50	 Very limited	i	 Somewhat limited	i	 Very limited	i
	1	Seepage	1.00	Dusty	0.01	Depth to water	11.00
	1	Slope	11.00	<u> </u>	!	<u> </u>	1
Omena	 - 45	 Very limited		 Somewhat limited	1	 Very limited	
Omeria	1 43	_		Dusty	0.01	-	11.00
	i	Slope	11.00	•	i	İ	i
100011	!	 -	!	 -	I	 -	!
190811: Hettinger	 - 45	 Somewhat limited	I	 Very limited	1	 Somewhat limited	1
	43	Seepage	10.03	·	11.00	•	10.30
	Í		İ	Depth to		Unstable	0.10
	1	I	I	saturated zone	Ī	•	1
	1	l	1	Dusty	10.02	•	1
				Piping	0.01		

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct.	•	reas	Embankments, dikes levees	, and	Aquifer-fed excavated pond	s
	-			Rating class and		Rating class and	Value
	lunit	limiting features	 	limiting features	<u> </u>	limiting features	<u> </u>
190811:	i	! 	i	! 	i	! 	<u> </u>
Muck	- 30	Very limited	I	Very limited	I	Somewhat limited	I
	1	Seepage	1.00	Ponding	1.00	Unstable	0.50
	1	l	1	· •	1.00	excavation walls	I
	1	I	1	•	I	I	l
	!	<u> </u>	1		1.00	•	!
	!	 	1	•	11.00		!
	-	l İ	1	Dusty	0.01] 	!
190812:	i .	! 	i	! 	i	! 	i
Hettinger	- 45	Somewhat limited	i	Very limited	i	Somewhat limited	i
-	İ	Seepage	0.03	Ponding	11.00	Slow refill	0.30
	1	I	1	Depth to	1.00	Unstable	0.10
	1	I	1	saturated zone	I	excavation walls	I
	1	l	1	•	0.02	•	I
	!	<u> </u>	!	Piping	0.01	<u> </u>	!
Tonkey	- I 30	 Very limited	1	 Very limited	1	 Very limited	1
10likey	-1 20	Seepage	11.00	· <u>-</u>	11.00		11.00
	i	l beepage	1	•	11.00	•	•
	i	i I	i	•	1		i
	i	i I	i	Dusty	0.01	i I	i
	1	l	I	I -	I	I	I
190814:	1	I	1	I	I	I	I
Kalkaska	- 85	· -		Very limited		Very limited	
	!	Seepage	11.00	Seepage	11.00	Depth to water	11.00
190815:	-	l İ	1	 	!] 	!
Kalkaska	-1 85	ı Verv limited	i	 Very limited	<u> </u>	 Very limited	:
na ina ina ina ina ina ina ina ina ina i	1	Seepage	1.00	·	11.00	-	11.00
	i	Slope	11.00		i	i -	į
	1	I	I	I	I	I	I
190816:	1	l	1	I	I	I	I
Kalkaska	- 90	•		Very limited		Very limited	
	!	Seepage	1.00		1.00	Depth to water	11.00
	-	Slope	11.00	! !	!	! !	1
190817:	i	i İ	i	i	i	i İ	i
Kalkaska	- j 90	Very limited	i	Very limited	i	Very limited	i
	1	Seepage	11.00	Seepage	1.00	Depth to water	1.00
	1	Slope	1.00	I	I	I	I
	1	<u> </u>	1	!	!	!	!
190818:	1		!	 	!		!
Kalkaska	- 90	Very limited Seepage	 1.00	·	 1.00	Very limited Depth to water	11.00
	1	Seepage Slope	11.00		1	Depth to water	11.00
	i	, 	1	I	i	I	i
190819:	Ì	l	İ	Ì	İ	l	ĺ
Kalkaska	- 55	Very limited	1	Very limited	1	Very limited	I
	1	Seepage	1.00	Seepage	1.00	Depth to water	1.00
Total Talls			!	 	!		!
East Lake	- 35	-		Very limited Seepage	 1.00	Very limited Depth to water	11.00
	1	Seepage 	11.00	Seepage 	1	Depth to water	11.00
190820:	i		i		i		i
Kiva	- 65	 Very limited	İ	Very limited	İ	Very limited	i
	1	Seepage	11.00	Seepage	11.00		11.00
	1	Slope	10.08	Dusty	0.01	l	I
		<u> </u>	1	<u> </u>	!	<u> </u>	!
Mancelona	-1 30	_		Very limited		Very limited	11 00
	1	Seepage	1.00	Seepage	1.00	Depth to water	1.00
	1	Slope	0.08	I .	1	i	1

Table 13.—Ponds and Embankments—Continued

	Pct. of	•	reas	Embankments, dikes levees	, and	-	is
	map	Rating class and	Value	Rating class and	Value		
	lunit	limiting features	<u>i</u>	limiting features	<u>i</u>	limiting features	<u>i</u>
		!	1	!	1	!	1
190821:	=0	 Tome limited	1	 Town limited	1	 Town limited	
Kiva	1 20		1			Very limited Depth to water	1
				Seepage Dusty	10.01	•	11.00
	<u> </u>	l probe	11.00	l Dusty	10.01	! 	<u> </u>
Mancelona	30	Very limited	i	Very limited	i	Very limited	i
	I	Seepage	1.00	Seepage	1.00	Depth to water	1.00
	I	Slope	1.00	I	1	I	1
	!	!	1	!	1	!	1
190823: Kiva	I =0	 Tome limited	1	 Trans. limited	1	 Town limited	!
KIVa		•		Very limited Seepage		Very limited Depth to water	11.00
	;		11.00		10.01	•	11.00
	i	l Siope	1	l sasey	1	! 	i
Mancelona	30	Very limited	i	Very limited	i	Very limited	i
	l	Seepage	1.00	Seepage	1.00	Depth to water	11.00
	I	Slope	1.00	I	1	I	1
100004	!	<u> </u>	!	!	!	!	!
190824: Lake beaches	I I 100	 Not rated	1	 Not rated	1	 Not rated	!
Lake Deaches	1 100	NOC TALEG	1	NOC TACEG	1	NOT Tated	<u> </u>
190825:	i	! 	i	i I	i	! 	i
Lake bluffs	100	Not rated	i	Not rated	i	Not rated	i
	I	I	1	I	1	I	1
190826:		<u> </u>	1	1	1	<u> </u>	1
Leelanau	60	•		•		Very limited	1 00
		Seepage 	11.00	Seepage	10.93	Depth to water	11.00
East Lake	I 30	 Verv limited	i	 Very limited	i	 Very limited	i
	i	•				Depth to water	11.00
	I	I	1	I	1	I	1
190827:	1	I	1	I	1	I	I
Leelanau	65	•		Somewhat limited		Very limited	
	!		1.00		10.93	Depth to water	1.00
		Slope	11.00	! !	1	! !	1
East Lake	25	 Very limited	i	 Very limited	i	 Very limited	i
		•	11.00	_	11.00	Depth to water	11.00
	I	Slope	1.00	I	1	I	1
10000		<u> </u>	!	! :	1	! :	1
190828: Leelanau	l 1 65	 Vor: limited		 Somewhat limited	!	 Very limited	1
Leelanau	1 65	Seepage	11.00	•	•	Depth to water	11.00
	i	Slope	11.00		1	l sepen ee water	1
	i	i -	i	İ	i	İ	i
East Lake	25	Very limited	1	Very limited	1	Very limited	1
	I		1.00		1.00	Depth to water	1.00
	!	Slope	11.00	!	!	<u> </u>	!
190829:	l I] 	I] 	I] 	1
Leelanau	ı I 50	 Verv limited	i	 Somewhat limited	1	 Very limited	1
		Seepage	1.00	•		Depth to water	11.00
	I	Slope	11.00			<u>.</u>	i
	I	i -	I	I	I	I	1
East Lake	35	=		Very limited		Very limited	1
	1	Seepage	1.00	Seepage	1.00	Depth to water	1.00
	:	Slope	1.00				

Table 13.—Ponds and Embankments—Continued

	 Pct. of	•	reas	Embankments, dikes levees	, and	Aquifer-fed excavated pond	s
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190830: Leelanau	 50 	Seepage	 1.00 1.00			 Very limited Depth to water 	 1.00
East Lake	 35 	Seepage	 1.00 1.00	Seepage	 1.00	 Very limited Depth to water 	 1.00
190831: Lupton	 60 	 Very limited Seepage 	 1.00 	content Ponding		excavation walls	 0.10
Markey	 	 	 1.00 	Hard to pack Very limited Ponding Depth to saturated zone Seepage Hard to pack	1.00 1.00 	 - Very limited Unstable excavation walls 	 1.00
190832: Mancelona	 90 	 Very limited Seepage 		 Very limited Seepage 		 Very limited Depth to water 	 1.00
190833: Mancelona	 90 	 Very limited Seepage Slope				 Very limited Depth to water 	 1.00
190834: Mancelona	 60 	 Very limited Seepage 	 1.00	 Very limited Seepage 		 Very limited Depth to water 	 1.00
East Lake	30 	Very limited Seepage		Very limited Seepage		Very limited Depth to water	 1.00
190835: Mancelona	 55 	 Very limited Seepage Slope	1.00 1.00			 Very limited Depth to water 	 1.00
East Lake	 35 	 Very limited Seepage Slope		 Very limited Seepage 		 Very limited Depth to water 	 1.00
190836: Mancelona	 50 	 Very limited Seepage Slope	i		 1.00	 Very limited Depth to water 	 1.00
East Lake	1 30 	 Very limited Seepage Slope 	1.00 1.00		 1.00 	 Very limited Depth to water 	 1.00

Table 13.—Ponds and Embankments—Continued

	 Pct. of	•	reas	Embankments, dikes levees	, and	=	s
		Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
	i	l	i	l	Ī	l	Ī
190837: Mancelona		Seepage		Seepage		 Very limited Depth to water 	 1.00
East Lake	 30 	Seepage		Seepage		 Very limited Depth to water 	 1.00
190838:	<u> </u>	! 	i	! 	i	! 	i
Mancelona		Seepage		Very limited Seepage 		Very limited Depth to water 	 1.00
East Lake		Seepage				 Very limited Depth to water 	 1.00
190839:		! 	i	! 	i	! 	
Mancelona	70 	· -		Very limited Seepage		Very limited Depth to water	11.00
Richter	•	•		Depth to saturated zone	1.00 	excavation walls	•
		 	1	Dusty	0.01	Slow refill	0.30
190840: Nester	 90 	•		 Somewhat limited Dusty		 Very limited Depth to water	 1.00
100041.	!	!	!	!	!	<u> </u>	
190841: Nester		•		 Somewhat limited Dusty 		 Very limited Depth to water 	 1.00
190842: Nester		· -		 Somewhat limited Dusty		 Very limited Depth to water	 1.00
190843: Nester		•		•	•	 Very limited Depth to water	1 1 1 1 1 1 1 1 1 1
190844: Nester	 90 	=		 Somewhat limited Dusty	İ	 Very limited Depth to water	1
190846: Pits, gravel	 100	 Not rated 		 Not rated 	 	 Not rated 	
190847: Richter	 45 	 - Somewhat limited Seepage 	 0.70 	 - Very limited Depth to saturated zone Dusty	11.00	excavation walls	 1.00 0.30
Alcona	 40 	 Somewhat limited Seepage 	 0.70	 Not limited	İ	 Very limited	 1.00

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of	•	reas	Embankments, dikes levees	, and	=	s
	-	-		-		Rating class and	
	lunit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	<u> </u>
190848: Richter	•	Seepage	10.70	Depth to saturated zone	1.00 	excavation walls	 1.00 0.30
Alcona		Seepage	 0.70 0.08	 Not limited	l I	 Very limited	0.30 1.00
100040.	1	<u> </u>	1	<u> </u>	1	<u> </u>	!
190849: Roscommon		•	1.00 	Ponding Depth to saturated zone	1.00 1.00	excavation walls	 1.00
Markey	 30 	· -		Ponding Depth to Saturated zone Seepage Hard to pack	1.00 1.00	excavation walls	 1.00
190850: Sanilac	 90 	•		Depth to saturated zone Piping	1.00 	excavation walls Slow refill	 1.00 0.30
190851:	1	 		 	 	 	! !
Tonkey	40 	-	1.00 	Ponding Depth to saturated zone	1.00 1.00	excavation walls	 1.00
Munuscong	 25 	-	11.00	Ponding	1.00 1.00	excavation walls	 0.10
Iosco	 25 	-	 1.00 	:		 Very limited Unstable excavation walls 	 1.00
190852: Tonkey	 35 	 Very limited Seepage 		Depth to	1.00 1.00 0.01	excavation walls	 1.00
Munuscong	 30 	_	 1.00 	Depth to	•	excavation walls	 0.10

Table 13.—Ponds and Embankments—Continued

	 Pct. of	•	reas	 Embankments, dikes levees	, and	=	s
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
190852: Iosco	 20 	 Very limited Seepage 	 1.00	 Very limited Depth to saturated zone		 Very limited Unstable excavation walls	 1.00
190853: Water	 100	 Not rated		 Not rated	 	 Not rated 	
190854: Wallace	 50 	Depth to cemented pan Seepage	 1.00 1.00 0.92	Thin layer	 1.00 1.00	· •	 1.00
Kalkaska	 45 	 Very limited	Ì	 Very limited Seepage	 1.00	 Very limited Depth to water 	 1.00
190855: Wind eroded land	 100 	· -	 1.00 0.68		 1.00	 Very limited Depth to water 	 1.00
190856: Wind eroded land	 100 	 Very limited Seepage Slope	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
193236: Beaches	 100	 Not rated	 	 Not rated	 	 Not rated	
193237: Thompsonville	 50 	 - Very limited Seepage - 	 1.00 	 - Very limited Depth to saturated zone Seepage		excavation walls	 1.00
Milnichol	 40 	 Very limited Seepage 	 1.00 	•	1.00 1.00	excavation walls	 1.00
193255: Spinks	 50 	 Very limited Seepage	 1.00	 Very limited Seepage		 Very limited Depth to water	 1.00
Coloma	 40 	 Very limited Seepage	 1.00	 Very limited Seepage		 Very limited Depth to water	 1.00
193256: Spinks	 50 	 Very limited Seepage Slope	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
Coloma	 40 	 Very limited Seepage Slope	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00

Table 13.—Ponds and Embankments—Continued

and soil name	 Pct. of	l		 Embankments, dikes levees		excavated pond	
				Rating class and			
	lunit	limiting features	 	limiting features	 	limiting features	
193257:	i	' 	i	i I	i	i I	i
Spinks	55	·		Very limited		Very limited	1
	I				1.00	Depth to water	1.00
		· •	11.00		!		!
Coloma	ı I 35	•	 	 Very limited	;	 Very limited	<u> </u>
	i	•	•	-	•	Depth to water	11.00
	l	Slope	1.00	I	I	I	1
	1	<u> </u>	1	!	1	!	1
193258: Spinks	I I 50	 Very limited	!	 Very limited	1	 Very limited	!
Spinks	1 30	•	11.00	•	11.00	•	11.00
	i		11.00				1
	l	I	1	I	I	I	1
Coloma	40	•		Very limited		Very limited	1
	!		•	Seepage	11.00	Depth to water	11.00
		Slope 	1.00	! 	1	! 	1
193260:	i	! 	i	! 	i	! 	i
Copemish	95	Very limited	İ	Very limited	İ	Very limited	İ
	I		•		11.00	•	1.00
	!	cemented pan		-	11.00	<u> </u>	!
	!		1.00 1.00	•	1	 	1
	i	biope	1	! 	i	! 	i
193262:	i	İ	i	İ	i	İ	i
Kaleva	95	·		Very limited		Very limited	1
	!	Seepage	11.00	Seepage	1.00	Depth to water	11.00
193263:	 	 		 		 	!
Kaleva	95	 Very limited	i	' Very limited	i	 Very limited	i
	ĺ	Seepage	11.00	Seepage	11.00	Depth to water	11.00
	1	Slope	11.00	!	1	!	1
193265:		 	1		1		!
Grattan	I I 95	l Verv limited	i	 Very limited	1	 Very limited	1
ora coan	1	·	1.00	-	1.00	•	11.00
	i	İ	i	İ	i	İ	i
193266:	1	l	1	l	1	l	1
Grattan	95	•		Very limited	•	Very limited Depth to water	1
			1.00 1.00		11.00	Depth to water	1
	i		i	İ	i	İ	i
193267:	I	l	1	I	1	I	1
Grattan	95	_		Very limited		Very limited	
	!	Seepage Slope	1.00 1.00		11.00	Depth to water	11.00
	i	Siobe	1	! 	i	! 	i
193269:	İ	İ	İ	İ	İ	İ	İ
Grattan	95	_		Very limited		Very limited	1
	l	Seepage	11.00		11.00	Depth to water	11.00
	I I	Slope 	11.00	I I	1	I I	1
193270:	i	 	i	' 	i	' 	i
Covert	90	Very limited	i	Very limited	i	 Very limited	i
	l	Seepage	1.00		11.00		1.00
	!	 -	!	Depth to	0.99	excavation walls	5
	I	I	1	saturated zone	1	I	1

Table 13.—Ponds and Embankments—Continued

	Pct.	•	reas	Embankments, dikes levees	, and	-	s
and SOII name	map	` 	Value	Rating class and		<u>'</u>	
	unit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	l
193271:	 	 		 	 	 	
Pipestone	90 	·	 1.00 	Depth to saturated zone	11.00	excavation walls	 1.00
193272:	i	İ	i	İ	i	İ	i
Dair	90 	·	 1.00 	Ponding Depth to saturated zone		excavation walls	 1.00
193277:	i		i	' 	i	' 	
Benona	90 	· -	 1.00	•	•	Very limited Depth to water	 1.00
193278:	i	İ	i	İ	i	İ	i
Benona	90 	Seepage	 1.00 1.00	Seepage		Very limited Depth to water 	 1.00
193279:		 		 	 	 	!
Benona	90 	Seepage	 1.00 1.00	Seepage	 1.00 	Very limited Depth to water 	 1.00
193284:	 	 	 	 	 	 	
Udorthents	55 	Slope	 1.00 0.03	Dusty		Very limited Depth to water 	 1.00
Udipsamments	 35 	Seepage	 1.00 1.00	Seepage		 Very limited Depth to water 	 1.00
193285:	i		i	i I	i	i I	i i
Lumley	55 		 1.00 	content Ponding Depth to saturated zone Seepage	1.00 1.00 1.00	excavation walls	 0.10
Makinen	40 	 Very limited Seepage 	 1.00 	Depth to saturated zone Seepage	 1.00 1.00 1.00 1.00 1.00	excavation walls	 1.00

Table 13.—Ponds and Embankments—Continued

	Pct. of		reas	Embankments, dikes levees	, and	Aquifer-fed excavated pond	s
		Rating class and		`	Value		
	-	limiting features		limiting features		limiting features	
	ī	I	ī	I	ı	I	ī
193286: Histosols	 55 	•	 1.00	•	 1.00	•	 1.00
	 	 	 	· •	 1.00 1.00 1.00 1.00	 	
Aquents	 45 	•	 1.00 	 Very limited Ponding Depth to saturated zone Seepage	1.00 1.00	excavation walls	 1.00
193287:	i	İ	i	İ	i i	i İ	i
Dune land	55	Not rated	1	Not rated	1	Not rated	I
Quartzipsamments	 40 	Seepage	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
102200			!		!		!
193288: Udipsamments	 100 	•	 1.00	 Very limited Seepage 	 1.00	 Very limited Depth to water	1 1.00
193342:	i		i	! 	i	! 	i
Gorvan	35 	•	 1.00 	Very limited Ponding Depth to saturated zone	1.00 1.00 	excavation walls	 1.00
Houghton	 30	 Verv limited	 	Seepage Dusty Very limited	1.00 0.03 	•	
		· -	1.00 		1.00 1.00 1.00	Unstable cxcavation walls l	0.10
	<u>'</u>	! 	i	Hard to pack	11.00	•	i
Glendora	 20 	 Very limited Seepage 	 1.00	 Very limited	İ	 Very limited Unstable	 1.00
	 	 	 	saturated zone Seepage 	 1.00 1.00	I	
193349:		 	1	 		177 1:::::::::::::::::::::::::::::	!
Spinks	50 	Seepage	 1.00 1.00		 1.00 	Very limited Depth to water 	 1.00
Coloma	40 	Seepage	 1.00 1.00		 1.00	 Very limited Depth to water	11.00

Table 13.—Ponds and Embankments—Continued

	 Pct. of	•	reas	 Embankments, dikes levees	, and	· -	ls
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
193351: Benona	l I	 - Very limited Seepage	 	 - Very limited Seepage	 	 	
193354: Dune land	 50	 Not rated	 	 Not rated	 	 Not rated	
Quartzipsamments	 40 	Seepage	•	 Very limited Seepage 		 Very limited Depth to water 	 1.00
193357: Shavenaugh	 85 	Seepage	 1.00 1.00		1 1.00	 Very limited Depth to water 	1 1.00
193359: Shavenaugh	 85 	Seepage		 Very limited Seepage 	 1.00	 Very limited Depth to water 	 1.00
193360: Shavenaugh	•	•	 1.00	 Very limited Seepage 	 1.00	 Very limited Depth to water 	 1.00
193362: Benzonia	 90 	Seepage	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
193363: Benzonia	 90 	Seepage	 1.00 1.00			 Very limited Depth to water 	 1.00
193364: Benzonia	 90 	Seepage	 1.00 1.00		 1.00	 Very limited Depth to water 	1 1.00
193365: Benzonia	 90 	 Very limited Seepage	1 1.00	 Very limited Seepage		 Very limited Depth to water	1 1.00
193371: Dair	 50 	 	 1.00 	 Very limited Ponding Depth to saturated zone Seepage		ĺ	1 1.00
Pipestone	40 	 Very limited Seepage 	 1.00 	 Very limited	İ	 Very limited Unstable excavation walls	1.00
193372: Access Denied	 100	 Not rated 		 Not rated 		 Not rated 	

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct.		reas	Embankments, dikes levees	, and	Aquifer-fed excavated pond	ls
	map	Rating class and limiting features		Rating class and limiting features	•	Rating class and limiting features	
193423: Benona	 	 Very limited Seepage	 	 Very limited Seepage	 	 Very limited	 1.00
193484: Pits, sand and gravel	 100	- 	 	 - - Not rated		 - - Not rated	
193494: Nordhouse	 - 100 	Seepage	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
193496: Nordhouse	 - 95 	Seepage	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
193497: Nordhouse	 - 95 	•	1 1.00	 Very limited Seepage		 Very limited Depth to water	 1.00
193498: Nordhouse	 - 40	•	1 1 1 1 1 1 1 1 1 1	 Very limited Seepage		 Very limited Depth to water	1 1 1 1 1 1 1 1 1 1
Platteriver	 - 35 	•	 1.00 	: • • · · · · · · · · · · · · · · · · ·		 Very limited Unstable excavation walls 	 1.00
Dair	 - 25 	•	 1.00 	Depth to		İ	 1.00
193503: Spinks	 - 50 	-	1 1.00	 Very limited Seepage	1 1.00	 Very limited Depth to water	1 1.00
Shavenaugh	- 40 -	 Very limited Seepage	1 1.00	 Very limited Seepage		 Very limited Depth to water	1 1.00
193504: Spinks	 - 50 	 Very limited Seepage Slope	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
Shavenaugh	 - 40 	 Very limited Seepage Slope	 1.00 1.00		 1.00 	 Very limited Depth to water 	 1.00
193505: Spinks	 - 50 	Seepage	 1.00 1.00		1 1 1 1 1 1 1 1 1 1	 Very limited Depth to water 	 1.00
Shavenaugh	 - 40 	 Very limited Seepage Slope	1.00 1.00		 1.00	 Very limited Depth to water 	 1.00

Table 13.—Ponds and Embankments—Continued

	Pct. of		reas	Embankments, dikes levees	, and	=	.s
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	İ	limiting features	İ	limiting features	İ
	I	I	I	I	I	I	I
193506:			!		1		1
Spinks		· =		·		Very limited	11.00
	!		11.00		11.00	Depth to water	11.00
	:	l stobe	1 . 00	 	1	! !	
Shavenaugh	1 40	' Very limited	i	 Very limited	i	 Very limited	i
-				·		-	11.00
	I	Slope	11.00	I	1	I -	1
	I	I	I	l	1	I	1
193507:	l	<u> </u>	1	<u> </u>	1	<u> </u>	1
Spinks		· =		Very limited		Very limited	11 00
	!				11.00	Depth to water	11.00
	!	· •	1.00 	! !	1	! !	1
Shavenaugh	I 40	•	•	 Very limited	i	 Very limited	i
						-	11.00
	ĺ	Slope	11.00	i	İ	i -	İ
	I	I	I	I	1	I	1
193508:		<u> </u>	1		1	<u> </u>	1
Madaus	90	· =		_		Very limited	
	!			,		•	11.00
	!	Carbonate content	11.00	· •	1.00 		1
	i .	! 	<u> </u>		11.00	•	i
	i	i I	i	Dusty	10.03	•	i
	i	İ	i	i -	i	İ	i
193509:	I	I	I	l	1	I	1
Boyer		•		Very limited		Very limited	
	!	Seepage	11.00	Seepage		· •	11.00
	!	 	1	Dusty	0.01	1	1
Shavenaugh	I 40	' Verv limited	i	 Very limited	i	 Very limited	i
<u> </u>		•		Seepage		-	11.00
	I	I	I	I	1	I -	1
193510:	I	I	I	I	1	I	1
Boyer				Very limited		Very limited	
	!		•	Seepage	•	· •	11.00
	!	Slope	11.00	Dusty	0.01] 	1
Shavenaugh	I I 40	ı IVerv limited	<u> </u>	 Very limited	i	 Very limited	<u> </u>
	i	•		·		-	11.00
	ĺ	Slope	11.00	i	İ	i -	İ
	I	I	I	l	1	I	1
193511:		!	1	!	•	!	1
Boyer	50	_		Very limited		Very limited	
	!		1.00		10.01	Depth to water	1.00
	i .	=	1.00 	Dusty 		! 	i
Shavenaugh	40	•	•	Very limited	•	' Very limited	i
3	i	_	11.00	_		Depth to water	11.00
	I	Slope	11.00	I	1	I -	1
	l	l	I	I	I	I	1
193513:		l 	!		!	l 	1
Dair	50	•		Very limited		Very limited	11 00
	I I	Seepage	1.00	•	11.00		1.00
	! 	! 	1	Depth to saturated zone	1.00 	excavation walls 	1
	1	ı	1		•		
	1	1	1	Seepage	11.00	1	1

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct.	•	reas	Embankments, dikes levees	, and	Aquifer-fed excavated pond	ls
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	1	limiting features	1	limiting features	1
102512.	!		!		<u> </u>		!
193513: Adrian	I -1 45	 Very limited	1	 Very limited	 	 Very limited	1
narran	1 43	Seepage	11.00		11.00	·	11.00
	i	l scapage	1	Depth to	11.00	•	
	i	İ	i	saturated zone	İ	i I	i
	1	I	1	Seepage	11.00	I	1
	1	I	1	·	1.00		1
	1	1	1	Dusty	10.03	 	
193514:	i	! 	i	! 	<u> </u>	! 	i
Platteriver	- 55	· -		Very limited		Very limited	Ī
	1	Seepage	11.00	·	11.00	•	11.00
	!	1	!	•	11 00	excavation walls	1
	1	I I	1	Seepage 	11.00	 	1
Pipestone	- 40	 Very limited	i	Very limited	i	Very limited	i
	1	Seepage	1.00	· •	1.00	•	1.00
	1	!	1			excavation walls	1
	-	 		Seepage 	11.00	 	
202010:	i	İ	i	' 	i	' 	i
Houghton	- 55	Very limited	1	Very limited	•	Somewhat limited	1
	1	Seepage	1.00		1.00	•	0.10
	!	!	!	content		excavation walls	1
	1	1	!	Ponding Depth to	1.00 1.00		
	i	i i	i	•	I	! 	i
	i	i	i	Seepage	11.00	i İ	i
	1	1	1	Hard to pack	11.00	<u> </u>	I
Adrian	I -I 4∩	 Very limited		 Very limited		 Very limited	
ACLICIT	1 40	Seepage	11.00	·	11.00	·	11.00
	i	i	i	Depth to	11.00	excavation walls	i
	1	I	1		1	I	1
	!	!	!		1.00		!
	1	 	1	Hard to pack Dusty	1.00 0.03		1
	i	İ	i		1	i İ	i
202016:		 	1	 Very limited	ļ .	 Very limited	!
Spinks	- J 50	Seepage	1 1.00	· -	11.00	• •	11.00
	i		i		İ		i
Tekenink, sandy		177	!	 	!		1
substratum	- 4±0 	Very limited Seepage	1	Not limited	 	Very limited Depth to water	1
	i		i	İ	i i		i
631170:		 	!	 	1		1
Fogg	1 20	Very limited Seepage	 1.00	Very limited Seepage	 1.00	Very limited Depth to water	 1.00
	ĺ	Slope	11.00		I	Sebour co marer	1
			!	l	!	l	!
Benzonia	- 40	_		Very limited	 1.00	Very limited	 1.00
	i I	Seepage Slope	1.00 1.00		1.00	Depth to water 	11.00
	Í	i	i	l	İ	l	İ
631171:	 E0	 Vonu limited	1	 Von: limited		 Von: limited	
Fogg	1 30	Very limited Seepage	 1.00	Very limited Seepage	 1.00	Very limited Depth to water	1
	i	Slope	11.00		,		1
	í	i -			i	I	i

Table 13.—Ponds and Embankments—Continued

	Pct. of	•	reas	Embankments, dikes levees	, and	=	s
	map	Rating class and	Value	Rating class and	Value	Rating class and	Value
	unit	limiting features	<u> </u>	limiting features	<u> </u>	limiting features	1
CO44.84		<u> </u>	!	! :	1	<u> </u>	!
631171: Benzonia	I I 4∩	 Very limited	1	 Very limited		 Very limited	
Belizolita	1 -10	•	11.00			_	11.00
	i		11.00		1	l peptil to water	1
	i		i	İ	i	I	i
631172:	l	l	1	I	1	I	1
Fogg		•		Very limited		Very limited	
	!		•	Seepage	11.00	Depth to water	11.00
	 	Slope	1.00 	 	1	 	!
Benzonia	I I 40	 Verv limited	•	 Very limited	i	 Very limited	<u> </u>
		•				_	11.00
	i		11.00		i		i
	1	!	1	!	1	!	1
631173: Fogg	I 50	 Vary limited	I	 Very limited	I	 Very limited	1
£0gg		•		Very limited Seepage			11.00
	<u>'</u>		11.00		1	Depth to water	1
	i	İ	i	İ	i	İ	i
Benzonia	40	Very limited	1	Very limited	1	Very limited	1
	l	Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	11.00	<u> </u>	!	<u> </u>	!
631174:	 	 	1	 	1	 	1
Fogg	i I 50	' Verv limited	i	 Very limited	i	' Very limited	i
99		•			•	• •	11.00
	l	I	I	I	1	I	I
Benzonia		· -		· -		Very limited	1
		Seepage	1.00	Seepage	1.00	Depth to water	11.00
680939:	 	 		 		 	!
Fern	I 50	Verv limited	i	 Somewhat limited	i	Very limited	i
		•		Depth to		_	11.00
	ĺ	Slope	0.68	saturated zone	İ	excavation walls	İ
	l	l	1	l	1	Slow refill	0.97
Spinks	1 40	 Tom: limited	1	 Town limited	!	 Tom: limited	!
Spinks		•		Very limited Seepage		Very limited Depth to water	11.00
	i	Slope	11.00		1	l peptil to water	1
	i		i	İ	i	i İ	i
680943:	Ι	l	I	l	I	I	I
Milnichol		•				Very limited	
	!	Seepage	11.00	Depth to		Unstable	11.00
	!	! !	1	saturated zone Seepage	1	excavation walls	1
	<u>'</u>	! 	i	Seepage 	1	! 	i
680945:	İ	İ	İ	İ	İ	İ	İ
Fern	90			Somewhat limited		Very limited	1
	!	Seepage	1.00	· -	10.99	•	11.00
	I I	Slope 	11.00	saturated zone	1	excavation walls Slow refill	I 10.97
	i	' 	i	' 		PTOM TETTIT	0.91
680946:	İ	İ	i	İ	i	İ	İ
Fern	90	Very limited	•	Somewhat limited		Very limited	1
	!	Seepage	11.00	•	10.99		11.00
	1	I	1	saturated zone	1	excavation walls	1
	:		:		:	Slow refill	0.97

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. Of		reas	Embankments, dikes levees	, and	_	ls
	-	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
	1	 	i	 	i	 	i
680971: Nessen	İ	Seepage	11.00	Seepage		 Very limited Depth to water	1 1.00
	1	Slope 	1.00 	 	1	 	
Kaleva		Seepage		Seepage		Very limited Depth to water 	 1.00
680972:	1	 	1	 	!	 	!
Nessen		Seepage	1.00 1.00			Very limited Depth to water 	 1.00
Kaleva		Seepage	1.00 1.00	Seepage		 Very limited Depth to water 	 1.00
680973:		 	 	 		I I	
Nessen		Seepage	•			Very limited Depth to water 	 1.00
Kaleva		Seepage		Seepage		 Very limited Depth to water 	 1.00
680974:		 		 		 	
Nessen		Very limited Seepage		Very limited Seepage		Very limited Depth to water	11.00
Kaleva		•		· _		 Very limited Depth to water	1 1.00
893251:		 		 		I I	
Boyer	İ	Seepage	1.00	Seepage		 Very limited Depth to water 	11.00
Shavenaugh	İ	Seepage	11.00	Seepage 		 Very limited Depth to water 	 1.00
894062:		 		 		! 	
Remus	50 	Very limited Slope Seepage	1.00 0.53	Dusty	1.00 0.01	Very limited Depth to water 	 1.00
Spinks	40 	 Very limited Seepage Slope	 1.00 1.00			 Very limited Depth to water 	 1.00
894063: Remus	 50 	 Very limited Slope Seepage	1.00	 Very limited Piping Dusty	 1.00 0.01	•	 1.00
Spinks	 40 	 Very limited Seepage Slope			 1.00	 Very limited Depth to water 	 1.00

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	 Pct. of		reas	 Embankments, dikes levees		 Aquifer-fed excavated pond	s
	-	•		•		Rating class and limiting features	
894064:	Ī	 	l i	 	I	 	I I
Fern	50 	Very limited Seepage Slope 	11.00		0.99	excavation walls	 1.00 0.97
Remus	 40 	 Very limited Slope Seepage	11.00	 Very limited Piping Dusty		•	 1.00
894065:	i	! 	1	! 	i	! 	
Fern	50 	Very limited Seepage -			0.99	Very limited Unstable excavation walls Slow refill	 1.00 0.97
Remus	40 	 Somewhat limited Seepage 		 Very limited Piping Dusty		•	 1.00
894104: Mollineaux	 50 	Seepage				 Very limited Depth to water 	 1.00
Remus	 40 	•	11.00	 Very limited Piping Dusty		•	 1.00
894105: Mollineaux	 50 	 Very limited Seepage Slope		 Very limited Seepage 		 Very limited Depth to water 	 1.00
Remus	 40 	Slope	11.00	 Very limited Piping Dusty		•	 1.00
894165:	i	! 	i	! 	i	! 	<u> </u>
Spinks	50 	•		ĺ	•	Very limited Depth to water 	 1.00
Tekenink, sandy substratum	 40 	 Very limited Seepage Slope	 1.00 1.00		 	 Very limited Depth to water 	 1.00
899682: Kaleva	 90 	 Very limited Seepage Slope	 1.00 1.00		 1.00	 Very limited Depth to water 	 1.00
899722: Goodharbor	 90 	 Very limited Seepage Slope	 1.00 0.68		 1.00	 Very limited Depth to water 	 1.00

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Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	 Pct. of		reas	Embankments, dikes levees	, and	Aquifer-fed excavated pond	ls
	map unit	Rating class and limiting features		Rating class and limiting features		Rating class and limiting features	
899731:	I I] 	T I	 	T I] 	
Covert	50 	Very limited Seepage -	 1.00 	Very limited Seepage Depth to saturated zone	 1.00 0.99	•	11.00
Pipestone	 40 	 Very limited Seepage 	 1.00 	 Very limited Depth to saturated zone Seepage	 1.00 1.00	excavation walls	 1.00
899733:		 		 		 	
Covert	50 	Very limited Seepage 	 1.00 	Very limited Seepage Depth to saturated zone	 1.00 0.99 		 1.00
Dair	 45 	 Very limited Seepage 	11.00	 Very limited Ponding Depth to saturated zone Seepage	 1.00 1.00 1.00		1.00
899734:		 		 	 	 	
Benzonia	90 	Very limited Seepage Slope 	 1.00 1.00		 1.00 	Very limited Depth to water 	 1.00

Table 14.—Engineering Properties

(Absence of an entry indicates that data were not estimated)

Map unit symbol	 Depth	USDA texture	Classi	fication	Frag	ments	Po	ercenta	ge pass	-	 Liquid	l Dlac-
and soil name	ı pebru	OSDA CEXCUIE	<u> </u>	<u> </u>	 >10	I 3-10	 	Sieve i	iuiiber-		-	Flas- ticity
and soll name	! !		 Unified	AASHTO	/10 in	3-10 in	I I 4	 10	I I 40	I I 200		lindex
	l In	<u>.</u>	1 Onlined	1 AASIIIO	l Pct	l Pct	 	1 10	1 30	1 200	l Pct	I
	! ***		1	1	<u> </u>	FCC	!		!	!	FCC	l
190775:	! !	1	1	1	l I	!	!	! !	! !	! !	! !	l I
Adrian	I 0-8	Muck	 PT	A-8	I 0	1 0	1 100	1 100	1 100	 90-100	 	I NP
110111011	•	Muck	PT	A-8	1 0	,		•	190-100	•	•	l NP
	24-60	•	SP-SM, SP, SM	•	I 0	•	180-100	•	•	•	•	•
	İ	i	i	A-1-b, A-2-4	I	i	i	İ	İ	İ	İ	I
	I	1	1	1	l	I	I	I	I	I	I	l
Houghton	0-10	Muck	PT	A-8	0	1 0	100			90-100	•	NP
	10-60	Muck	PT	A-8	0	1 0	100	100	90-100	40-100		NP
		1	1	1		1	1			1	1	
190777:						1						
Alcona	0-8	Sandy loam	SC-SM, SM,	A-4, A-2-4	0	1 0-8	95-100	190-100	155-95	125-65	115-25	NP-/
	Ι Ι Ω_12	 Loamy fine sand, sandy	CL-ML, ML SP-SM, SM	 A-4, A-2-4	I I 0	I 0-8	190-100	I 175-100	I I 60-100	I I10-55	I I15-20	l INTD=/I
	1 0 12	loam, loamy sand	1	1 4, 1 2 4	,	1	1 20 100	73 ±00	00 ±00	1 10 33	1 20	 141 - 4
	' 12-18	Loamy sand	SP-SM, SM	A-2-4, A-1	, I 0	1 0-8	90-100	75-100	135-75	10-30	15-25	 NP-5
	•	Sandy loam	ISC-SM	A-4, A-2	I 0		195-100	•	•			
	24-60	Stratified loamy sand	SM, SC-SM	A-4, A-2-4		0-8	95-100	90-100	40-80	 15-50	15-30	NP-7
	I	to sandy loam	1	1	l	I	I	I	I	I	I	l
	I	1	1	I	l	I	1	I	l	I	I	l
Richter		Sandy loam	SM, SC-SM	A-4, A-2	0	1 0	•	•	•		15-25	
	8-27	Fine sandy loam	SC, SM, SC-SM		0	1 0	100	90-100	45-90	15-45	10-30	NP-16
	07 60	I Charlista I I ann a Sian		A-1, A-2-4	. ^	1	1 100	 00 100	1	115 45	110 05	
	27-60	Stratified loamy fine sand to sandy loam	SM, SC-SM, SC	A-4, A-2-4, A-1	0	0	100	190-100	145-80	15-45	10-25	NP-IO
	! !	sand to sandy loam	1	N-1	l I	1	!	 	 	! !	! !	l I
190778:	' 		i	i	! 	i	i		! !	i	! 	!
Alcona	I 0-8	Sandy loam	SC-SM, SM,	A-4, A-2-4	I 0	I 0-8	95-100	90-100	155-95	125-65	15-25	 NP-7
	İ	i	CL-ML, ML	i '	I	i	i	İ	İ	İ	İ	I
	8-12	Loamy fine sand, sandy	SP-SM, SM	A-4, A-2-4	0	I 0-8	90-100	75-100	60-100	10-55	15-20	NP-4
	l	loam, loamy sand	1	1	l	1	1	I	I	I	I	l
	•	Loamy sand	SP-SM, SM	A-2-4, A-1	0	•	90-100	•	•			
	•	Sandy loam	SC-SM	A-4, A-2	0	•	95-100	•	•			
	24-60	Stratified loamy sand	SM, SC-SM	A-4, A-2-4	0	0-8	95-100	90-100	40-80	15-50	15-30	NP-7
	l	to sandy loam	I	1	l	!	1	I	I	I	I	l
Richter	I I 0-8	Sandy loam	 SM, SC-SM	 A-4, A-2	I I 0	1 0	I I 100	I I Q	I 155-8∩	1 125-50	ı 15−25	l l 2-7
VICILIEE		Fine sandy loam	SM, SC-SM SC, SM, SC-SM		1 0	,	•	•	•		110-30	
	, 02/ I			A-1, A-2-4	İ	i	1	, 50 ±00	, 13 JU	123 43	1 20 30	, 10 I
	27-60	Stratified loamy fine	SM, SC-SM, SC	. ,	, I 0	i 0	1 100	90-100	45-80	15-45	 10-25	NP-10
	i	sand to sandy loam	1	A-1		i	i			 	İ	
	I	1	1	I	l	I	I	I	I	I	I	I

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	 USDA texture	Classi	fication	Frag	ments	Po	ercenta sieve	ge pass number-	_	 Liquid	 Plas-
and soil name	I	L	ı	I	>10	3-10	I	ı	ı	ı	limit	ticity
	1	I	Unified	AASHTO	in	in	4	10	40	200	1	index
	In	1	1	1	Pct	Pct	1	I	I	I	Pct	I
	1	I	1	I			1	I	l	1		I
190779:	1	I	1	I _	1	1	1	1	1	1	1	I
Alpena	0-4	Gravelly sandy loam		A-3, A-2-4,	1 0	0-10	75-90	50-75	10-55	5-35	15-25	NP-7
	1 4 60	10.11.1		A-1-b	1	1 0 00	1 0 0 0				1 0 14	
	1 4-60	Cobbly coarse sand, gravelly loamy sand	SP-SM, SM	A-2, A-1-b	1 0	0-20	65-85	55-75	130-60	5-25	0-14	NP
	! !	graverry roamy sand	1	I I	1		!	! !	 	! !		! !
190780:	i i	1	<u> </u>		i	<u> </u>	i	i	! 	i	i	
Au Gres	0-12	Sand	SP-SM, SP, SM	 A-3, A-2-4,	i o	i o	95-100	75-100	35-70	0-15	0-14	NP
	i	i		A-1-b	i	į	i	i	İ	i	i	İ
	12-24	Sand	SP, SP-SM,	A-3, A-2-4,	0	0	95-100	75-100	35-75	0-30	15-25	NP-7
	1	1	SC-SM, SM	A-1-b	1	1	1	1	l	1	1	I
	24-60	Sand	SP-SM, SP, SM		1 0	0	95-100	75-100	35-70	0-15	0-14	NP
	1	1	!	A-1-b	1	1	1	1		1	1	
TT - 111 -		101	1 (2) (1 2 2 2 4	1	1 0 5	105 100	105 100				
Kalkaska	1 0-7	Sand		A-3, A-2-4, A-1-b	1 0	0-5	95-100	182-100	45-70	5-15	0-14	NP
	I I 7-15	 Sand	•	A-1-D A-3, A-2-4,	1 0	I I 0-5	 95-100	I 185-100	I I 15-75	I I 5-30	I 0-14	I INP
	1 / 13			A-1-b	1	1 0 3	195 100	100 100	1 1 3 /3	1 3 30	1 0 14	l NE
	15-32	Sand	•	A-3, A-2-4,	i o	I 0-5	95-100	185-100	45-70	5-15	0-14	' I NP
	i	I	•	A-1-b	i	İ	i	İ	İ	i	i	i İ
	32-60	Sand	SP-SM, SP, SM	A-3, A-2-4,	0	0-5	95-100	85-100	45-70	0-15	0-14	NP
	I	1	1	A-1-b	1	l	I	I	I	I	1	I
	I	I	I	I	1	I	I	I	I	I	1	I
190781:		<u> </u>	<u> </u>		1	1						
Bach		Loam	ML, CL-ML, CL		1 0	1 0	100	•	•	•	15-30	
	1 8-19	Silt loam, loam, very fine sandy loam	ML, CL-ML, CL	A-4	1 0	1 0	100	100	1 82-TOO	120-80	20-35	2-10
	I I 19-60	Stratified fine sand to	ISC CT.	 A-6, A-4	1 0	1 0	1 100	1 100	I I 70 – 95	I I40-85	1 25-40	ı I 8-16
	1 13 00	silt	I	N 0, N 4	i	i	1 100	1 100	70 JJ	1 40 03	123 40	1 0 10
	i	1	i	i	i	i	i	i	İ	i	i	i
190782:	i	i	i	i	i	i	i	i	İ	i	i	i İ
Deer Park	0-1	Sand	SM	A-3, A-2	0	0	100	100	50-70	5-15	0-14	NP
	•	Sand	SP-SM, SM	A-3, A-2-4	0	0	1 100	•	50-80	•	•	NP
	4-60	Sand	SP-SM, SM	A-3, A-2-4	0	0	100	100	50-80	5-30	0-14	NP
	1	!	!	1	1	1	!	1	!	1	1	!
190783:	1 0 1	101	100	1 2 2 2	1	1	1 100	1 100			1 0 14	
Deer Park	•	Sand Sand		A-3, A-2 A-3, A-2-4	I 0	I 0	•	•	50-70 50-80	•	0-14	NP NP
	•	•	SP-SM, SM SP-SM, SM	A-3, A-2-4 A-3, A-2-4	1 0		•	•	•	•	0-14	I NP
	, , 00			3, 4 2 4	i	i	1	1	, 50 00 I	, 5 50 I	1 0 14	111
190784:	i	i	i	i	i	i	i	i	i i	i	i	i
Deer Park	0-1	Sand	SM	A-3, A-2	; o	0	100	100	50-70	5-15	0-14	NP
	1-4	Sand	SP-SM, SM	A-3, A-2-4	j 0	, 0	100	100	50-80	5-30	0-14	NP
	4-60	Sand	SP-SM, SM	A-3, A-2-4	0	0	100	100	50-80	5-30	0-14	NP
	I	I	1	1	1	1	1	1	l		1	I

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	 USDA texture	Classi	fication	Frag	ments	Pe	ercenta	ge pass number-	-	 Liquid	 Plas-
and soil name	<u>.</u> -	1	i	1	· >10	J 3-10	i 	Ī	l I		_	ticity
	I	İ	Unified	AASHTO	in	in	4	1 10	40	200	į	lindex
	In	Ī	1	1	Pct	Pct	ī	ı	ı	ı	Pct	ī
	ı 	I	1	1		ı —	I	I	I	I	ı —	1
190784:	l	I	1	I	I	I	I	I	l	1	1	1
Roscommon	0-6	Sand	SM, SP-SM	A-1, A-3,	1 0	1 0	95-100	85-100	40-75	5-25	15-20	NP-4
	l I 6-60	 Cond	 SP-SM, SP, SM	A-2-4	I I 0	I I 0	 95-100	105 100	 40 75	1 0 30	115 20	INTO 4
) 6-60 I	I Sand	SF-SM, SF, SM	A-1	1 0	1 0	192-100	102-100	4 0 - 75	I 0-30	113-20	INF-4
	! 	i	İ				i	i i		i	<u> </u>	i
190787:	İ	i	i	i	i	i	i	i	i i	i	i	i
East Lake	0-8	Loamy sand	SP-SM, SM	A-2-4, A-1	0	0-15	95-100	85-100	40-75	10-30	0-14	NP
	8-26	Loamy sand, sand	SP-SM, SP, SM	A-3, A-2-4,	0	0-15	85-100	70-100	35-75	0-30	0-14	NP
	l	I .	•	A-1	!		!	!			!	1
	26-60	Gravelly coarse sand		A-3, A-2-4,	1 0	0-15	40-95	30-85	20-60	0-10	0-14	NP
	 	1	GP, GP-GM	A-1-b	! !	! !	!	1	! !	!	!	1
190788:	 	1	 	1	! !	! !		! !	! !		<u> </u>	i
East Lake	, 0-8	Loamy sand	SP-SM, SM	A-2-4, A-1	, I 0	0-15	95-100	85-100	 40-75	10-30	0-14	 NP
		Loamy sand, sand	SP-SM, SP, SM				185-100				0-14	NP
	l	I	1	A-1	I	I	I	I	I	I	1	1
	26-60	Gravelly coarse sand		A-3, A-2-4,	1 0	0-15	40-95	30-85	20-60	0-10	0-14	NP
	<u> </u>	1	GP, GP-GM	A-1-b	!	!	!	1	!	1	!	1
190789:	 	1			!	!	!	!	!	1	!	1
East Lake	I ι Λ_Ω	 Loamy sand	 SP-SM, SM	 A-2-4, A-1	I I 0	I I 0-15	 95-100	 85_100	I I 40-75	110-30	 0-14	I I NP
East Dake		Loamy sand, sand	SP-SM, SP, SM		1 0		185-100				•	l NP
	,			A-1	i	,					0	i
	26-60	Gravelly coarse sand	SP, SP-SM,	A-3, A-2-4,	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
	l	I	GP, GP-GM	A-1-b	I	I	1	I	I	I	1	1
	l	I	1	1	I	I	1	I	l	I	1	1
190790:		17		120421	1		105 100	105 100		110 20		
East Lake		Loamy sand Loamy sand, sand	SP-SM, SM SP-SM, SP, SM	A-2-4, A-1	0 0	•	95-100 85-100	•	•	•	0-14 0-14	NP NP
	6-20 	Loany Sand, Sand		A-1	1	l 0-13	102-100	70-100 	33-73 	I 0-30	1 0-14	NE
	26-60	 Gravelly coarse sand	•	A-3, A-2-4,	, I 0	0-15	 40-95	 30-85	20-60	0-10	0-14	NP
	I	i		A-1-b	İ	İ	į	İ	İ	i	į	i
	l	I		I	I	I	1	I	I	I	1	1
190791:	Ι	I	1	1	Ι .	Ι .	1	1	Ι	1	1	1
Eastport	0-3	Sand	SP-SM, SP, SM		1 0	1 0	90-100	75-100	35-70	0-15	0-14	NP
	I I 3-26	 Cand	 SP-SM, SP, SM	A-1-b	I I 0	I I 0	 90-100	 75_100	 25_70	 0-15	 0-14	I I NP
) 3-20 I	I Sand		A-1-b	1	1 0	190-100	/3-100	33-70 	1 0-13	1 0-14	NE
	26-60	Sand	SP-SM, SP, SM	•	, I 0	, I 0	90-100	75-100	135-70	0-15	0-14	I NP
	,	Ī	i , , , ,	A-1-b	i	İ	i	i	İ	İ	i	i
	I	L	1	1	I	I	I	I	I	I	I	1
190792:	1	I	1	L	I	I	1	I	l .	1	I	1
Edwards		Muck Marly material	PT OH, MH	A-8 A-8, A-7, A-5	I 0 I 0	I 0				90-100 70-90		NP

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	 USDA texture	Classi	fication	Frag	ments	Pe	ercenta	ge pass	_	 Liquid	 Plas
and soil name	. <u>.</u>	i	i		 >10	I 3-10	i i	1		Ī	limit	
	İ	i	Unified	AASHTO	in	in	4	10	40	200		index
	In In	<u> </u>	İ	ļ	Pct	Pct	Ī	İ.	l	Ī	Pct	Ī
190794:	l I	 	 	I I	1		 	 	 			
Emmet	0-8 	Sandy loam 	SM, SC-SM, SC	A-4, A-2-4, A-1-b	0 	0-8 	90-100 	75-100 	45-85 	20-50 	15-25 	NP-10
	8-26 	Sandy loam, loamy sand, sandy clay loam		A-6, A-4, A-2-6	0 	0-8 	95-100 	85-100 	40-90 	10-55 	25-37 	7-15
	26-32 	Sandy loam, sandy clay	. , ,	A-4, A-6, A-1-b, A-2	0 	0-8 	95-100 	75-100 	45-95 	20-75 	20-40 	5-20
	32-60 	Sandy loam	SM, SC-SM, SC	A-4, A-2-4, A-1-b	i 0	0-8 	85-100 	 60-100 	45-80 	20-50 	15-25 	NP-10
Leelanau	 0-8 	Loamy sand	SP-SM, SM, SC-SM	 A-2-4, A-1 	0	0-15	 85-100 	 75-100 	ı 35-75 	110-30	 15-25 	 NP-7
	8-28	Loamy sand, sand	SW-SM,	' A-3, A-2-4, A-1	i 0	0-15 	85-100 	75-100 	35-75 	5-30	15-25 	 NP-7
	28-36	Sandy loam	SM, SC-SM, SC	•	i 0	 0-20 	80-100 	75-100 	45-70 	 20-40	 20-30	 NP-10
	36-60 	Loamy sand	•	 A-2-4, A-1 	0	0-10	80-100 	75-100 	35-75 	10-30 	 15-25 	NP-7
190795:	 	 	İ	! 	1		 	 	! 			
Emmet	0-8 	Sandy loam 	SM, SC-SM, SC	A-4, A-2-4, A-1-b	0 	0-8 	90-100 	75-100 	45-85 	20-50 	15-25 	NP-10
		Sandy loam, loamy sand, sandy clay loam		A-6, A-4, A-2-6	0 	0-8 	95-100 	85-100 	40-90 	10-55 	25-37 	7-15
	26-32 	Sandy loam, sandy clay loam	. , ,	A-4, A-6, A-1-b, A-2	0 	0-8 	95-100 	75-100 	45-95 	20-75 	20-40 	5-20
	32-60 	Sandy loam 	SM, SC-SM, SC	A-4, A-2-4, A-1-b	0 	0-8 	85-100 	60-100 	45-80 	20-50 	15-25 	NP-10
Leelanau	 0-8 	 Loamy sand 	SP-SM, SM, SC-SM	 A-2-4, A-1 	 0 	 0-15 	 85-100 	 75-100 	ı 35-75 	 10-30 	 15-25 	 NP-7
	8-28 	Loamy sand, sand	SW-SM,	A-3, A-2-4, A-1	i 0	0-15 	85-100 	75-100 	35-75 	5-30 	 15-25 	NP-7
	28-36 I	Sandy loam	SM, SC-SM, SC	A-4, A-2-4, A-1	0 	0-20 	80-100 	75-100 	45-70 	20-40 	20-30 	NP-10
	36-60 I	Loamy sand	SW-SM, SP-SM, SM	A-2-4, A-1 	0	0-10 	80-100 	75-100 	35-75 	10-30 	15-25 	NP-7
190796:	l I	 	 	I I	1	 	 	 	 	 		
Emmet	0-8 	Sandy loam 	SM, SC-SM, SC	A-4, A-2-4, A-1-b	0 	0-8 	90-100 	75-100 	45-85 	20-50 	15-25 	NP-10
[Sandy loam, loamy sand, sandy clay loam		A-6, A-4, A-2-6	0 	0-8 	95-100 	85-100 	40-90 	10-55 	25-37 	7-15
			SC, SC-SM,	A-4, A-6, A-1-b, A-2	i 0	0-8 	95-100 	75-100 	45-95 	20-75 	20-40 	5-20
	32-60 	•	SM, SC-SM, SC		i 0 I	0-8 	85-100 	60-100 	45-80 	20-50 	15-25 	NP-10

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Classi	fication	Frag	ments	Pe	ercenta sieve	ge pass number-		 Liquid	 Plas-
and soil name	I	I		1	>10	3-10	Ī	ı	ı	Ī	 limit	ticity
	I	1	Unified	AASHTO	in	in	4	10	40	200	I	index
	In	T	1	Ī	Pct	Pct	Ī	ı	ı	Ī	Pct	ī
		I	1	1	1		1	I	I	1		I
190796:	l	I	1	1	1	l	1	I	I	1	1	1
Leelanau	0-8 	Loamy sand 	SP-SM, SM, SC-SM	A-2-4, A-1 	0 	0-15 	85-100 	75-100 	35-75 	10-30 	15-25 	NP-7
	8-28 	Loamy sand, sand	SW-SM, SP-SM, SM	A-3, A-2-4, A-1	0 	0-15 	85-100 	75-100 	35-75 	5-30 	15-25 	NP-7
	28-36 	Sandy loam 	SM, SC-SM, SC	A-4, A-2-4, A-1	0 	0-20 	80-100 	75-100 	45-70 	20-40 	20-30 	NP-10
	36-60 	Loamy sand 	SW-SM, SP-SM, SM	A-2-4, A-1	0 	0-10 	80-100 	75-100 	35-75 	10-30 	15-25 	NP-7
190797:	! !	1		 	<u> </u>	<u> </u>	<u> </u>	! !	! !	<u> </u>	<u> </u>	<u> </u>
Emmet	 0-8 	Sandy loam	SM, SC-SM, SC	A-4, A-2-4, A-1-b	0	0-8	90-100	 75-100	 45-85 	120-50	15-25	 NP-10
	8-26 	Sandy loam, loamy sand sandy clay loam	•	A-6, A-4, A-2-6	0	0-8 	95-100	85-100 	40-90 	10-55	25-37	7-15
	26-32 	Sandy loam, sandy clay		A-4, A-6, A-1-b, A-2	0	0-8 	95-100	75-100 	45-95 	20-75	20-40	5-20
	32-60 	Sandy loam	SM, SC-SM, SC		0	0-8 I	85-100 	60-100 	45-80 	20-50 	 15-25 	NP-10
Leelanau	I 0-8 	 Loamy sand 	 SP-SM, SM, SC-SM	 A-2-4, A-1 	0	 0-15 	 85-100 	 75-100 	I 35-75 	 10-30 	 15-25 	 NP-7
	8-28 	Loamy sand, sand	SW-SM,	A-3, A-2-4, A-1	i 0	0-15 	85-100 	75-100 	35-75 	5-30 	15-25 	NP-7
	28-36 	Sandy loam	SM, SC-SM, SC	A-4, A-2-4, A-1	0 	0-20 	80-100 	75-100 	4 5-70 	20-40 	20-30 	NP-10
	36-60 	Loamy sand 	SW-SM, SP-SM, SM	A-2-4, A-1 	0 	0-10 	80-100 	75-100 	35-75 	10-30 	15-25 	NP-7
190799:	' 	i	i	i	i	i	i	i	i	i	i	i
Emmet	0-8 	Sandy loam	SM, SC-SM, SC	A-4, A-2-4, A-1-b	i 0	0-8 	90-100 	75-100 	45-85 	20-50 	15-25 	NP-10
	8-26 	Sandy loam, loamy sand sandy clay loam	, SC, CL	A-6, A-4, A-2-6	i 0	0-8 	95-100 	85-100 	40-90 	 10-55 	25-37 	7-15
	26-32 	Sandy loam, sandy clay loam		A-4, A-6, A-1-b, A-2	i 0	0-8 	95-100 	75-100 	45-95 	20-75 	20-40 	5-20
	32-60 	Sandy loam	SM, SC-SM, SC		0	0-8 	85-100 	 60-100 	45-80 	20-50 	15-25 	NP-10
Leelanau	I 0-8 	 Loamy sand 	SP-SM, SM, SC-SM	 A-2-4, A-1 	0	 0-15 	 85-100 	 75-100 	I 35-75 	 10-30 	 15-25 	 NP-7
	8-28 	Loamy sand, sand	SW-SM, SP-SM, SM	A-3, A-2-4, A-1	i 0	0-15 	85-100 	75-100 	35-75 	5-30 	15-25 	NP-7
	28-36 	Sandy loam 	SM, SC-SM, SC	A-4, A-2-4, A-1	i 0	0-20 	80-100 	75-100 	45-70 	20-40 	20-30 	NP-10
	36-60 	Loamy sand	SW-SM, SP-SM, SM	A-2-4, A-1	0	0-10	80-100	75-100	35-75	110-30	15-25	NP-7

Table 14.-Engineering Properties-Continued

Map unit symbol	Depth	 USDA texture	Classi	fication	Frag	ments	P	ercentac sieve	ge pass number-	-	 Liquid	 Plas-
and soil name		I	1	I	>10	3-10	ı	ı	ī	ı	limit	ticity
		<u> </u>	Unified	AASHTO	in	in	4	10	40	200	<u> </u>	index
	In	1	1		Pct	Pct	1	1	1	1	Pct	1
190801:		1			!	!	1	1	!	!	!	!
Emmet	0-8	 Gravelly sandy loam	SM, SC-SM, SC	 a_2 a_1_h	I I 0	I 0-8	1 180-95	ı 160-75	1 135-60	1 110-35	115-25	 NTD_1∩
Entitle		Sandy loam, loamy sand,		A-6, A-4,	1 0	•	•	85-100		•	•	•
	0 -0	sandy clay loam		A-2-6	i						1	
į	26-32	Sandy loam, sandy clay	SC, SC-SM,	A-4, A-6,	0	0-8	95-100	75-100	45-95	20-75	20-40	5-20
1				A-1-b, A-2	I	1	1	1	I	I	1	1
I	32-60	Sandy loam	SM, SC-SM, SC		1 0	I 0-8	85-100	60-100	45-80	20-50	15-25	NP-10
		!		A-1-b	!	!		!	!	!	!	!
Mancelona	0-8	 Gravelly sandy loam	 SM, SC-SM	 A-1-b	I I 0	I I 0-5	170-00	I 155-75	125-55	115_25	115-25	 ND_7
Mancerona		Loamy sand, sand,		A-1-D A-3, A-2-4,				155-95		1 5-30		NP
	0 23	gravelly loamy sand		A-1-b	ı v	1 0 3	1	1	1	1 3 30	1 0 14	111
	25-30	Sandy loam, gravelly	•	A-6, A-4, A-2	0	0-5	85-100	55-95	45-95	20-75	20-35	8-15
į		sandy clay loam,	İ	İ	ĺ	İ	İ	İ	İ	ĺ	İ	İ
I		gravelly sandy loam		I	I	1	I	I	I	I	1	1
1				A-2, A-1-b,	1 0	0-10	40-90	30-85	20-60	0-15	0-14	NP
		sand, sand	GP, GW	A-3	!	!	!	!	!	!	!	!
190803:		 	l I	 	 	!	 	 	 		!	1
Emmet	0-8	 Gravelly sandy loam	SM, SC-SM, SC	IA-2. A-1-b	I 0	I 0-8	1 180-95	1 160-75	1 135-60	1 110-35	115-25	INP-10
		Sandy loam, loamy sand,	. ,	A-6, A-4,	i 0	•		185-100				
i		sandy clay loam		A-2-6	İ	i	i	i	İ	į	i	i
1	26-32	Sandy loam, sandy clay	SC, SC-SM,	A-4, A-6,	0	I 0-8	95-100	75-100	45-95	20-75	20-40	5-20
1				A-1-b, A-2	I	I	1	I	I	1	1	I
	32-60	Sandy loam	SM, SC-SM, SC		1 0	1 0-8	185-100	60-100	45-80	20-50	15-25	NP-10
		 		A-1-b		1					1	
Mancelona	0-8	 Gravelly sandy loam	SM, SC-SM	 A-1-b	1 0	I 0-5	1 170-80	ı 155-75	I 135-55	I 115-35	I 115-25	เ เพp-7
114110010114				A-3, A-2-4,	1 0	1 0-5	•	155-95	•	•	•	•
i		gravelly loamy sand	•	A-1-b	İ	i	İ	İ	İ	İ	i	i
1	25-30	Sandy loam, gravelly	SC-SM, SC	A-6, A-4, A-2	J 0	0-5	85-100	55-95	45-95	20-75	20-35	8-15
1		sandy clay loam,	1	I	I	1	1	1	I	I	1	1
		gravelly sandy loam	1	1			I	I		!	!	1
	30-60			A-2, A-1-b,	1 0	0-10	40-90	30-85	20-60	0-15	0-14	NP
		sand, sand	GP, GW	A-3	! !	1	1	1	! !	!	1	!
190805:		! 	l I	i	! 	<u> </u>	 	! 	! 	<u> </u>	i	
Emmet	0-8	 Sandy loam	SM, SC-SM, SC	A-4, A-2-4,	, 0	0-8	90-100	 75-100	45-85	20-50	15-25	NP-10
i		I -		A-1-b	I	I	I	I	I	I	1	1
1	8-26	Sandy loam, loamy sand,	SC, CL	A-6, A-4,	J 0	I 0-8	95-100	85-100	40-90	10-55	25-37	7-15
1		sandy clay loam	•	A-2-6	I .	1	1	1	1	1	1	1
	26-32	Sandy loam, sandy clay		A-4, A-6,	1 0	1 0-8	95-100	75-100	45-95	20-75	20-40	5-20
	22 60	•		A-1-b, A-2	I I 0	1 0 0	105 100	160 100	145 00	120 50	115 05	IND 10
	32-60	Sandy loam	SM, SC-SM, SC	A-4, A-2-4, A-1-b	, U	0-8	1 192-TOO	60-100	45-8U 	∠U-5U 	115-25	IND-TO
		1	1	1 2 1 7	!	:	!	:	:	!	!	:

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Classi	fication	Frag	ments	Po	ercenta sieve	ge pass number-	-	 Liquid	 Plas-
and soil name	ı beben	I ODDA CERCUIE	¦	1	 >10	I 3-10	'	1	ı			ticity
and soll name	! 		Unified	AASHTO	l in	Jin	1 4	1 10	1 40	200		index
	l In	<u></u>	1	i	Pct	l Pct	i .	i	i	i 	Pct	i
	· —	i	i	i	i —	i —	i I	I	i I	i	i —	i I
190805:	I	İ	i	i	i	i	İ	İ	į	i	i	İ
Omena	0-8	Sandy loam	SM, SC-SM, SC	C A-4, A-2-4	0	0-10	90-100	75-100	55-85	25-50	15-25	2-8
	8-14	Loam, sandy loam	SC, SM, CL,	A-4, A-2-4	0	0-15	90-100	75-100	50-95	25-75	15-20	2-10
	1	1	ML	1	1	1	1	1	1	1	1	1
	14-60	Sandy loam	SM, SC-SM, SC	C A-4, A-2-4	1 0	0-10	190-100	75-100	55-85	25-50	15-25	2-8
190806:	 -				1	1	!			1	1	!
Emmet	I I ∩–8	 Sandy loam	SM, SC-SM, SC	 	1 0	I I 0-8	 90-100	I 175-100	I I 45 – 85	120-50	I 115-25	I INTD–1∩
Dilline C	1	I	I	A-1-b	i	1	1 20 100	/3 ±00 	1 43 03	120 30	1 23	1
	8-26	Sandy loam, loamy sand,	SC, CL	A-6, A-4,	i 0	0-8	95-100	85-100	40-90	10-55	25-37	7-15
	I	sandy clay loam	i '	A-2-6	i	i	İ	İ	į	i	i	İ
	26-32	Sandy loam, sandy clay	SC, SC-SM,	A-4, A-6,	0	I 0-8	95-100	75-100	45-95	20-75	20-40	5-20
	l	loam		A-1-b, A-2	1	I	1	I	1	1	1	1
	32-60	Sandy loam	SM, SC-SM, SC		1 0	1 0-8	85-100	60-100	45-80	20-50	15-25	NP-10
	!	!	!	A-1-b	!	!	!	!	!	!	!	!
Omena	l 	 Sandy loam	 SM, SC-SM, SC	1 7 7 7 7	1 0	l . o 10	 90-100	 75 100	1 5 5 6 5	125 50	115 25	I I 2-8
Omena	•	Loam, sandy loam	SC, SM, CL,	. ,	1 0	•	190-100		•	•	•	•
	1 0 14	I	ML	1 1	i	1 0 13	1 20 100	/3 ±00 	1	123 73	1 20	1 2 10
	14-60	Sandy loam	SM, SC-SM, SC	 A-4, A-2-4	0	0-10	90-100	75-100	55-85	25-50	15-25	2-8
	İ	i	i '	i ,	İ	i	İ	İ	į	i	İ	İ
190807:	l	1	1	1	1	I	1	I	1	1	1	1
Emmet	1 0-8	Sandy loam	SM, SC-SM, SC		1 0	1 0-8	90-100	75-100	45-85	20-50	15-25	NP-10
				A-1-b								!
	8-26	Sandy loam, loamy sand,	SC, CL	A-6, A-4, A-2-6	0	0-8	95-100	185-100	40-90	110-55	125-37	7-15
	I I 26-32	sandy clay loam Sandy loam, sandy clay	ISC SC-SM	A-2-6 A-4, A-6,	1 0	I I 0-8	1 195-100	I 175-100	 15-95	120-75	120-40	1 5-20
	20 J2 	loam		A-1-b, A-2	1	1 0 0	193 100	/3 100 	1 42 93	120 73	120 40	1 3 20
	I 32-60	Sandy loam	SM, SC-SM, SC	•	i 0	I 0-8	85-100	60-100	145-80	120-50	115-25	INP-10
	İ	1	1	A-1-b	į i	i	İ	İ	i	i	i	i
	I	1	1	1	I	I	I	I	1	1	I	I
Omena		Sandy loam	SM, SC-SM, SC		1 0	•	90-100		•	•	•	•
	8-14	Loam, sandy loam	SC, SM, CL,	A-4, A-2-4	1 0	0-15	90-100	75-100	50-95	25-75	15-20	2-10
			ML		1							1
	1 14-60	Sandy loam	SM, SC-SM, SC	: A-4, A-2-4	0	1 0-10	90-100	175-100	155-85	125-50	15-25	2-8
190808:	 	1	1	1	1	! !	!	! !	 	1	1	
Emmet	ı I 0-8	 Sandv loam	SM, SC-SM, SC	 A-4. A-2-4.	1 0	I 0-8	190-100	175-100	1 145-85	120-50	1 115-25	INP-10
	 I		1	A-1-b	i	i				1	i	i
	8-26	Sandy loam, loamy sand,	SC, CL	A-6, A-4,	i 0	0-8	95-100	85-100	40-90	10-55	25-37	7-15
	I	sandy clay loam	1	A-2-6	I	I	I	I	1	1	I	I
	26-32	Sandy loam, sandy clay		A-4, A-6,	1 0	I 0-8	95-100	75-100	45-95	20-75	120-40	5-20
		loam		A-1-b, A-2	!							
	32-60	Sandy loam	SM, SC-SM, SC		1 0	I 0-8	85-100	160-100	45-80	120-50	115-25	NP-10
	I I	1	1	A-1-b	1	I I	1	I I	I I	I	I	1
	I	1	1	1	1	1	1	I	I	I	1	1

Map unit symbol	 Depth	USDA texture	Classi	fication	Fragi	ments	Po	ercenta	ge pass:	-	 Trianid	 Plas-
and soil name	Depun	I ODDA CERCUIE	¦ 		>10	I 3-10	 	31646 1	ı		_	lticity
and soll name	! 	İ	Unified	AASHTO	in	10	4	1 10	 40	200	•	index
	In	T	Ī	I	Pct	Pct	ı	ı	ı	ı	Pct	I
190808:		!		1	1	ļ .	1	l	ļ .	l	1	1
		l land land	1	1 2 4 2 0 4		1 0 10	100 100	 75 100	 	I I O F F O	115 05	1 0 0
Omena		Sandy loam	SM, SC-SM, SC		1 0	•	90-100		•	•	•	•
	0-14	Loam, sandy loam	SC, SM, CL,	A-4, A-2-4	0	1 0-12	90-100	1 /2-100	120-92	25-75	115-20	2-10
i	 14-60	 Sandy loam	ML SM, SC-SM, SC	 A-4, A-2-4	1 0	 0-10	 90-100	 75-100	ı 55-85	 25-50	 15-25	2-8
190809:] 	1		1		 	1	l	 	 		
Emmet	ı I 0-8	Sandy loam	SM, SC-SM, SC	I IA-4 A-2-4	1 0	ı I 0-8	190-100	I 175-100	I 145-85	1 120-50	115-25	INTP-10
	1	I		A-1-b	i	1	1	1	1	1	1	1
	I 8-26	Sandy loam, loamy sand,	•	A-6, A-4,	i 0	I 0-8	195-100	85-100	40-90	10-55	125-37	7-15
i		sandy clay loam		I A-2-6	i	i	i	i	i		i	i
i	26-32		SC, SC-SM,	A-4, A-6,	I 0	0-8	95-100	75-100	45-95	20-75	120-40	5-20
i	İ	loam		A-1-b, A-2	i	İ	i	i I	İ	İ	i	i
i	32-60	Sandy loam	SM, SC-SM, SC	A-4, A-2-4,	0	0-8	85-100	60-100	45-80	20-50	15-25	NP-10
ļ	 -	1	1	A-1-b	I	l	1	l	ļ	 	1	1
Omena	 0-8	 Sandy loam	SM, SC-SM, SC	 A-4, A-2-4	0	 0-10	90-100	 75-100	ı 55-85	 25-50	 15-25	2-8
I	8-14	Loam, sandy loam	SC, SM, CL,	A-4, A-2-4	0	0-15	90-100	75-100	50-95	25-75	15-20	2-10
1		I	ML	I	1	I	1		l	l	1	1
1	14-60	Sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	0-10	90-100	75-100	55-85	25-50	15-25	2-8
	l	I	1	I	I	l	I		l	l	1	1
190811:	l	I	1	I	1	l	1		l	l	1	1
Hettinger	•	Loam	ML, CL-ML, CL		0	0	100		•		120-30	•
	8-23	Silty clay loam, clay	CL	A-6	0	I 0	100	100	90-100	75-95	25-40	10-25
	00 00	loam			1	. ^	1 100	100	 05 100		120 60	
	23-60	Stratified clay loam to		A-7-6, A-6, A-4	1 0	0	100	100	182-100	1/0-95	30-60	5-35
	l I	silty clay loam	I CT	A-4	1	! !	1	 	! !	 	!	1
190812:	 		1	! !	 	! !	 	 	! !	 		1
Hettinger	ı I 0-8	 Loam	ML, CL-ML, CL	I I 2λ – Δ	1 0	i I 0	1 100	I 100	I 185-100	1 160-90	120-30	1 2-10
neccinger	•	Silty clay loam, clay		A-6	1 0	1 0	1 100		•	•	125-40	•
	1	loam	1	1	i	ı	1	1	1	<i> 10 30</i> 	1	1
i	23-60	Stratified clay loam to	MH, ML, CH,	' A-7-6, A-6,	I 0	I 0	I 100	100	85-100	170-95	130-60	I 5-35
i	i	silty clay loam		A-4	i	i	i	İ	İ	İ	i	i
i		i	İ	İ	İ	İ	İ	l	İ	l	İ	İ
Tonkey	0-8	Loam	CL-ML, CL	A-6, A-4	0	0	100	100	85-95	60-90	20-30	4-11
į	8-20	Fine sandy loam, loamy	SM, SC-SM, SC	A-4, A-2-4	0	0	100	100	50-75	15-40	15-25	NP-9
1	l	sand	1	I	I	I	I		l	l	1	1
1	20-60	Stratified sand to	SM, SP-SM,	A-3, A-4,	0	0-2	95-100	85-100	40-80	5-65	15-30	NP-11
1	l	sandy loam	ML, SC-SM	A-1, A-2-4	1	l	1		l	l	1	1
I	l	I	1	I	I	I	I	l	l	l	1	1

Table	14	Engineering	Pron	erties	-Continued

Map unit symbol	 Denth	USDA texture	Classi	fication	Frag	ments	Po	ercenta	ge pass: number-	_	 Liquid	 Dlace
and soil name	ı pebru	OSDA CEXCUIE	<u></u>	· · · · · · · · · · · · · · · · · · ·	>10	I 3-10	 	Sieve i	i i i i i i i i i i i i i i i i i i i		limit	•
and soll name	! !	1	Unified	I AASHTO	l in	l in	1 4	1 1 10	I 40	1 200	•	lindex
	l In	<u>'</u>	1 01121200	1 111011110	Pct	l Pct		1 10	1 10	1 200	Pct	1
	¦ ==	1	<u>'</u>			1	1	! !	! !	1	1	
190814:	! !	1	<u> </u>	<u> </u>	<u> </u>	i	<u> </u>	! !	! !	<u> </u>	i	<u> </u>
Kalkaska	I 0-7	Sand	SM	A-3, A-2-4,	i 0	1 0-5	195-100	85-100	45-70	5-15	0-14	I NP
	, I	1	1	A-1-b	i	i	i		i	i	i	i
	7-15	Sand	SP-SM, SM	A-3, A-2-4,	, 0	0-5	95-100	85-100	45-75	5-30	0-14	NP
	I	I	1	A-1-b	1	1	1	I	I	I	1	I
	15-32	Sand	SM	A-3, A-2-4,	1 0	0-5	95-100	85-100	45-70	5-15	0-14	NP
	l	I	1	A-1-b	1	1	1	I	I	1	1	1
	32-60	Sand	SP-SM, SP, SM		1 0	0-5	95-100	85-100	45-70	0-15	0-14	NP
		1	!	A-1-b		1	!	!	!	1	!	!
100015	!	!		!	!	!	!	!	!	!	!	!
190815: Kalkaska	I I 0-7	 Sand	 SM	 A-3, A-2-4,	I I 0	I I 0-5	1 195-100	 0E 100	 45 70	I I 5-15	I I 0-14	I INP
Naikaska	U-7	Isano	SM	A-1-b	1 0	1 0-5	192-100	102-100	43-70 	1 2-12	1 0-14	I NP
	I I 7-15	 Sand	 SP-SM, SM	A-1-B A-3, A-2-4,	1 0	1 0-5	195-100	I 185-100	I I 45-75	I I 5-30	I 0-14	I NP
'	1 , 10	I	1	A-1-b	1	1	1	1	1	1	1	112
	15-32	Sand	SM	A-3, A-2-4,	i o	i 0-5	195-100	85-100	45-70	I 5-15	0-14	, I NP
	İ	İ	i	A-1-b	i	i	i	İ	i	İ	i	i
	32-60	Sand	SP-SM, SP, SM	I A-3, A-2-4,	, , 0	0-5	95-100	85-100	45-70	0-15	0-14	NP
	l	1	1	A-1-b	1	1	1	I	I	1	1	I
	l	I	1	1	1	1	1	I	I	I	1	1
190816:	l	I	1	1	1	1	1	I	I	1	1	1
Kalkaska	0-7	Sand	SM	A-3, A-2-4,	1 0	0-5	95-100	85-100	45-70	5-15	0-14	NP
				A-1-b	!	!			l 	!		!
	7-15	Sand	SP-SM, SM	A-3, A-2-4,	1 0	0-5	95-100	185-100	145-75	5-30	0-14	NP
	I I 15-32	 Comd	I ISM	A-1-b A-3, A-2-4,	I I 0	I I 0-5	1 195-100	 0E 100	 45 70	 E 1E	I I 0-14	I INP
	15-32 	Isano	SM	A-1-b	1 0	1 0-5	192-100	102-100	43-70 	1 2-12	1 0-14	I NP
	1 32-60	I Sand	SP-SM, SP, SM	•	. 0	1 0-5	195-100	ı 185–100	1 145-70	I 0-15	0-14	I NP
	3 <u>2</u> 00			A-1-b	1	1	1	1	1	1	1	112
,	I	i	i	i	i	i	i	i	i	i	i	i
190817:	i İ	i	i	i	i	i	i	i	i	i	i	i
Kalkaska	0-7	Sand	SM	A-3, A-2-4,	0	0-5	195-100	85-100	45-70	5-15	0-14	NP
	I	1	1	A-1-b	1	1	1	I	I	1	1	I
	7-15	Sand	SP-SM, SM	A-3, A-2-4,	1 0	0-5	95-100	85-100	45-75	5-30	0-14	NP
	I	I	1	A-1-b	1	1	1	I	I	I	1	I
	15-32	Sand	SM	A-3, A-2-4,	1 0	0-5	95-100	85-100	45-70	5-15	0-14	NP
				A-1-b	!							!
	32-60	Sand	SP-SM, SP, SM		1 0	0-5	95-100	85-100	45-70	0-15	0-14	NP
	!	!	!	A-1-b	!	!	!	!	!	!	!	!

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Classi	fication	Frag	ments	P	ercenta	ge pass	_	 Liquid	 Plas-
and soil name	i -	Ī			>10	3-10	i	ı	l	1		ticity
	İ	İ	Unified	AASHTO	in	in	4	10	40	200	İ	index
	I In	!	I.	I.	Pct	Pct	!	!	l	I	Pct	<u> </u>
190818:	I I	1		 	 	 	 	 	I 	 		
Kalkaska	0-7 	Sand		A-3, A-2-4, A-1-b	l 0 I	0-5 	95-100 	85-100 	45-70 	5-15 	0-14 	NP
	7-15	Sand		A-3, A-2-4, A-1-b	0 I	0-5 	95-100 	85-100 	45-75 	5-30 	0-14 	NP
	15-32 	Sand		A-3, A-2-4, A-1-b	0 I	0-5 	95-100 	85-100 	45-70 	5-15 	0-14 	NP
	32-60 	Sand 	SP-SM, SP, SM	•	0 	0-5 	95-100 	85-100 	45-70 	0-15	0-14 	NP
190819:	 	 	1	 	 	 	 	 	 	 	1	
Kalkaska	0-7	Loamy sand	SP-SM, SM	A-2-4, A-1		0-15	95-100	85-100	40-75	10-30	0-14	NP
	7-15 	Sand		A-3, A-2-4, A-1-b	l 0 I	0-5 	95-100 	85-100 	45-75 	5-30 	0-14 	NP
	15-32 	Sand		A-3, A-2-4, A-1-b	0 	0-5 	95-100 	85-100 	45-70 	5-15 	0-14 	NP
	32-60 	Sand	SP-SM, SP, SM	A-3, A-2-4, A-1-b	0 	0-5 	95-100 	85-100 	4 5-70 	0-15	0-14	NP
East Lake	I I 0−8	 Loamy sand	 SP-SM, SM	 A-2-4, A-1	l 0	 0-15	 95-100	 85-100	 40-75	 10-30	 0-14	 NP
	8-26 	Loamy sand, sand	SP-SM, SP, SM	A-3, A-2-4, A-1	l 0 I	0-15 	85-100 	70-100 	35-75 	0-30 	0-14 	NP
	26-60 	Gravelly coarse sand		A-3, A-2-4, A-1-b	0 I	0-15 	40-95 	30-85 	20-60 	0-10 	0-14 	NP
190820:	 	1	1	 	l I	 	 	 	l I	1	1	
Kiva	ı I 0-6	 Gravelly sandy loam	SM, SC-SM, SC	 A-2-4. A-1-b	, I 0	 0-10	175-100	160-75	135-55	115-35	115-25	INP-10
		Sandy loam, loam, gravelly sandy loam	SC, SC-SM,	A-4, A-2-4, A-1-b	, o 0	•	•	•	•	•	120-30	•
	20-60	Gravelly coarse sand	SP-SM, SP	A-1-b	0	15-40	 70-85	 55-75	 25-50	0-10	0-14	NP
Mancelona	ı I 0-8	Gravelly sandy loam	SM, SC-SM	 A-1-b	I 0	I 0-5	1 170-80	ı 155-75	ı I 35-55	1 115-35	 15-25	INP-7
		Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	, 0 			55-95 				NP
		Sandy loam, gravelly sandy clay loam,	SC-SM, SC	A-6, A-4, A-2	0 	0-5 	85-100 	55-95 	45-95 	20-75 	 20-35 	8-15
		gravelly sandy loam Very gravelly coarse sand, sand		 A-2, A-1-b, A-3	 0 	 0-10 	 40-90 	 30-85 	 20-60 	 0-15 	 0-14 	 NP
190821:	! 			! 	 	<u> </u>	! 	! 	! 			
Kiva	0-6	Gravelly sandy loam	SM, SC-SM, SC	A-2-4, A-1-b	0	0-10	75-100	60-75	35-55	15-35	15-25	NP-10
	6-20 	Sandy loam, loam, gravelly sandy loam		A-4, A-2-4, A-1-b	Ι 0 Ι	0-10 	85-100 	70-95 	40-90 	20-70 	20-30 	4-10
	20-60 	Gravelly coarse sand	SP-SM, SP	A-1-b 	0 	15-40 	70-85 	55-75 	25-50 	0-10 	0-14 	NP

Table 14.-Engineering Properties-Continued

Depth	USDA texture	1		ı		1	sieve	number-	_	Liquid	 Plas-
		' 	<u> </u>	>10	I 3-10	'	1	1	1		ticity
	' 	Unified	I AASHTO	l in	in	' 4	, 10	1 40	200		lindex
Tn	<u>'</u> I	1	1	<u> </u>	<u> </u>		 	 	 		1
		1	1	<u> </u>	1	1	! !	1		===	1
	 	1	1	! !	1	1	! !	1	!	1	!
0 0	l Conservation condendation	I CM CC CM	 7 1 %	1 0	I 0 E	170 00	 EE 7E	125 55	115 25	115 25	INP-7
		,	•	1 0	•	•	•	•	•	•	NP
					1 0-5	100-100	1 22-32	130-75	1 2-30	1 0-14	I NP
		•	•	1 0	1 0 5	105 100	 	145 05	100 75	100 25	 8-15
		ISC-SM, SC	A-6, A-4, A-2		1 0-5	182-100	122-32	145-95	120-75	120-35	1 9-12
			!	!	!	!	!	!	!	!	!
			1		1 0 10	1	1 00 05	1	1 0 45	1	
			. , ,	. 0	1 0-10	140-90	30-85	120-60	0-12	0-14	NP
	sand, sand	GP, GW	A-3	!	!	!	!	!	!		!
			!	!	!	!	!	!	!	!	!
0.6	 Construction Construction	I CM CC CM CC	1	1 0	1 0 10	175 100	 60 7E	125 55	115 25	115 25	INTO 10
			. ,								
				. 0	1 0-10	182-100	170-95	140-90	120-70	120-30	4-10
			•	1	115 40	170 05	 7-	105 50	1 0 10	1 0 14	
20-60	Gravelly coarse sand	SP-SM, SP	I A-I-D		115-40	1 /0-85	55-75	125-50	1 0-10	0-14	NP
0-8	 Gravelly sandy loam	ISM SC-SM	ı IA-1-b	1 0	1 0-5	1 170-80	ı 155-75	I 135-55	I 115-35	I 115-25	INTP-7
		,	•	1 0	•	•	•		•	•	l NP
					1	1	1	1	1 3 30	1 0 11	1 -11-
		•	•	, , ,	1 0-5	185-100	I 155-95	1 145-95	120-75	120-35	I 8-15
		I DC DEI, DC	N 0, N 4, N 2		1 0 3	103 100	1	1 43 33	120 /3	120 33	1 0 13
		i			i	i			i	i .	i
		ISD-SM SM	ı ∆-2 ∆-1-h	, , ,	1 0-10	140-90	1 130-85	120-60	1 0-15	1 0-14	l NP
					1 0 10	1 20 30	1	120 00	1 0 13	1 0 11	1 111
	l	1 01, 01	1	' !	i	i	! !	! !	i	i	i
	! 	i	i	i	i	i	i	' 	i	i	i
0-8	' Toamv sand	ISP-SM. SM.	 A-2-4. A-1	I 0	i 0-15	185-100	175-100	135-75	110-30	115-25	 NP-7
			1,	i	1	1	1	1	1	1	1
8-28	' Toamy sand. sand	•	 A-3. A-2-4.	I 0	i 0-15	185-100	175-100	135-75	I 5-30	115-25	 NP-7
0 20	l				1 0 10	1	1	1	1 3 30	1	1
28-36	ISandy loam	•	•	I 0	0-20	180-100	175-100	145-70	120-40	120-30	 NP-10
	l			i	0 = 0	1	1	1	1	1	
36-60	' Toamv sand	•	•	I 0	i 0-10	180-100	175-100	135-75	110-30	115-25	 NP-7
	I		i, I	İ	i	i	,	1	i	i	i
	I	1	i	i	i	i	i	i	i	i	i
0-8	Loamy sand	SP-SM, SM	A-2-4, A-1	I 0	0-15	95-100	85-100	40-75	110-30	0-14	NP
	-			I 0						0-14	•
-	. <u>.</u> ,			i	i	i	i	i	i	i	i
26-60	Gravelly coarse sand	•	•	I 0	0-15	40-95	30-85	120-60	0-10	0-14	NP
	. <u>.</u>		. , ,	i	i	i		i	i	i	i
	I	· ,	i	I	i	i	i	i	i	i	i
2 3 2 3	8-25 25-30 30-60 0-6 6-20 20-60 0-8 8-25 25-30 30-60 0-8 8-28 36-60	0-8 Gravelly sandy loam 8-25 Loamy sand, sand, gravelly loamy sand 25-30 Sandy loam, gravelly sandy clay loam, gravelly sandy loam 30-60 Very gravelly coarse sand, sand 0-6 Gravelly sandy loam 6-20 Sandy loam, loam, gravelly sandy loam 20-60 Gravelly coarse sand 0-8 Gravelly sandy loam 8-25 Loamy sand, sand, gravelly loamy sand 25-30 Sandy loam, gravelly sandy clay loam, gravelly sandy loam sandy clay loam, gravelly sandy loam sandy clay loam, gravelly sandy loam sand, sand, gravelly sandy loam sand, sand, sand, gravelly sandy loam sand, gravelly sandy loam SP-SM, SW gravelly sandy loam SP-SM, SW SAND	0-8 Gravelly sandy loam SM, SC-SM A-1-b SP-SM, SM A-3, A-2-4,	0-8 Gravelly sandy loam SM, SC-SM A-1-b 0 0 0 0 0 0 0 0 0	0-8 Gravelly sandy loam SM, SC-SM A-1-b 0 0-5 10-5	0-8 Gravelly sandy loam SM, SC-SM A-1-b 0 0-5 70-80 8-25 Loamy sand, sand, gravelly loamy sand	Description	The	10	Pet	

Table 14.—Engineering Properties—Continued

Map unit symbol	Depth	 USDA texture	Classi	fication	Frag	ments	Po	ercenta	ge pass	_	 Liquid	 Plas-
and soil name	_		Unified	 AASHTO	>10 in	3-10 in	 4	 10	I I 40	 200	limit	
	In	1	1		Pct	Pct	<u>'</u>	<u> 10 </u>	l	1	 Pct	1
100007		1	1	!	!	!	!	ļ	!	Į.	!	1
190827: Leelanau	0-8	 Loamy sand 	 SP-SM, SM, SC-SM	 A-2-4, A-1 	 0 	 0-15 	 85-100 	 75-100 	I 35-75 	 10-30 	 15-25 	 NP-7
	8-28	Loamy sand, sand	•	A-3, A-2-4, A-1	0 	0-15	85-100 	75-100 	35-75 	5-30	15-25 	NP-7
	28-36	Sandy loam	SM, SC-SM, SC	•	0	0-20	80-100	75-100	45-70 	 20-40	20-30	NP-10
	36-60	 Loamy sand 	•	A 1 A-2-4, A-1 	0	 0-10 	 80-100 	 75-100 	 35-75 	10-30 	15-25	NP-7
East Lake	0-8	 Loamy sand	SP-SM, SM	 A-2-4, A-1	0	 0-15	 95-100	 85-100	 40-75	 10-30	0-14	NP
i		Loamy sand, sand	SP-SM, SP, SM	A-3, A-2-4,	j 0						0-14	NP
	26-60	 Gravelly coarse sand 	SP, SP-SM,	A-1 A-3, A-2-4, A-1-b	 0 	 0-15 	 40-95 	 30-85 	 20-60 	 0-10 	0-14	 NP
190828: I		1	l I	 	1	! !	 	 	l I	 	1	
Leelanau	0-8	Loamy sand	SP-SM, SM, SC-SM	A-2-4, A-1	0 	0-15 	85-100 	75-100 	35-75 	 10-30	15-25 	NP-7
	8-28	Loamy sand, sand	SW-SM,	A-3, A-2-4, A-1	0	0-15	85-100 	75-100 	35-75 	5-30	15-25	NP-7
	28-36	Sandy loam	SM, SC-SM, SC	•	0	 0-20	80-100 	75-100 	45-70 	20-40	20-30	NP-10
	36-60	Loamy sand 	•	A-2-4, A-1	i 0	0-10 	80-100 	75-100 	35-75 	10-30 	 15-25 	NP-7
East Lake	0-8	 Loamy sand	 SP-SM, SM	 A-2-4, A-1	0	 0-15	 95-100	 85-100	 40-75	 10-30	0-14	NP
	8-26	Loamy sand, sand	SP-SM, SP, SM	A-3, A-2-4, A-1	0	0-15	85-100 	70-100	35-75 	0-30	0-14	NP
	26-60	Gravelly coarse sand	SP, SP-SM,	A-3, A-2-4, A-1-b	i 0	0-15 	40-95 	30-85 	20-60 	0-10	0-14	NP
190829: I		1	1	 	 	! !	! !	I I	l I	 	1	I I
Leelanau	0-8	Loamy sand	SP-SM, SM, SC-SM	A-2-4, A-1 	0 	0-15 	85-100 	75-100 	35-75 	 10-30	15-25 	NP-7
	8-28	Loamy sand, sand	SW-SM,	A-3, A-2-4, A-1	0 	0-15 	85-100 	75–100 	35-75 	5-30 	15-25 	NP-7
	28-36	Sandy loam	SM, SC-SM, SC	•	0 	0-20 	80-100 	75–100 	45-70 	 20-40 	20-30 	NP-10
	36-60	Loamy sand 	•	A-2-4, A-1	0 	0-10 	80-100 	75-100 	35-75 	10-30 	15-25 	NP-7
 East Lake	0-8	 Loamy sand	 SP-SM, SM	 A-2-4, A-1	0	 0-15	 95-100	 85-100	 40-75	 10-30	 0-14	NP
i		Loamy sand, sand	SP-SM, SP, SM		i 0	•	85-100 	•	•	•	0-14 	NP
	26-60	 Gravelly coarse sand 	SP, SP-SM,	A-3, A-2-4, A-1-b 	0 	0-15 	40-95 	30-85 	20-60 	0-10 	0-14 	NP

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	 USDA texture	Classi	fication	Frag 	ments	Po	ercenta sieve	ge pass number-	-	 Liquid	 Plas-
and soil name	ļ		 Unified	AASHTO	>10 in	3-10 in	 4	 10	I I 40	 200		ticity
	l In	<u> </u>		AASHIO	Pct	Pct	<u> </u>	l 10	l 40	1 200 1	 Pct	I
		1	1	I			ĺ	I	I	I		I
190830:	İ	İ	j	İ	ĺ	İ	İ	ĺ	İ	ĺ	İ	ĺ
Leelanau	0-8	Loamy sand	SP-SM, SM,	A-2-4, A-1	0	0-15	85-100	75-100	35-75	10-30	15-25	NP-7
	l	I	SC-SM	1	I	I	1	I	l		I	1
	8-28	Loamy sand, sand	SW-SM,	A-3, A-2-4,	1 0	0-15	85-100	75-100	35-75	5-30	15-25	NP-7
	l	I	/ -	A-1	Ι .	I	1	1	Ι .	1	1	1
	28-36	Sandy loam	SM, SC-SM, SC		1 0	0-20	180-100	75-100	45-70	20-40	20-30	NP-10
	1 26 60	17	l CTT CM	A-1	I I 0	1 0 10	100 100	 75 100	125 75	110 20	115 05	 ND 7
	1 30-00	Loamy sand	SW-SM, SP-SM, SM	A-2-4, A-1	1 0	1 0-10	80-100	1 12-100	135-75	110-30	112-23	INP-/
	! !	1	SF-SM, SM	1	! !		1	! !	 		! !	
East Lake	ı I 0-8	 Loamy sand	SP-SM, SM	A-2-4, A-1	, I 0	0-15	95-100	185-100	140-75	110-30	0-14	l NP
		Loamy sand, sand	SP-SM, SP, SM		i 0	•	185-100	•	•	•	•	NP
	İ	i -	i	A-1	İ	į	i	İ	İ	į	i	į
	26-60	Gravelly coarse sand	SP, SP-SM,	A-3, A-2-4,	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
	l	I	GP, GP-GM	A-1-b	I	1	1	I	l	I	I	I
	l	1	I	1	I	1	1	I	l	I	I	I
190831:		1	!		!	!					1	
Lupton			PT	A-8	I 0	1 0		100	•	190-100	•	NP
	10-60	Muck	PT	A-8	1 0	0	100	100	1 190-100	40-100		NP
Markey	I I 0-20	 Muck	I IPT	A-8	I 0	1 0	1 100	 100	 100	 90-100	 	I NP
rainey	1 20-60	•	•	A-3, A-2, A-1			195-100	•	•	•	' 	l NP
	,	i	1	1	i	i	1		,		i	i
190832:	İ	İ	j	İ	ĺ	İ	İ	ĺ	İ	ĺ	İ	ĺ
Mancelona	0-8	Sandy loam	SM, SC-SM	A-4, A-2-4,	J 0	0-8	90-100	75-95	45-70	20-40	15-25	NP-7
	l	I	1	A-1-b	I	1	1	I	l	I	I	I
	8-25	Loamy sand, sand,	SP-SM, SM	A-3, A-2-4,	1 0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	l	gravelly loamy sand		A-1-b				I				
	25-30	Sandy loam, gravelly	SC-SM, SC	A-6, A-4, A-2	1 0	0-15	85-100	55-95	45-95	20-75	20-35	8-15
	!	sandy clay loam,	!	1	l	!	1	I	l	!	1	!
	I I 30-60	gravelly sandy loam Very gravelly coarse	 SP-SM, SW,	 A-3, A-2,	I I 0	I I 0-15	 40-90	I I 30-85	1 120-60	I I 0-15	I I ∩–14	I INP
	30 00 	sand, sand	GP, GW	A-1-b	1	1 0 13	1 40 30	1 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0 0	120 00 I	1 0 13	1 0 14	111
	i	1	1	1	i	i	i	i	İ	i	i	i
190833:	İ	i	j	i	İ	į	i	İ	İ	į	İ	į
Mancelona	0-8	Sandy loam	SM, SC-SM	A-4, A-2-4,	J 0	0-8	90-100	75-95	45-70	20-40	15-25	NP-7
	l	1	I	A-1-b	I	I	1	I	l	I	I	I
	8-25	Loamy sand, sand,	SP-SM, SM	A-3, A-2-4,	1 0	0-15	80-100	55-95	30-75	5-30	0-14	NP
		gravelly loamy sand		A-1-b	!			l 				!
	25-30	Sandy loam, gravelly	SC-SM, SC	A-6, A-4, A-2	1 0	0-15	85-100	55-95	45-95	120-75	120-35	8-15
	 	sandy clay loam, gravelly sandy loam	I I	1	I I	1	1	I I	I I	1	1	
	 30-60	gravelly sandy loam Very gravelly coarse	 SP-SM, SW,	 A-3, A-2,	I I 0	I I 0-15	 40-90	 30-25	1 120-60	I I ∩-15	I I 0-14	I INP
	, 30 00 I	sand, sand	GP, GW	A-1-b	1	1 0 13	1-20-30	120 02	120 00 I	1 0 13	, o ₁₋₁	NE
	i	1	1	~	i	i	i	i	I	i	i	i

Table 14.-Engineering Properties-Continued

Map unit symbol	Depth	 USDA texture	Classi	fication	Frag	ments	Po	ercenta	ge pass number-	-	 Liquid	 Plas-
and soil name	-	i I	i	I	>10	I 3-10	i i	1	ı	l	limit	
i		İ	Unified	AASHTO	in	in	4	10	40	200	İ	index
	In	I	1	1	Pct	Pct	I	I	ı	I	Pct	I
190834:		 	I I	 		 	 	 	 	 	 	
Mancelona	0-8	Loamy sand	SP-SM, SM	 A-2-4, A-1-b	0	0-8	90-100	75-95	35-80	10-35	0-14	NP
į	8-25	Loamy sand, sand,		A-3, A-2-4,	0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	25 20	gravelly loamy sand Sandy loam, gravelly	•	A-1-b A-6, A-4, A-2	0	1 0 15	105 100	155 05	145 05	120.75	 20-35	 0 1 E
		sandy clay loam, gravelly sandy loam	 	A-0, A-4, A-2 	O	0-13	 	 	 	 	20-35 	 6-13
i	30-60	Very gravelly coarse	SP-SM, SW,	 A-3, A-2,	0	0-15	 40-90	30-85	20-60	0-15	0-14	, NP
ļ		sand, sand	GP, GW	A-1-b		1	1	Į.	!	!	!	ļ.
East Lake	0-8	 Loamy sand	 SP-SM, SM	 A-2-4, A-1	0	 0-15	 95-100	 85-100	 40-75	 10-30	0-14	I NP
1	8-26	Loamy sand, sand	SP-SM, SP, SM		0	0-15	85-100	70-100	35-75	I 0-30	0-14	NP
	26 60	 Constable constable	•	A-1	0	1 0 15	140 05	130 05	120 60		 0-14	l INP
	26-60	Gravelly coarse sand 		A-3, A-2-4, A-1-b	U	 0-12	40-95 	 	20-60 	0-10 	U-14 	NP
190835:		i	i	i i		i	i	i	i	i	i	i
Mancelona		Loamy sand		A-2-4, A-1-b	0		90-100				0-14	NP
!	8-25	Loamy sand, sand,		A-3, A-2-4,	0	0-15	180-100	55-95	30-75	5-30	0-14	NP
	25-30	gravelly loamy sand Sandy loam, gravelly	•	A-1-b A-6, A-4, A-2	0	I I 0-15	 85-100	I 155-95	I I 45-95	1 120-75	1 120-35	 8-15
		sandy clay loam, gravelly sandy loam			·	 	 	 	 		 	0 <u>-</u> 0
 	30-60	Very gravelly coarse sand, sand		A-3, A-2, A-1-b	0	0-15 	40-90 	30-85 	20-60 	0-15 	0-14 	NP
!			1									
East Lake		Loamy sand Loamy sand, sand	SP-SM, SM SP-SM, SP, SM	A-2-4, A-1	0		95-100 85-100	•	•	•	0-14 0-14	NP NP
	8-20	Loany Sand, Sand		A-1 A-1	U	l 0-13	183-100	/0-100 	33-73 	l 0-30	1 0-14	NE
i	26-60	Gravelly coarse sand		A-3, A-2-4, A-1-b	0	0-15 	40-95 	30-85 	20-60 	0-10 	0-14 	NP
190836:		 	1] 		 	 	 	 	 	1	
Mancelona	0-8	Loamy sand	SP-SM, SM	 A-2-4, A-1-b	0	0-8	90-100	75-95	35-80	10-35	0-14	NP
1	8-25	Loamy sand, sand,		A-3, A-2-4,	0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	05 00	gravelly loamy sand	•	A-1-b	0		105 100		145.05	100 75	100.05	
i		Sandy loam, gravelly sandy clay loam,	SC-SM, SC 	A-6, A-4, A-2 	0	0-12	 82-100	55-95	45-95 	20-75	20-35 	8-15
	20 60	gravelly sandy loam			0	1 0 15	140.00	120 05	100 60			
	30-60	Very gravelly coarse sand, sand		A-3, A-2, A-1-b	0	0-12	40-90 	30-85 	20-60 	 0-15	0-14 	NP
 East Lake	0-8	 Loamy sand	 SP-SM, SM	 A-2-4, A-1	0	I I 0-15	 95-100	I 185-100	I I 40-75	I I10-30	 0-14	l INP
		Loamy sand, sand	SP-SM, SP, SM		0	•	185-100	•	•	•	0-14	NP
i		I	1	A-1		1	I	I	I	I	1	I
	26-60	Gravelly coarse sand		A-3, A-2-4, A-1-b	0	0-15 	40-95 	30-85 	20-60 	0-10 	0-14 	NP

Table 14.-Engineering Properties-Continued

Map unit symbol	Depth	USDA texture	Classi	fication	Frag 	ments	P	ercenta sieve	ge pass number-	-	 Liquid	 Plas-
and soil name		I	1	1	>10	3-10	Ī	ı	ı	ī	limit	ticity
		1	Unified	AASHTO	in	in	4	10	40	200	1	index
I	In	I	1	1	Pct	Pct	I	I	I	1	Pct	T
100000		!	!	!	!	!	!	!	1	1	1	!
190837: Mancelona	0-8	 Loamy sand	 SP-SM, SM	 A-2-4, A-1-b	I I 0	I I 0-8	 90-100	 75_05	135-60	110-25	 0-14	l NP
Mancerona		Loamy sand, sand,		A-2-4, A-1-b A-3, A-2-4,	1 0		80-100				•	
i i	0 23	gravelly loamy sand		A-1-b	ı	1 0 13	1	1	1	1 3 30	1 0 14	112
i i		Sandy loam, gravelly sandy clay loam,	•	A-6, A-4, A-2	0 	0-15 	 85-100 	55-95 	45-95 	20-75 	 20-35 	8-15
I		gravelly sandy loam	I	1	Ι .	1	1	1	1	1	1	1
!	30-60	Very gravelly coarse sand, sand		A-3, A-2, A-1-b	0 	0-15 	40-90 	30-85 	20-60 	0-15 	0-14	NP
 East Lake	0-8	 Loamy sand	 SP-SM, SM	 A-2-4, A-1	I I 0	I I 0-15	 95-100	I 185-100	I I40-75	I I10-30	 0-14	I I NP
last lake		Loamy sand, sand	SP-SM, SP, SM	•	1 0	•	185-100	•	•	•	0-14	l NP
į		i -		A-1	I	i	i	i	i	İ	i	i
	26-60	Gravelly coarse sand 		A-3, A-2-4, A-1-b	0 	0-15 	40-95 	30-85 	20-60 	0-10 	0-14 	NP
190838: I		! !	1	 	l I	 	1	 	 	1	1	
Mancelona	0-8	 Loamy sand	SP-SM, SM	 A-2-4, A-1-b	I 0	I 0-8	90-100	1 175-95	1 135-80	110-35	I 0-14	l NP
i		Loamy sand, sand,		A-3, A-2-4,			180-100					NP
I		gravelly loamy sand	1	A-1-b	l	I	1	I	l	I	1	1
 		Sandy loam, gravelly sandy clay loam, gravelly sandy loam	SC-SM, SC 	A-6, A-4, A-2 	0 	0-15 	85-100 	55-95 	45-95 	20-75 	20-35 	8-15
i		Very gravelly coarse sand, sand		A-3, A-2, A-1-b	, 0 	0-15 	40-90 	 30-85 	 20-60 	0-15	0-14	NP
 East Lake	0_0	 Loamy sand	 SP-SM, SM	 A-2-4, A-1	I I 0	 0_15	 95-100	105_100	 40-75	110-20	I I 0_14	l NP
East Lake		Loamy sand Loamy sand, sand	SP-SM, SP, SM		1 0		85-100					•
i	0 _0			A-1	İ	0 -0					i	i
 	26-60	Gravelly coarse sand		A-3, A-2-4, A-1-b	0 I	0-15 	40-95 	30-85 	20-60 	0-10 	0-14 	NP
190839: I		1	!		 -	1	1	1		1	1	1
Mancelona	0-8	 Gravelly sandy loam	 SM, SC-SM	 A-1-b	I I 0	I I 0-5	1 170-80	I 155-75	I 135-55	I 115-35	I 115-25	INP-7
		Loamy sand, sand,	,	A-3, A-2-4,	1 0	•	180-100	•	•	•	•	NP
į		gravelly loamy sand		A-1-b	I	i	i	i	i	İ	i	i
 	25-30	Sandy loam, gravelly sandy clay loam,	SC-SM, SC 	A-6, A-4, A-2 	I 0	0-5 	85-100 	55-95 	45-95 	20-75 	20-35 	8-15
 	30-60	gravelly sandy loam Very gravelly coarse sand, sand		 A-3, A-2, A-1-b	 0 	 0-10 	 40-90 	 30-85 	 20-60 	 0-15 	 0-14 	 NP
 Richter	0-8	 Sandy loam	 SM, SC-SM	 A-4, A-2	I I 0	I I 0	 100	I I 90-100	 55-80	125-50	I I15-25	I I 2-7
		Sandy loam Fine sandy loam 	SC, SM, SC-SM		0 0	0	•		45-90			
 		 Stratified loamy fine sand to sandy loam	SM, SC-SM, SC	•	I 0 	I I 0 I	 100 	 90-100 	 45-80 	 15-45 	 10-25	 NP-10

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Table 14.-Engineering Properties-Continued

Map unit symbol and soil name	 Depth	USDA texture	(1	issi	ficat	ion	Frag	ments	P	ercenta sieve	ge pass: number-	-	 Liquid	 Plas-
and soil name		I	1		ī		>10	3-10	Ī	ı	l	ı	- limit	ticity
1		I	Unified	i	I	AASHTO	in	in	4	10	40	200	1	index
I	In	T	I		<u> </u>		Pct	Pct	I	I	I	l .	Pct	Ī
190840:		 					1	<u> </u>	İ	! 	l 	! 	1	
Nester		Silt loam	ML, CL-ML,	CL	A-6,	A-4	0	•	•	•	•	•	15-35	•
I		Silt loam	ML, CL-ML,				1 0	•	•	•	•	•	15-35	•
ı		Silty clay loam	CL		A-7,			•	•	•	•	•	30-45	•
I	28-60	Silty clay loam	CL		A-7,	A-6	1 0	0-5 	95-100 	95-100 	90-100	80-95 	30-45 	15-25
190841:		1	i		i		i	i	i	i	i	i	i	i
Nester	0-6	Silt loam	ML, CL-ML,	CL	A-6,	A-4	0	0-5	90-100	75-100	65-100	50-90	15-35	2-15
I		Silt loam	ML, CL-ML,	CL	A-6,	A-4	1 0	0-5	90-100	75-100	65-100	50-90	15-35	2-15
I		Silty clay loam	CL		A-7,		•	•	•	•	•	•	30-45	•
	28-60	Silty clay loam	CL		A-7,	A-6	0	0-5	95-100	95-100	90-100	80-95 	30-45	15-25
190842:		i	i		i		i	i	i	i	i	i	i	i
Nester	0-6	Silt loam	ML, CL-ML,	CL	A-6,	A-4	0	0-5	90-100	75-100	65-100	50-90	15-35	2-15
1		Silt loam	ML, CL-ML,	CL	A-6,	A-4	0	0-5	90-100	75-100	65-100	50-90	15-35	2-15
I	8-28	Silty clay loam	CL		A-7,	A-6	1 0	0-5	95-100	95-100	90-100	80-95	30-45	15-25
l '	28-60	Silty clay loam	CL		A-7,	A-6	0	0-5	95-100	95-100	90-100	80-95 	30-45	15-25
190843:		İ	i		i		i	i	İ	' 	! 	i	i	i
Nester	0-6	Silt loam	ML, CL-ML,	CL	A-6,	A-4	1 0	0-5	90-100	75-100	65-100	50-90	15-35	2-15
I	6-8	Silt loam	ML, CL-ML,	CL	A-6,	A-4	1 0	0-5	90-100	75-100	65-100	50-90	15-35	2-15
I		Silty clay loam	CL		A-7,	A-6	1 0	0-5	95-100	95-100	90-100	80-95	30-45	15-25
l '	28-60	Silty clay loam	CL		A-7,	A-6	0	0-5	95-100	95-100	90-100	80-95 	30-45	15-25
190844:		1	i		i			i	İ	! 	i İ	i	i	i
Nester	0-6	Silt loam	ML, CL-ML,	CL	A-6,	A-4	1 0	0-5	90-100	75-100	65-100	50-90	15-35	2-15
I	6-8	Silt loam	ML, CL-ML,	CL	A-6,	A-4	1 0	0-5	90-100	75-100	65-100	50-90	15-35	2-15
I	8-28	Silty clay loam	CL		A-7,	A-6	1 0	0-5	95-100	95-100	90-100	80-95	30-45	15-25
<u> </u>	28-60	Silty clay loam	CL		A-7,	A-6	0	0-5	95-100	95-100	90-100	80-95	30-45	15-25
190847:		i I	i		i		;		 	! 	! 	! 	i	İ
Richter	0-8	Sandy loam	SM, SC-SM		A-4,	A-2	1 0	0	100	90-100	55-80	25-50	15-25	2-7
I	8-27	Fine sandy loam	SC, SM, SC			A-6, , A-2-4	0	0	100	90-100	45-90 	15-45 	10-30	NP-16
	27-60	 Stratified loamy fine	SM, SC-SM,			•	i 0	i 0	1 100	190-100	145-80	15-45	110-25	INP-10
i	1	sand to sandy loam			A-1	•	i	i	1	1	1	1	1	1
Alcona	 0-8	 Sandy loam	 SC-SM, SM,		 A – 4	A-2-4	I I 0	l l 0-8	 95-100	 90-100	 55-95	 25-65	 15-25	 NP-7
11200114	00		CL-ML, MI		1 1,		i	1	1	1	1	1	1	
i		Loamy fine sand, sandy	SP-SM, SM		A-4,	A-2-4	0	0-8	90-100	75-100	60-100	10-55	15-20	NP-4
I		loam, loamy sand	I		I		1	1	1	I	L	L	1	1
		Loamy sand	SP-SM, SM			4, A-1	1 0	•	190-100	•	•	•	•	NP-5
		Sandy loam	SC-SM		A-4,		•	•	•	•	•	•	120-30	•
	24-60 	Stratified loamy sand to sandy loam	SM, SC-SM		A-4,	A-2-4	I 0	0-8 	95-100 	90-100 	40-80 	15-50 	15-30 	NP-7

Table 14.—Engineering Properties—Continued

Map unit symbol	 Depth	USDA texture	Classi	fication	Frag	ments	l P	ercenta sieve	ge pass number-	-	 Liquid	 Plas-
and soil name	i -	i I		1	>10	3-10	i i	Ī	ī	ī	limit	ticity
		1	Unified	AASHTO	in	in	4	10	40	200	I	lindex
	l <u>In</u>	Ī.	1	<u>.</u>	Pct	Pct	Ī	Ī.	Ī.	I.	Pct	<u> </u>
190848:	 	1	1	1	 	1	1	 	 	 	 	l I
Richter	0-8	Sandy loam	SM, SC-SM	A-4, A-2	i 0	i 0	100	90-100	155-80	125-50	15-25	I 2-7
		Fine sandy loam	SC, SM, SC-SM		I 0	i 0	•	90-100 				
	27-60 	Stratified loamy fine sand to sandy loam	SM, SC-SM, SC 	A-4, A-2-4, A-1 	0 	0 	100 	90-100 	45-80 	15-45 	10-25 	NP-10
Alcona	0-8 	Sandy loam	SC-SM, SM, CL-ML, ML	A-4, A-2-4 	0 	0-8 	95-100 	90-100 	55-95 	25-65 	15-25 	NP-7
	8-12 	Loamy fine sand, sandy loam, loamy sand	SP-SM, SM	A-4, A-2-4	0 	0-8 	90-100 	75-100 	60-100 	10-55 	15-20 	NP-4
	12-18	Loamy sand	SP-SM, SM	A-2-4, A-1	0	0-8	190-100	•	•	•	•	•
	•	Sandy loam	•	A-4, A-2	1 0		95-100					
	24-60 	Stratified loamy sand to sandy loam	SM, SC-SM 	A-4, A-2-4 	0 	0-8 	95-100 	90-100 	40-80 	15-50 	15-30 	NP-7
190849:	i		1	i	İ	i	i	i İ	! 	i	İ	İ
Roscommon	0-6 	Sand		A-1, A-3, A-2-4	0 	I 0	95-100 	85-100 	40-75 	5-25 	15-20 	NP-4
	6-60 	Sand 	SP-SM, SP, SM 	A-3, A-2-4, A-1	0 	0 	95-100 	85-100 	40-75 	0-30 	15-20 	NP-4
Markey	0-20	 Muck	PT	A-8	, I 0	i 0	1 100	100	100	 90-100	' 	 NP
	20-60 	Sand	SP-SM, SP, SM	A-3, A-2, A-1 	0 	I 0	95-100 	60-100 	30-75 	0-30 	 	NP
190850:	İ	İ	İ	İ	İ	İ	i	İ	İ	İ	ĺ	ĺ
Sanilac	•	Silt loam	ML, CL-ML, CL		J 0	1 0	100	•	•	•	20-30	•
	6-16 	Fine sandy loam, silt loam, very fine sandy loam	SC, SM, CL, ML 	A-6, A-4 	0 	0 	100 	100 	70-95 	40-90 	20-30 	3-11
	16-24 	Silt loam, fine sandy loam, very fine sandy loam	SC, SC-SM, CL, CL-ML	A-4 	0 	0 	95-100 	90-100 	85-100 	40-90 	20-30 	5-10 5-10
	24-60 	Stratified very fine sand to silt loam	SC, SM, CL,	A-6, A-4 	0 	0	100	100 100	70-95 	 40-90 	 20-40 	3-18
190851:	! 	1	<u> </u>	1	! !	<u> </u>		! 	! 	! !	! !	!
Tonkey	0-8	 Sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	i o	100	100	60-70	30-40	15-28	NP-9
-	8-20	Fine sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	0	100	100	50-75	15-40	15-25	NP-9
	20-60 	Stratified sand to sandy loam		A-3, A-4, A-1, A-2-4	0 	0-2 	95-100 	85-100 	40-80 	5-65 	15-30 	NP-11
Munuscong	0-10	Sandy loam	SM, SC-SM, SC	 A-4, A-2	I I 0	0	1 100	 90-100	 60-85	 30-50	' 15-25	' 2-8
-		Sandy loam, fine sandy loam	SM, SC-SM, SC		0 	i 0	•	90-100 	•	•	•	•
	24-60 	Silty clay, clay	ML 	A-7	I 0	i 0	100 	100 	90-100 	75-95 	40-80 	20-40

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Classi	fication	Frag 	ments	P		ge pass: number-	-	 Liquid	 Plas-
and soil name	. <u>-</u>	Ī	i	1	>10	I 3-10	Ī	1			-	ticity
	İ	i	Unified	AASHTO	in	in	4	1 10	40	200		index
	I In	!	<u> </u>	1	Pct	Pct	Ī	I .	I .	l	Pct	Ī
190851:	 	1				!	 	 	 	 		1
Iosco	ı I 0-8	 Loamy sand	SP-SM, SM	 A-2-4, A-1-b	0	1 0-8	190-100	1 175-100	I 135-85	1 110-35	1 0-14	I NP
10500		Loamy sand, sand, loamy		A-3, A-2-4,	0		190-100	•	•	•	•	
	,	fine sand	SC-SM	A-1-b	,	1	1	1	1	1	1	1
	27-34	•	SC, SC-SM,	A-6, A-7,	0	0-8	90-100	85-100	65-95	30-90	25-45	5-25
	l	sandy clay loam		A-2, A-4		İ	Ì	İ	İ	İ	İ	Ì
	34-60 	Silty clay loam, clay loam, loam	CL-ML, CL	A-7, A-6, A-4	0	0-8 	90-100 	85-100 	70-95 	50-90 	25-45 	5-25
190852:	l I	;	1	! !			 	! !	 	 	1	1
Tonkey	I 0-8	Sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	i o	I 100	100	60-70	30-40	115-28	 NP-9
		Fine sandy loam	SM, SC-SM, SC		0	i 0	•	•	150-75	•	•	•
		Stratified sand to		A-3, A-4,	0	0-2	95-100	85-100	40-80	5-65	15-30	NP-11
	 	sandy loam	ML, SC-SM	A-1, A-2-4		İ	 	l I	l I	l I	İ	İ
Munuscong	0-10	Sandy loam	SM, SC-SM, SC	A-4, A-2	0	i 0	100	90-100	60-85	30-50	15-25	2-8
_		Sandy loam, fine sandy	SM, SC-SM, SC		0	i 0	100 	90-100 	 60-85 	30-50 	15-30 	2-10
	24-60 	Silty clay, clay	ML	A-7	0	0 	100	100 	90-100 	75-95 	40-80	20-40
Iosco	I 0-8	Loamy sand	SP-SM, SM	 A-2-4, A-1-b	0	1 0-8	90-100	75-100	135-85	10-35	I 0-14	I NP
	8-27	Loamy sand, sand, loamy	SP-SM, SM,	A-3, A-2-4,	0	0-8	90-100	75-100	35-85	5-35	15-25	NP-7
	l	fine sand	SC-SM	A-1-b		İ	Ì	İ	İ	l	İ	İ
	27-34 	Silty clay loam, loam, sandy clay loam	SC, SC-SM, CL, CL-ML	A-6, A-7, A-2, A-4) 0 	l 0−8 l	90-100 	85-100 	65−95 	30-90 	25-45 	5-25
	34-60 	Silty clay loam, clay loam, loam	CL-ML, CL	A-7, A-6, A-4	0	0-8 	90-100 	85-100 	70-95 	50-90 	25-45 	5-25
190854:	 	;	1	! !			 	 	 	 	1	1
Wallace	, 0-8 	Sand		A-3, A-2-4, A-1-b	0	0	 95-100 	95-100 	45-70 	0-10 	i	 NP
	8-24 I	Sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0	95-100 	 90-100	45-95 	5-30	j	NP
	24-60 	Sand	SP-SM, SP, SM		0	i 0	95-100	90-100 	45-95 	0-30	i	NP
Kalkaska	I 0-7 	 Sand 	SM	 A-3, A-2-4,	0	 0-5	 95-100	 85-100 	 45-70 	 5-15 	0-14	NP
	7-15	Sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-5	95-100	 85-100	 45-75 	 5-30	0-14	NP
	 15-32 	Sand	•	A-3, A-2-4, A-1-b	0	0-5	 95-100	85-100 	45-70 	 5-15 	0-14	NP
	 32-60 	Sand	SP-SM, SP, SM		0	 0-5 	 95-100 	 85-100 	 45-70 	 0-15 	0-14	NP

Table 14.-Engineering Properties-Continued

Map unit symbol	Depth	 USDA texture	Class	sifica	tion	 	Frag	ments	P	ercenta sieve	ge pass number-	_	 Liquid	 Plas
and soil name		I	1	ī		ī	>10	3-10	ī	ī	ī	ī	- limit	ticit
I		I	Unified	- 1	AASHT)	in	in	4	10	40	200	1	index
	In	<u> </u>	1	T		ī	Pct	Pct	ī	ī	ī	ı	Pct	ī
1		I	1	1		- 1			1	I	I	I		I
193237:		i İ	i	i		i		i	i	i	į.	İ	i	i
Thompsonville	0-5	Fine sand	SP-SM, SP	A-3	, A-2	- 1	0	1 0	80-100	80-100	40-95	0-35	0-14	NP
I	5-15	Fine sand, sand	SP, SP-SM	A-3	, A-2	- 1	0	0	80-100	80-100	40-95	0-35	0-14	NP
I	15-29	Sand, fine sand	SP-SM, SP	A-3	, A-2	- 1	0	0	80-100	80-100	40-95	0-35	0-14	NP
I	29-37	Sand, fine sand	SP-SM, SP	A-3	, A-2	- 1	0	0	80-100	80-100	40-95	0-35	0-14	NP
I	37-55	Sand, fine sand	SP-SM, SP	A-3	, A-2	- 1	0	0	80-100	80-100	40-95	0-35	0-14	NP
I	55-72	Silty clay loam	CL	A-7	, A-6	- 1	0	0	90-100	90-100	180-100	65-95	20-50	20-35
I	72-80	Stratified very fine	CL, CL-ML	A-7	, A-6,	A-4	0	1 0	90-100	90-100	180-100	65-95	10-50	3-35
I		sandy loam to silty	1	- 1		- 1		1	1	1	1	l	1	1
I		clay loam	1	- 1		- 1		1	1	1	1	l	1	1
I		I	1	- 1		- 1		1	1	1	1	l	1	1
Milnichol	0-2	Fine sand	SP-SM, SP	A-3	, A-2	- 1	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
I	2-12	Fine sand, sand	SP-SM, SP	A-3	, A-2	I	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
I		Sand, fine sand	SP-SM, SP	A-3	, A-2	I	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
I		Sand, fine sand	SP-SM, SP	A-3	, A-2	I	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
I		Sand, fine sand	SP-SM, SP		, A-2	I	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
		Sand, fine sand	SP-SM, SP	•	, A-2	١	0	0-5	•	•	45-80	•	•	NP
I		Stratified loamy fine	SC, SC-SM	A-4		١	0	0-5	90-100	90-100	65-90	40-50	0-25	NP-10
I		sand to fine sandy loam		ı		I		1	1	1	1	l	1	I
I		Clay loam, silty clay	CL	A-4	, A-7,	A-6	0	0-5	90-100	90-100	85-100	65-95	30-50	5-30
I		loam	1	ı		١		1	1	1	1	l	1	I
I		Silt loam, clay loam,	CL	A-7	, A-6,	A-4	0	0-5	90-100	90-100	75-100	75-95	30-50	5-30
		silty clay loam	!					!	1	!	!	!	!	!
!		<u> </u>	!					!	1	!	!	!	!	!
193255:		<u> </u>	1	!				!				!	1	!
Spinks		Sand	SP-SM, SP	A-3		. !	0	1 0	•	•	40-85	•	0-14	NP
		Sand, fine sand	SP-SM, SP		, A-2	. !	0	1 0	•		140-85	•	0-14	NP
		Sand, fine sand	SP-SM, SP		, A-2	!	0	1 0			140-85		0-14	NP
		Loamy fine sand, loamy	SP-SM, SM, S	3P A-3	, A-2	!	0	1 0	185-100	185-100	140-85	0-55	0-14	NP
		sand, fine sand, sand			- 0	!	•	1	105 400	105 100	1 40 05		1	!
ļ		Loamy fine sand, loamy	SP-SM, SM, S	5P A-3	, A-2	!	0	1 0	182-T00	182-100	140-85	0-55	0-14	NP
		sand, fine sand, sand	l an are an	1 1 1		١ .	•	1	175 100	175 100	125 05	I 0 25	1 0 14	
ļ	72-80	Sand, fine sand	SP-SM, SP	I W-T	, A-3,	A-2	0	1 0	175-100	175-100	35-85	0-35	0-14	NP
ColomaI	0 3	 Ca d	I OD OM OM	13.2	3 0	!	0	1 0	105 100	105 100	140.00	I I E 20	1 0 14	170
Coloma		Sand	SP-SM, SM		, A-2	!	0	I 0			140-90		0-14	NP NP
I		Loamy sand, sand	SP-SM, SM		, A-2	- !	0	1 0	•		140-90	•	0-14	I NP
I		Loamy sand, loamy fine	SP-SM, SM	IM-3	, A-2	!	U		102-100	102-100	40-90	1 2-30	0-14	INP
I		sand, fine sand, sand Loamy sand, loamy fine	I CD CM CM	17 2	7. 2	!	0	1 0	105 100	105 100	1 40-90	I I 5-30	 0-14	I I NP
I			SP-SM, SM	IM-3	, A-2	!	U		102-100	102-100	140-90	1 2-30	1 0-14	INP
l I		sand, fine sand, sand Loamy sand, loamy fine	 SP-SM, SM	12-3	, A-2		0	1 0	185_100	185-100	I 40-90	I I 5-30	I I 0-14	I INP
I I		sand, fine sand, sand	SF = SM, SM	I M-3	, A-Z	!	U	1 0	102-100	102-100	1 40 - 30	1 2-30	1 0-14	INP
I I		sand, fine sand, sand Loamy sand, loamy fine	 SP-SM, SM	y = 3	, A-2	!	0	1 0	185-100	185-100	I I40-90	I I 5-30	I I 0-14	I NP
I I	25-40	sand, fine sand, sand	ior-om, om	I M-3	, A-2	!	U	1 0	192-100	102-100	1-20-30	ı 5-30	1 0-14	I NE
		, sand, iine sand, sand	I	ı		ı		1	1	I	I	ı	I	!
1	40.00	IT comes cond cond cond-	LCD_CM CM	12 3	7 7		^		105.100	105_100	140-00	I E 20	1 0.14	
ļ		Loamy sand, sand, sandy loam	SP-SM, SM	A-3	, A-2		0	0	85-100	85-100	40-90	5-30	0-14	NP

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Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	 USDA texture	 	Cla	ssi	ficat	ion	Frag	ments	P		ge pass number-	-	 Liquid	 Plas-
and soil name	I	I	1			ī		>10	3-10	ī	T	Τ	ı	limit	ticity
	l	1	Uni	fied		l	AASHTO	in	in	4	10	40	200	1	index
	In	1	ī			ı		Pct	Pct	ī	T	T	ı	Pct	ī
	ı —	I	1			l		1	1	1	I	I	I	1	1
193256:	l	I	1			I		1	1	1	1	1	I	1	1
Spinks	J 0-5	Sand	SP-SM,	SP		A-3		0	1 0	85-100	85-100	40-85	0-15	0-14	NP
		Sand, fine sand	SP-SM,	SP		A-3,		1 0	1 0	85-100			0-35	0-14	NP
		Sand, fine sand	SP-SM,			A-3,		•	1 0	85-100	•	•		0-14	NP
	17-62	Loamy fine sand, loamy	SP-SM,	SM,	SP	A-3,	A-2	1 0	0	85-100	85-100	40-85	0-55	0-14	NP
	l	sand, fine sand, sand	1			I		1	1	1		1	I	1	1
	62-72	Loamy fine sand, loamy	SP-SM,	SM,	SP	A-3,	A-2	1 0	1 0	85-100	85-100	40-85	0-55	0-14	NP
	l	sand, fine sand, sand	1			I		1	1	1	1	1	I	1	I
	72-80	Sand, fine sand	SP-SM,	SP		A-1,	A-3, A-2	0	1 0	75-100	75-100	35-85	0-35	0-14	NP
						l 	- •		!				l		
Coloma	•	Sand	SP-SM,			A-3,		1 0	1 0	85-100	•	•	5-30	0-14	NP
		Loamy sand, sand	SP-SM,			A-3,		0	1 0	85-100	•	•		0-14	NP
	4-8	Loamy sand, loamy fine	SP-SM,	SM		A-3,	A-2	1 0	1 0	182-100	182-100	140-90	5-30	0-14	NP
	. 0 15	sand, fine sand, sand	100.01	~~		1		1	1	105 100	105 100	1 40 00	I - 20	1 0 14	
	8-T2	Loamy sand, loamy fine	SP-SM,	SM		A-3,	A-2	1 0	. 0	85-100	182-100	140-90	5-30	0-14	NP
	1 15 05	sand, fine sand, sand	I OD OM	014		12 2	3 0	1 0	1	105 100	105 100	140.00	I	1 0 14	
	15-25	Loamy sand, loamy fine	SP-SM,	SM		A-3,	A-2	1 0	1 0	182-100	182-100	40-90	1 2-30	0-14	NP
	1 25 40	sand, fine sand, sand	I CD CM	CM		1 7 2	3 2	1 0	1 0	 85-100	105 100	140 00	I I 5-30	I I 0-14	I I NP
	25-40	Loamy sand, loamy fine sand, fine sand, sand	SP-SM,	SM		A-3,	A-2	0	1 0	102-100	102-100	140-90	1 2-30	1 0-14	INP
	I 40-80	Loamy sand, sand, sandy	I CD_CM	СМ		ı A−3,	A-2	1 0	1 0	 85-100	185-100	140-90	I 5-30	0-14	I NP
	1 0 00	loam	I SE SM,	SM		A J,	A Z	1	1	100 100	100 100	1 20 30	1 2 20	1 0 14	I NE
	! 	I Todaii	i			<u> </u>		i	i	i	i	<u> </u>	! !	i	i
193257:	' I	i	i			i		i	i	i	i	i	i	i	i
Spinks	I 0-5	Sand	SP-SM,	SP		A-3		i 0	i 0	85-100	85-100	40-85	0-15	0-14	NP
_		Sand, fine sand	SP-SM,			A-3,	A-2	i 0	i 0	85-100			0-35	0-14	NP
		Sand, fine sand	SP-SM,			A-3,		0	0	85-100			0-35	0-14	NP
	17-62	Loamy fine sand, loamy	SP-SM,	SM,	SP	A-3,	A-2	0	0	85-100	85-100	140-85	0-55	0-14	NP
	l	sand, fine sand, sand	i			İ		İ	İ	İ	ĺ	İ	İ	İ	Ì
	62-72	Loamy fine sand, loamy	SP-SM,	SM,	SP	A-3,	A-2	1 0	1 0	85-100	85-100	40-85	0-55	0-14	NP
	I	sand, fine sand, sand	1			l i		1	1	1	I	1	I	1	I
	72-80	Sand, fine sand	SP-SM,	SP		A-1,	A-3, A-2	0	0	75-100	75-100	35-85	0-35	0-14	NP
	l	I	1			l		1	1	1	1	1	I	1	1
Coloma	0-3	Sand	SP-SM,	SM		A-3,	A-2	1 0	0	85-100	85-100	40-90	5-30	0-14	NP
	3-4	Loamy sand, sand	SP-SM,	SM		A-3,	A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	4-8	Loamy sand, loamy fine	SP-SM,	SM		A-3,	A-2	0	1 0	85-100	85-100	40-90	5-30	0-14	NP
	l	sand, fine sand, sand	1			I		1	1	1	1	1	I	1	1
	8-15	Loamy sand, loamy fine	SP-SM,	SM		A-3,	A-2	1 0	0	85-100	85-100	40-90	5-30	0-14	NP
	l	sand, fine sand, sand	1			I		1	1	1		1	I	1	1
	15-25	Loamy sand, loamy fine	SP-SM,	SM		A-3,	A-2	0	1 0	85-100	85-100	140-90	5-30	0-14	NP
		sand, fine sand, sand	1				_	1	1	1	I	1	!	1	1
	25-40	Loamy sand, loamy fine	SP-SM,	SM		A-3,	A-2	0	1 0	85-100	85-100	140-90	5-30	0-14	NP
		sand, fine sand, sand	1	_			- •						 	1	1
	40-80	Loamy sand, sand, sandy	SP-SM,	SM		A-3,	A-2	1 0	1 0	85-100	185-100	140-90	5-30	0-14	NP
	!	loam	!			l .		!	1	!	ļ	!	Į.	1	1
	I	I	I			I		I	1	I	I	I	I	I	I

mahla '	14Engine	D	C-	
Table .	14.—Engine	ering Prot	erties-co	ntinuea

Map unit symbol	 Denth	USDA texture	1	Clas	ssif	icat	ion	Frag	ments	l P	ercenta sieve	-	_	 Liquid	 Dlac
and soil name	Depth) OSDA CEXCUIE	·!					1 > 1 0	1 2 10	-	sieve i	IUIIDEI-			
and soll name	!		l mai	fied	- !		AASHTO	>10 in	3-10 in	I I 4	 10	l l 40	1 200	limit	
	<u>!</u>	!	1 0111	ттеа			AASHIU	 		<u> </u>	1 10	40	. 200	!	lindex
	l <u>In</u>	!	!		!			Pct	Pct	!	!		1	Pct	
193258:	 	1	1		- !			 	!	1	 	 	1	1	
Spinks	ı I 0-5	 Sand	SP-SM,	g D	-	A-3		I 0	1 0	85-100	185-100	 10_85	1 0-15	1 0-14	NP
SPINS		Sand, fine sand	SP-SM,				A-2	1 0	1 0	185-100					l NP
	•	Sand, fine sand	SP-SM,			,	A-2	1 0	1 0	185-100	•		•	•	l NP
	•	Loamy fine sand, loamy	SP-SM,			,		1 0	1 0	185-100	•		•	0-14	l NP
	1 17-02	sand, fine sand, sand	ISE-SM,	SM,	SFI	д-э,	A-2		1 0	182-100	182-100	140-05	1 0-33	1 0-14	I NE
	I I 60 70	Loamy fine sand, loamy	I CD CM	CM	CD.	7 2	7 2	I I 0	1 0	105 100	105 100	 40 0E	1 0 55	I 0-14	I NP
	62-72		SP-SM,	SM,	SPI	Α-Э,	A-2	. 0	1 0	85-100	182-100	40-85	1 0-55	0-14	I NP
	I 70 00	sand, fine sand, sand	I an are	25	!	- 1		I .	1	175 100	175 100	1	1 0 05	1 0 14	
	1 /2-80	Sand, fine sand	SP-SM,	SP	- !	А-Ι,	A-3, A-2	0	1 0	75-100	1 /2-100	35-85	0-35	0-14	NP
Coloma	ı I 0-3	 Sand	SP-SM,	SM	-	A-3	A-2	I I 0	1 0	185-100	I 185-100	I I 4 0 – 9 0	I 5-30	I 0-14	I NP
00101110	•	Loamy sand, sand	SP-SM,				A-2	1 0	1 0	185-100	•			0-14	l NP
		Loamy sand, loamy fine	SP-SM,				A-2	1 0	1 0	185-100			•	0-14	•
	1 - 0	sand, fine sand, sand	I DE DET,	511	-	n J,	n Z		1	103 100	1	1 40 30	1 3 30	1 0 11	1 111
	ι Ι Ω_15	Loamy sand, loamy fine	SP-SM,	CM	-	y = 3	A-2	I 0	i 0	185-100	 85-100	140-90	1 5-30	0-14	l NP
	1 0 13	sand, fine sand, sand	I SE SM,	SM	-	д Э,	A Z		1	103 100	100 100	1 - 20	1 2 20	1 0 14	I ME
	 15_25	Loamy sand, loamy fine	 SP-SM,	CM	-	7-2	A-2	I I 0	1 0	185-100	105_100	1 40 - 00	1 5-30	I 0-14	I NP
	1 15-25		ISP-SM,	SM	- !	м-э,	A-2		1 0	102-100	102-100	40-90	1 2-30	1 0-14	I NP
	I I 05 40	sand, fine sand, sand Loamy sand, loamy fine	I CD CM	034	- !	3 2	3 0		1 ^	105 100	105 100	1 40 00	1 5 20	1 0 14	1770
	25-40		SP-SM,	SM	- !	Α-Э,	A-2	0	1 0	85-100	182-100	40-90	1 2-30	0-14	NP
	I . 40 00	sand, fine sand, sand	I an are	63.4	!			I .	1	105 100	105 100	1 40 00	I - 20	1 0 14	
	1 40-80	Loamy sand, sand, sandy	ISP-SM,	SM	!	Α-З,	A-2	I 0	1 0	85-100	182-100	40-90	1 5-30	0-14	NP
	 -	loam	1		!			 -	!	!	1		1	!	!
193260:	 	1	1		-			 	!	1	! !	 	1	1	1
Copemish	l 0-2	Sand	SP-SM,	SD	-	Z -3	A-2	I 0	i 0	1 100	1 100	50-90	0-15	1 0-14	NP
Сорештан	•	Sand	SP-SM,				A-2	1 0	1 0	1 100	•		0-15	•	l NP
	•	Sand	SP-SM,				A-2	1 0	1 0				•	0-14	
	1 11-28	•	SP-SM,				A-2	1 0	1 0		•		•	0-14	•
	1 28-36	·	SP-SM,				A-2	1 0	1 0	1 100	•		0-15	•	I NP
	26-36 36-80	•	. ,			,		1 0	1 0	1 100		50-90 50-90	•	•	I NP
	1 30-00	Isand	SP-SM,	SP	-	м-э,	A-2	1 0	1 0	1 100	1 100	1 20 - 90	1 0-13	0-14	I NP
193262:	! 		i		i			! 	i	i .	i		i	<u> </u>	<u> </u>
Kaleva	I 0-3	Sand	SP-SM,	SP	i	A-3		i 0	i 0	85-100	185-100	40-90	I 0-15	I 0-14	I NP
		Sand	SP-SM,			A-3		1 0	1 0	185-100	•			•	l NP
	•	Sand	SP-SM,			A-3		1 0	1 0	185-100				0-14	•
	11-16	•	SP-SM,			A-3		1 0	1 0				•	0-14	•
	16-21	•	SP-SM,			A-3		1 0	1 0	185-100	•		•	0-14	•
	21-70	·	SP-SM,			A-3		1 0	1 0	185-100			•	0-14	
	1 70-80	•	SP-SM,			A-3		1 0	1 0	185-100			•	0-14	•
	. 70 00	, bana	ior om,	SE	!					100 100	100 100	-0 30	. 0 13	. 0 14	I ME

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Class	ification	Frag	ments	P		ge pass: number-	-	 Liquid	 Plas-
and soil name	i	i	_ i		>10	I 3-10	i 		l	l .		ticity
	i	i	Unified	AASHTO	in	in	4	10	40	200		index
	In	1		<u> </u>	Pct	Pct			1	I	Pct	Ι
	<u> </u>	i	i	i	i —	i —	i	İ	i	İ	i —	İ
193263:	i İ	i	i	i	i	i	i	i	i	i	i	i
Kaleva	0-3	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	140-90	0-15	0-14	NP
	3-9	Sand	SP-SM, SP	A-3	1 0	0	85-100	85-100	40-90	0-15	0-14	NP
	9-11	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-90	0-15	0-14	NP
	11-16	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-90	0-15	0-14	NP
	16-21	Sand	SP-SM, SP	A-3	1 0	1 0	85-100	85-100	40-90	0-15	0-14	NP
	21-70	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-90	0-15	0-14	NP
	70-80	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-90	0-15	0-14	NP
	I	1	I	I	I	1	1	1		1	1	1
193265:	I	1	1	I	1	1	1	1	1	1	1	1
Grattan	•	Sand	SP-SM, SP	A-3	1 0	•	90-100	•	•	0-15	•	NP
	•	Sand	SP-SM, SP	A-3	1 0	•	90-100	•	•	•	0-14	NP
	13-18	•	SP-SM, SP	A-3	1 0						0-14	
	18-25	•	SP-SM, SP	A-3	1 0						0-14	
	25-53	•	SP-SM, SP	A-3	1 0	1 0	90-100				0-14	NP
	53-80	Sand	SP-SM, SP	A-3	1 0	1 0	90-100	90-100	45-90	0-15	0-14	NP
	!	!	!			!	1			1	!	1
193266:		!										
Grattan		Sand	SP-SM, SP	A-3	0		90-100			0-15	0-14	NP
		Sand	SP-SM, SP	A-3	0		90-100	•	•	•	•	NP
	13-18	•	SP-SM, SP	A-3	0		90-100	•	•	•	•	•
	18-25	•	SP-SM, SP	A-3			•	•	•	•	0-14	•
	25-53	•	SP-SM, SP	A-3	1 0	1 0	90-100					NP
	53-80	Sand	SP-SM, SP	A-3	1 0	1 0	90-100	90-100	145-90	0-15	0-14	NP
102067	!	!	!	!	!	!	1	!	!	!	!	!
193267:	1 0 4	10-4	 	13.2	1 0	1 0	100 100	100 100	145 00	1 0 15	1 0 14	
Grattan	•	Sand	SP-SM, SP	A-3	1 0		90-100	•	•	0-15	0-14	NP
	4-13	Sand	SP-SM, SP	A-3 A-3	1 0		90-100	•	•	•	0-14	NP NP
	13-18 18-25	•	SP-SM, SP	IA-3	1 0	•	•	•	•	•	0-14	•
	25-53	•	SP-SM, SP	A-3	1 0	1 0					0-14 0-14	NP
	23-33	•	SP-SM, SP SP-SM, SP	A-3	1 0		90-100 90-100				0-14	•
	1 22-00	I	SF-SM, SF	I W-2	1 0	1 0	190-100	190-100	143-30	1 0-13	1 0-14	I NE
193269:	1	1			;		1	<u> </u>		<u> </u>		
Grattan	I 0-4	 Sand	 SP-SM, SP	 A-3	1 0	1 0	190-100	190-100	145-90	 0-15	0-14	NP
Gractan	•	Sand	SP-SM, SP	A-3	1 0	•	190-100	•	•	•	0-14	I NP
	1 13-18	•	SP-SM, SP	A-3	, ,					•	0-14	•
	18-25	•	SP-SM, SP	A-3	1 0	1 0					0-14	
	25-53		SP-SM, SP	A-3	1 0	1 0					0-14	•
	53-80		SP-SM, SP	A-3	1 0	1 0	190-100				0-14	•
	, 55 50 I	I		1	i	i	1	1	1	5	· · · - ·	·

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Class	ification	Frag	ments	l P	ercenta	ge pass	_	 Liquid	 Plas-
and soil name	Ī	İ	1		>10	I 3-10	i i		1		limit	ticity
	İ	i	Unified	AASHTO	in	in	4	10	40	200	i	index
	In	T	1	1	Pct	Pct	ı	ı	ı	ı	Pct	ı
102070	!	!	1	!	1	!	!	1	!	!	!	1
193270:	I I 0 1	10	I OD OM OD	13 2 3 2	1 0	1 0	100 100	100 100	145 00	1 0 15	1 0 14	170
Covert	•	Sand	SP-SM, SP	A-3, A-2	1 0	1 0	90-100	•	•	0-15	0-14	NP
	•	Sand Sand	SP-SM, SP	A-3, A-2	•	1 0	90-100			0-15	0-14	NP
	0-16 18-25	•	SP, SP-SM SP, SP-SM	A-3, A-2 A-3, A-2	•	1 0	90-100 90-100			0-15	0-14	NP NP
	25-29	•				1 0	190-100	•	•	•	•	I NP
	29-38		SP, SP-SM SP-SM, SP	A-3, A-2 A-3, A-2	•	1 0	190-100				0-14	I NP
	29-36 38-47	•	SP-SM, SP SP, SP-SM	A-3, A-2	•	1 0	190-100			•	0-14	I NP
	1 47-80	•	SP, SP-SM	A-3, A-2	1 0	•	190-100	•	•	•	0-14 0-14	I NP
	4/-60 		SF	A-3, A-2 	1	1	190-100	90-100	 4 5-90	I 0-13	U-14	NE
193271:	i	i	i	i	i	i	i	i	i	i	i	i
Pipestone	J 0-2	Sand	SP-SM, SP	A-3, A-2	1 0	0	85-100	85-100	50-90	0-35	0-14	NP
	2-9	Sand, fine sand	SP-SM, SP	A-3, A-2	1 0	0	85-100	85-100	50-90	0-35	0-14	NP
	9-12	Sand, fine sand	SP-SM, SP	A-3	1 0	0	85-100	85-100	50-90	0-35	0-14	NP
	12-24	Sand, fine sand	SP-SM, SP	A-3	•	0	85-100	85-100	50-90	0-35	0-14	NP
	24-32	Sand, fine sand	SP-SM, SP	A-3	1 0	0	85-100	85-100	50-90	0-35	0-14	NP
	32-80	Sand, fine sand	SP-SM, SP	A-3	1 0	1 0	85-100	85-100	50-90	0-35	0-14	NP
193272:	 	1	I I			!	1		 		 	
Dair	I 0-4	Muck	 PT	 A-8	i 0	i 0	1 100	1 100	1 100	90-100	 	l NP
Dair	•	Mucky loam, loam, mucky	•	A-2	1 0	1 0	1 100			130-75		•
	, <u> </u>	sandy loam	I		i	i	1 100	1	00 30 	130 73	13 20 	
	7-11	Sand	SP, SP-SM	A-2, A-3	1 0	0	90-100	90-100	45-90	0-15	0-14	NP
	11-21	Sand	SP, SP-SM	A-2, A-3	1 0	1 0	90-100	90-100	45-90	0-15	0-14	NP
	21-50	Sand	SP, SP-SM	A-2, A-3	1 0	1 0	90-100	90-100	45-90	0-15	0-14	NP
	50-80	Sand	SP, SP-SM	A-2, A-3	1 0	1 0	90-100	90-100	45-90	0-15	0-14	NP
193277:		1	1	1	1	!			1		1	1
Benona	ı I 0-2	 Sand	 SP-SM, SP	 A-3, A-2	1 0	1 0	 85-100	I 185-100	I I 4 0 – 9 0	I 0-30	I I 0-14	I INP
	•	Sand	SP-SM, SP	A-3, A-2	•	i 0	185-100	•	•	•	0-14	l NP
	•	Sand	SP, SP-SM	A-3, A-2	•	i 0	85-100	•	•	•	0-14	NP
	•	Sand	SP, SP-SM	A-3, A-2		i 0	185-100			•	0-14	I NP
	17-28	·	SP-SM, SP	A-3, A-2	i o	i 0	185-100	•	•	•	0-14	I NP
	28-46	•	SP-SM, SP	A-3, A-2	•	i 0	85-100	•	•	•	0-14	I NP
		Loamy sand, sand	SP-SM, SM	A-3, A-2	j 0	į o	85-100			j 5-30	0-14	NP
100000	!	!	!	!	1	!	!	!	!	!	!	!
193278: Benona	I I 0-2	 Sand	 SP-SM, SP	 A-3, A-2	I I 0	I I 0	 85-100	 85_100	140-90	I I 0-30	 0-14	 NP
Bellolla	•	Sand	SP-SM, SP	A-3, A-2	•	•	185-100			•	0-14	l NP
	I 6-9	Sand	SP-SM, SP SP, SP-SM	A-3, A-2		1 0	185-100	•	•	•	•	I NP
	•	Sand	SP, SP-SM	A-3, A-2	•	1 0	85-100	•	•	I 0-15	0-14 0-14	I NP
	17-28	• • • •	SP-SM, SP	A-3, A-2	•	1 0	85-100			•	•	NP
	17-26 28-46		SP-SM, SP	A-3, A-2	1 0	1 0	85-100				0-14	I NP
	•	Loamy sand, sand	SP-SM, SM	A-3, A-2	1 0	1 0	185-100			•	0-14	I NP
	, 10 00	,_camy bana, bana	, 51 511, 511	, J, A E	: "	: "		, 55 100		. 5 50		

Table 14.—Engineering Properties—Continued

	l		Classi	fication	Frag	ments	l Po		ge pass	-		
Map unit symbol	Depth	USDA texture	<u> </u>		1 10		!	sieve	number-	-	Liquid	
and soil name	l i	1	 Unified	AASHTO	>10 in	3-10 in	I I 4	I I 10	I I 40	I I 200		ticity index
	<u> </u>	<u> </u>	Unified	AASHTO	<u> </u>		<u> </u>	1 10	1 40	200	<u>. </u>	Index
	In In	1	1	!	Pct	Pct	!			!	Pct	!
102070		1	!	!	!	!	!	!	!	!	!	!
193279:		l Const	100 014 00	1 2 2 2 0	1	1	105 100	105 100	1 40 00	1 0 20	1 0 14	
Benona	0-2	Sand	SP-SM, SP	A-3, A-2	I 0 I 0	1 0	185-100	•	•	•	0-14	NP
		Sand	SP-SM, SP	A-3, A-2	1 0		185-100	•	•	•	0-14	NP
		Sand	SP, SP-SM	A-3, A-2			185-100	•	•	•	•	•
		Sand	SP, SP-SM	A-3, A-2	1 0		185-100	•	•	•	0-14	NP
	17-28	•	SP-SM, SP	A-3, A-2	1 0	•	85-100	•	•	•		•
	28-46		SP-SM, SP	A-3, A-2		,	185-100	•	•	•		•
	46-80 	Loamy sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	182-100	140-90	1 5-30	U-14 	NP
193284:	 	i	İ	i	! 	i	i	i I	i	l I	! 	i I
Udorthents	0-80	Sandy loam	SC-SM	A-4, A-2	0	0	85-95	85-95	50-70	25-40	10-25	NP-10
	l	I -	1	1	I	I	1	I	I	1	I	I
Udipsamments	0-80	Sand	SP-SM, SP, SM	A-3, A-2, A-1	1 0	1 0	190-100	90-100	140-85	0-15	0-14	NP
193285:	 	1	1	1	 	<u> </u>		! 		 	! !	!
Lumley	I 0-3	Peat	PT	A-8	i 0	i 0	i 100	100	100	90-100	I 0-0	I NP
	3-6	Peat	I PT	IA-8	i 0	i 0	1 100	•	•	140-100	•	I NP
	6-8	Muck	I PT	IA-8	i 0	i 0	1 100	•	1 100	•	•	I NP
	8-20	Muck	I PT	IA-8	i 0	i 0	1 100	•	190-100	•		I NP
	20-45	•	I PT	IA-8	i 0	i 0	1 100	•	190-100	•	•	I NP
	45-53	Muck	l PT	IA-8	I 0	i 0	i 100	i 100	190-100	40-100	I 0-0	I NP
	53-80	Muck	PT	A-8	i 0	į o	100	100	90-100	140-100	0-0	NP
Makinen	0.4	 Muck		 A-8	I I 0	I I 0	 100	 100	1 100	 90-100	I 0 0	 NP
Makinen		Muck	PT PT	A-8	1 0	1 0	1 100	•	190-100	•		I NP
	14-22	•	PT	IA-8	1 0	1 0		•	190-100	•	•	I NP
	14-22	•	•	IA-8	1 0	1 0	•		190-100	•		I NP
	31-80	• • •	SP-SM, SP	IA-3	1 0	1 0	I 100		150-70	•		I NP
	 31-00	Sand	SP-SM, SP	I N-2	1	1 0	1 100	1 100	150-70	l 0-13	U-14 	l NE
193286:	i I	i	i	i	i	i	i	i	i	i	i	i
Histosols	I 0-45	Muck	PT	IA-8	i 0	i 0	i 100	100	100	90-100	I 0-0	I NP
	45-80	Sand	SP, SP-SM	A-2, A-3	i 0	į o	90-100	90-100	45-90	0-15	0-14	NP
Aquents	l I 0-80	 Sand	 SP, SP-SM	 A-2, A-3	I I 0	I I 0	 90-100	 90-100	 45-90	 0-15	 0-14	 NP
• • • • • • • • • • • • • • • • • • • •		Ī	i	i	i	i	İ	İ	i	İ	İ	i
193287:	l	I	1	1	I	I	1	I	I	I	I	I
Quartzipsamments	0-80	Sand	SP-SM, SP	A-3, A-2	1 0	0	100	100	150-85	0-15	0-14	NP
193288:	l 	I I	I I	1	! 		 	I I	1	I 	! 	I I
Udipsamments	0-80	Sand	SP-SM, SP, SM	A-3, A-2, A-1	i 0	i 0	90-100	90-100	40-85	0-15	0-14	NP
		i		1	İ	į			İ	 	<u>-</u> -	i

Table 14.-Engineering Properties-Continued

	l	!	Clas	sification	Frag	ments	l Po	ercenta		-	l	
Map unit symbol	Depth	USDA texture	!		1		<u>!</u>	sieve	number-		-	Plas-
and soil name		1			>10	3-10	!	1 10	1 40	•	•	ticity
	<u> </u>	<u>!</u>	Unified	AASHTO	in	in	1 4	1 10	1 40	200	<u>'</u>	lindex
!	In In		1	!	Pct	Pct	1	1			Pct	1
		!	!	!	!	!	!	!	!	!	!	!
193342:		10:21			1			1 100	105 100			
Gorvan	•	Silt loam	CL-ML, ML	A-4, A-6	1 0	1 0	100	•	•	160-90	•	2-15
ļ	4-11	Loam, mucky silt loam,	CL-ML, ML	A-4, A-6	1 0	1 0	100	100	182-100	160-90	115-40	2-15
	 11 07	silt loam	I CT MT MT	12426	I I 0	I 0 E	100 100	100 100	105 100	160.00	1	1 2 25
	11-2 <i>1</i> 	Loam, silty clay loam, silt loam, clay loam	CL-ML, ML	A-4, A-6	1 0	0-5	190-100	1 20-100	102-100	60-90	115-40	2-25
	 27-80	·	SP, SP-SM	I IA-3	1 0	I I ∩_1/I	180-100	I 180-100	1 135-70	I I 0-15	I I ∩_1/I	I NP
,	27 00 	I	I SE, SE SM	I S	1	1 0 14	100 100	100 100	133 70	1 0 13	1 0 14	I ME
Houghton	I 0-12	l Muck	' PT	 A-8	i 0	i 0	1 100	1 100	1 100	190-100	. 0-0	l NP
	12-26		PT	A-8	1 0	1 0	1 100	•		40-100	•	NP
i	26-80	•	PT	A-8	1 0	1 0	1 100	•		140-100		NP
i		1	i	i	i	i	i	i	i		, I	i
Glendora	I 0-6	Mucky loamy sand	SP-SM	A-2	i 0	i 0	95-100	95-100	50-90	5-15	0-14	NP
i		Loamy sand, sand, fine		A-2, A-3	0	0	95-100	95-100	50-90	5-15	0-14	NP
ı		sand	i	i	İ	ĺ	İ	İ	İ	Ì	İ	İ
ı	9-30	Sand, loamy sand, fine	SP-SM, SM	A-2, A-3	0	1 0	95-100	95-100	50-90	5-15	0-14	NP
I	l	sand	1	1	1	I	1	I	1	I	I	1
I	30-80	Sand, loamy sand, fine	SP-SM, SM	A-1, A-2, A-3	0	0	95-100	95-100	50-90	5-15	0-14	NP
I	l	sand	1	I	1	1	1	1	I		l	1
I	l	1	1	1	1	1	1	1	1	1	I	1
193349:	l	I	1	I	1	1	1	1	I		l	1
Spinks		Sand	SP-SM, SP	A-3	0	1 0	85-100				0-14	NP
!		Sand, fine sand	SP-SM, SP	A-3, A-2	1 0	0	85-100	•	•	•	0-14	NP
!		Sand, fine sand	SP-SM, SP	A-3, A-2	1 0	1 0	85-100					NP
ļ	17-62	Loamy fine sand, loamy	SP-SM, SM,	SP A-3, A-2	1 0	1 0	85-100	182-100	140-85	0-55	0-14	NP
 	. 60 70	sand, fine sand, sand	100 04 04		I I 0	I I 0	105 100	105 100	140 05	 0 FF	0 14	
	62-72	Loamy fine sand, loamy	SP-SM, SM,	SP A-3, A-2	1 0	0	85-100	182-100	140-85	0-55	0-14	NP
	 72 00	sand, fine sand, sand Sand, fine sand	I CD CM CD	 1	I I 0	1 0	 75-100	 75 100	125 05	I I 0-35	I I 0-14	I INP
	/2-60 	Sand, line Sand	SP-SM, SP	A-1, A-3, A-2	1 0	1 0	1/3-100	1 /2-100	133-63	1 0-35	U-14 	I NE
Coloma	ı I 0-3	 Sand	SP-SM, SM	 A-3, A-2	1 0	. 0	185-100	1 185-100	1 140-90	I 5-30	I I 0-14	l NP
COTOMA	3-4	Loamy sand, sand	SP-SM, SM	A-3, A-2	1 0	1 0	185-100	•	•		0-14	l NP
		Loamy sand, loamy fine	SP-SM, SM	A-3, A-2	1 0	1 0	185-100		•		0-14	
i		sand, fine sand, sand	1	1	i	i	1	i	1		, ·	i
i	8-15	Loamy sand, loamy fine	SP-SM, SM	 A-3, A-2	i 0	i 0	85-100	185-100	40-90	I 5-30	0-14	I NP
i	i -	sand, fine sand, sand	i ,	i - '	i	i	i	İ	i	i	i	i
į	15-25	Loamy sand, loamy fine	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
į	1	sand, fine sand, sand	i i	1	I	I	1	I	I	I	I	I
į	25-40	Loamy sand, loamy fine	SP-SM, SM	A-3, A-2	i 0	, 0	85-100	85-100	40-90	5-30	0-14	NP
j	l	sand, fine sand, sand	1	1	I	I	I	I	I	I	I	1
1	40-80	Loamy sand, sand, sandy	SP-SM, SM	A-3, A-2	1 0	0	85-100	85-100	40-90	5-30	0-14	NP
1	l	loam	1	I	I	I	1	I	l	1	I	I
ı	l	1	1	1	I	1	1	I	I	I	I	1

Table 14.-Engineering Properties-Continued

		1	1	Classi	ficat	cion	Frag	ments	P		ge pass	-	!	!
Map unit symbol	Depth	USDA texture	·				<u> </u>		<u> </u>	sieve	number-		Liquid	
and soil name	I	1	1		I		>10	3-10			1	1	•	ticity
	l	1	Uni	fied	1	AASHTO	in	in	4	10	40	200	1	index
	In	1	1		1		Pct	Pct	1	I	Ī	1	Pct	I
		1	1		1				1	1	1	I		I
193351:	İ	i	i		i		i	i	i	i	i	i	i	i
Benona	I 0-2	Sand	SP-SM,	SP	A-3,	A-2	i 0	i 0	185-100	185-100	40-90	I 0-30	I 0-14	INP
	1 2-6	Sand	SP-SM,		[A-3,		i 0	i o	•		140-90	•	•	l NP
	•	ISand	SP, SP		[A-3,		i 0	i			140-90			l NP
		Sand	SP, SP		A-3,		1 0	1 0	•		•	•	0-14	•
	17-28	•	SP-SM,		IA-3,		1 0	1 0	•	•	•	•	0-14	•
	1 28-46	•	SP-SM,		A-3,		1 0	1 0	•		140-90	•	•	l NP
		Loamy sand, sand	SP-SM,			A-2	1 0	1 0			40-90			I NP
	1 40-00	Loamy Sand, Sand	SP-SM,	SM	IA-3,	A-2		1 0	102-100	102-100	140-90	1 2-30	1 0-14	I NE
193354:	!		- !		!		!	!	!	!	!	!	!	!
	I 0 00	104	l an aw	an.	12 2	7.0	I I 0	1 0	I I 100	1 100	I 150-85	1 0 15	1 0 14	375
Quartzipsamments	. 0-80	Sand	SP-SM,	SP	A-3,	A-2	. 0	1 0	1 100	1 100	120-82	1 0-12	1 0-14	NP
400055	!	!	!		!		!	!	!	!	!		!	!
193357:	!	1	!		!		!	!			!		!	
Shavenaugh		Sand	SP-SM,		A-3	_	1 0	1 0	•	•	150-80	•	0-14	NP
	5-8	Sand, gravelly sand	SP-SM,		A-3,		1 0	1 0	•		50-80	•	•	NP
!		Sand, gravelly sand	SP-SM,		A-1,		1 0	1 0	•	•	•	•	0-14	•
	•	Sand, gravelly sand	SP-SM,		A-1,		1 0	1 0	•		•	•	0-14	•
		Sand, gravelly sand	SP-SM,	SP	A-1,	A-3	1 0	1 0	70-95	70-95	50-80	0-15	0-14	NP
	34-44	Loamy sand, gravelly	SP-SM		A-2,	A-3, A-1	0	0	55-95	55-95	35-80	0-30	0-14	NP
	l	loamy sand	1		1		1	1	1		1		1	l
	44-80	Gravelly sand, very	GP-GM,	GM, GI	P A-3,	A-1	1 0	1 0	30-85	30-85	0-80	0-30	0-14	NP
	l	gravelly sand, very	1		1		1	1	1	1	1	1	1	I
	I	gravelly loamy sand,	1		1		1	1	1	1	1	I	1	I
	I	stratified sand to	1		1		I	1	1	1	1	I	1	I
	I	gravelly sand	1		1		I	1	1	1	1	I	1	I
	İ	i	i		i		İ	İ	İ	i	i	İ	i	İ
193359:	İ	İ	i		i		İ	İ	İ	i	i	İ	i	İ
Shavenaugh	i 0-5	Sand	SP-SM,	SP	A-3		0	1 0	185-95	185-95	150-80	0-15	0-14	l NP
	I 5-8	Sand, gravelly sand	SP-SM,		A-3,	A-1	i 0	i 0	•		50-80	•	•	I NP
		Sand, gravelly sand	SP-SM,		A-1,		i 0	i 0					0-14	NP
		Sand, gravelly sand	SP-SM,		A-1,		i 0	i o	•		•	•	0-14	•
		Sand, gravelly sand	SP-SM,		A-1,		1 0	1 0	•	•	150-80	•	•	l NP
	•	Loamy sand, gravelly	SP-SM		. ,	A-3, A-1	•	1 0	•	•	•	•	0-14	•
	, J. 17	loamy sand	1		1		i	i	1	1	1		1	, I
	I 44-80	Gravelly sand, very	GP-GM,	CM CI) A – 3	A-1	i 0	1 0	130-85	130-85	I 0-80	0-30	 0-14	I INP
	l == 00	gravelly sand, very	IGE GM,	Gri, Gr	. i A. J,	. A 1	1	1	120 02	120 02	1 0 00	1 0 30	1 0 14	l ME
	! !	gravelly loamy sand,	-		1		1	1	1		1	1	1	! !
	! !		-		-		!	!	!	1	1	!	1	! !
	 -	stratified sand to	- !		-		1	1	1	1	1	1	1	I
	I	gravelly sand	!		!		!	!	!	1	!		1	!
	I	I	1		1		1	1	1	1	1	I	1	I

Table 14.-Engineering Properties-Continued

		1	Class	ification	Frag	ments	P	ercenta		-	17	
Map unit symbol	Depth	USDA texture	\ <u></u>		1 >10	1 2 10	!	sieve	number-	-	Liquid	
and soil name			 Unified	I AASHTO	>10 in	3-10 in	•	1 10	1 40	I I 200	•	ticit index
	!	<u>!</u>	Unified	AASHTO	<u></u>	<u> </u>	<u> </u>	1 10	1 40	1 200	<u> </u>	Index
	I In	1		1	Pct	Pct	!		!	!	Pct	1
		!	!	!	!	!	!	!	!	!	!	!
193360:												
Shavenaugh	•	Sand	SP-SM, SP	A-3	0	•	•	185-95	•	0-15	0-14	NP
	5-8	Sand, gravelly sand	SP-SM, SP	A-3, A-1	1 0	•	•	170-95	•	•	0-14	NP
		Sand, gravelly sand	SP-SM, SP	A-1, A-3	1 0	•	•	170-95	•	•	•	NP
		Sand, gravelly sand	SP-SM, SP	A-1, A-3	1 0	•	•	70-95	•		0-14	NP
	•	Sand, gravelly sand	SP-SM, SP	A-1, A-3	1 0	•	•	70-95	•	•	0-14	•
	34-44	Loamy sand, gravelly	SP-SM	A-2, A-3, A-1	1 0	1 0	55-95	55-95	35-80	0-30	0-14	NP
	1	loamy sand	1	1	1	1	1	l	1	I	1	1
	44-80	Gravelly sand, very	GP-GM, GM, G	P A-3, A-1	1 0	1 0	30-85	30-85	0-80	0-30	0-14	NP
	I	gravelly sand, very	1	I	1	1	1	l	I	I	1	1
	I	gravelly loamy sand,	1	I	1	1	1	l	I	I	1	1
	I	stratified sand to	1	1	1	1	1		I	I	1	1
	I	gravelly sand	1	1	1	1	1		I	I	1	1
	I	I	1	1	1	1	1		I	I	1	1
193362:	I	I	1	1	1	1	1		I	I	1	1
Benzonia	•	Sand	SP-SM, SP	A-3, A-2	1 0			85-100				NP
	•	Sand	SP-SM, SP	A-3, A-2	1 0			85-100				NP
	11-15	•	SP-SM, SP	A-3, A-2		•	•	85-100	•		•	•
	15-20	Sand	SP-SM, SP	A-3, A-2	1 0	1 0	85-100	85-100	40-90	0-15	0-14	NP
	20-27	Sand	SP-SM, SP	A-3, A-2	1 0	1 0	85-100	85-100	40-90	0-15	0-14	NP
	27-35	Sand	SP-SM, SP	A-3, A-2	1 0	1 0	85-100	85-100	40-90	0-15	0-14	NP
	35-80	Loamy sand, sand	SP-SM, SM	A-3, A-2	1 0	1 0	85-100	85-100	40-90	5-30	0-14	NP
	1	1	1	1	1	1	1		1	1	1	1
193363:	1	1	1	1	1	1	1		1	1	1	1
Benzonia	I 0-5	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	5-11	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	11-15	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	15-20	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	20-27	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	27-35	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	35-80	Loamy sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	I	I	1	1	1	1	1		1	1	1	1
193364:		I	1	1	1	1	1	1	I	I	1	1
Benzonia	0-5	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	5-11	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	11-15	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	15-20	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	20-27	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	27-35	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	35-80	Loamy sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	I	1	1	1	I	1	I	I	I	I	I	1

Table 14.—Engineering Properties—Continued

Map unit symbol	 Depth	 USDA texture	Class	ification	Fragi	ments	P	ercenta	ge pass	_	Liquid	 Plas-
and soil name	l	I	1	I	>10	3-10	ı	Ī	I .			ticity
		<u> </u>	Unified	AASHTO	in	in	4	1 10	1 40	1 200		lindex
	In In	1	!	1	Pct	Pct	!	!	!	!	Pct	!
193365:]	1 1	1	1	1	 	1	 	 	1	<u> </u>	
Benzonia	0-5	Sand	SP-SM, SP	A-3, A-2	i 0	I 0	85-100	85-100	140-90	0-15	0-14	NP
	5-11	•	SP-SM, SP	A-3, A-2	0		185-100		•	0-15	0-14	NP
i	11-15	Sand	SP-SM, SP	A-3, A-2	0	0	185-100	85-100	40-90	0-15	0-14	NP
1	15-20	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
1	20-27	Sand	SP-SM, SP	A-3, A-2	•	0	85-100	85-100	40-90	0-15	0-14	NP
I	27-35	•	SP-SM, SP	A-3, A-2			•		•	0-15		NP
	35-80	Loamy sand, sand	SP-SM, SM	A-3, A-2	1 0	1 0	185-100	85-100	40-90	5-30	0-14	NP
193371:	 	1		1	1			 	1	1		
Dair	0-4	Muck	IPT	A-8	1 0	1 0	1 100	1 100	1 100	190-100		l NP
	4-7	Mucky loam, loam, mucky	•	A-2	i	i 0	1 100			130-75	'	•
i		sandy loam	i	i	i	i	i	i	İ	i		i
I	7-11	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
1	11-21	Sand	SP, SP-SM	A-2, A-3	•	0	90-100	90-100	45-90	0-15	0-14	NP
1	21-50	Sand	SP, SP-SM	A-2, A-3	•	0	90-100	90-100	45-90	0-15	0-14	NP
	50-80	Sand	SP, SP-SM	A-2, A-3	•		190-100	90-100	45-90	0-15	0-14	NP
Pipestone	l I 0−2	 Sand	 SP-SM, SP	 A-3, A-2	1 0	I I 0	 85-100	I 185-100	I 150-90	I I 0-35	0-14	I NP
11peseone		Sand, fine sand	SP-SM, SP	A-3, A-2	•		185-100			0-35	0-14	l NP
i		Sand, fine sand	SP-SM, SP	IA-3	•	•	185-100	•	•	0-35		NP
i		Sand, fine sand	SP-SM, SP	A-3	0	•	185-100	•	•	0-35	0-14	NP
I	24-32	Sand, fine sand	SP-SM, SP	A-3	0	0	85-100	85-100	50-90	0-35	0-14	NP
ĺ	32-80	Sand, fine sand	SP-SM, SP	A-3	1 0	1 0	85-100	85-100	50-90	0-35	0-14	NP
193423:		1	!		!	!	!	!	!	!		!
193423: Benona	l I 0−2	 Sand	ICD_CM CD	 A-3, A-2	1 0	1 0	1 185-100	 05_100	140-00	I 0-30	0-14	I NP
Bellolla		Sand	SP-SM, SP SP-SM, SP	A-3, A-2	•	•	185-100	•	•	I 0-30	0-14	I NP
		Sand	SP, SP-SM	A-3, A-2	•	•	185-100		•	1 0-15	-	l NP
	9-17	• • • •	SP, SP-SM	A-3, A-2	•	•	185-100			•	0-14	I NP
	17-28	•	SP-SM, SP	A-3, A-2	•	•	85-100			•	0-14	NP
i	28-46	Sand	SP-SM, SP	A-3, A-2	0		85-100			0-15	0-14	NP
I	46-80	Loamy sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
102404		!	!		1	1	1	Į	!	1		!
193494: Nordhouse	l I 0−3	 Sand	I CD CM CD	 A-3	1 0	I I 0	I I 100	 100	I 50-90	I I 0-15	0-14	I INP
Nordhouse	0-3 3-11	•	SP-SM, SP SP-SM, SP	A-3	1 0	1 0	1 100		150-90	0-15 0-15	0-14	NP NP
	11-40	•	SP-SM, SP	A-3	1 0	1 0	1 100			0-15		I NP
	40-60	•	SP-SM, SP	A-3	1 0	1 0	1 100	•	150-90	0-15	0-14	l NP
	60-80	•	SP-SM, SP	A-3	0	0	100		50-90	0-15	-	NP
1	l	I	1	1	1	I	I	I	I	I		I
193496:	0.0	101		1	1	1		1 100			0.14	
Nordhouse		Sand	SP-SM, SP	A-3	I 0	I 0	100		150-90	0-15		NP
	3-11 11-40	•	SP-SM, SP SP-SM, SP	A-3 A-3	1 0	1 0	100 100		50-90 50-90	0-15 0-15	0-14 0-14	NP NP
	11-40	•	SP-SM, SP	A-3	1 0					0-15 0-15		I NP
	60-80	•	SP-SM, SP	IA-3	1 0	1 0	•		150-90	•	0-14	•
	, 22 23	1		i	i	i		. ==== 				. <u></u>

mahla	1 /	Engineering	- D			
Table	14	Endineerind	PLO	pertre	∍s—con	crnuea

	ļ	I .	Classi	fication	Fragi	ments	l Po	ercenta			!	!
Map unit symbol	Depth	USDA texture	l		<u> </u>		<u> </u>	sieve i	number-		Liquid	
and soil name	l	I	1	1	>10	3-10	•	l	Ι	1		ticity
	<u> </u>	<u> </u>	Unified	AASHTO	in	in	4	10	40	200	<u> </u>	index
	<u>In</u>	I	1	1	Pct	Pct	1	l	I	1	Pct	I
	l	I	1	1	l	I	1	l	I	1	1	1
193497:	l	I	1	1	l	I	1	l	l	1	1	1
Nordhouse	•	Sand	SP-SM, SP	A-3	0	0	100	•	•	0-15	0-14	NP
	•	Sand	SP-SM, SP	A-3	0	0	100	•	•	0-15	0-14	NP
	11-40	•	SP-SM, SP	A-3	1 0	0	100	100	50-90	0-15	0-14	NP
	40-60	Sand	SP-SM, SP	A-3	0	0	100	100	50-90	0-15	0-14	NP
	60-80	Sand	SP-SM, SP	A-3	0	1 0	100	100	50-90	0-15	0-14	NP
193498:	! 	1	 	<u> </u>	! 	! 	i	! 	! 		 	<u> </u>
Nordhouse	0-3	Sand	SP-SM, SP	A-3	0	0	100	100	50-90	0-15	0-14	NP
	3-11	Sand	SP-SM, SP	A-3	0	0	100	100	50-90	0-15	0-14	NP
	11-40	Sand	SP-SM, SP	A-3	I 0	I 0	100	100	50-90	0-15	0-14	NP
	40-60	Sand	SP-SM, SP	A-3	I 0	I 0	100	100	50-90	0-15	0-14	NP
	I 60-80	Sand	SP-SM, SP	A-3	I 0	I 0	i 100	100	50-90	I 0-15	0-14	I NP
	I	I	i ,	i	i	i	i	i	i	i	i	i
Platteriver	0-1	Highly decomposed plant	PT	i	0	0	100	100	100	90-100	i	NP
	I	material	I	1	I	I	1	I	I	1	I	1
i	1-3	Sand	SP-SM, SP	A-3	1 0	0	90-100	90-100	50-90	0-15	0-14	NP
	3-14	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	50-90	0-15	0-14	NP
	14-20	Sand	SP-SM, SP	IA-3	1 0	0	190-100	90-100	150-90	I 0-15	0-14	NP
	20-29	Sand	SP-SM, SP	IA-3	1 0	0	190-100	90-100	150-90	I 0-15	0-14	NP
	29-80	Sand	SP-SM, SP	IA-3	1 0	0	190-100	90-100	150-90	I 0-15	0-14	NP
	i	i	i ′	i	i İ	i	i	i İ	i	i	i	i
Dair	0-4	Muck	PT	A-8	I 0	I 0	100	100	100	190-100	i	NP
	4-7	Mucky loam, loam, mucky	ISC-SM	A-2	I 0	I 0	100	100	60-90	130-75	115-20	NP-10
	i	sandy loam	i	i	i İ	i	i	i İ	i	i	i	i
	7-11	Sand	SP, SP-SM	A-2, A-3	1 0	0	190-100	90-100	145-90	I 0-15	0-14	NP
	11-21	Sand	SP, SP-SM	A-2, A-3	I 0	I 0	190-100	90-100	45-90	0-15	0-14	NP
	21-50	Sand	SP, SP-SM	A-2, A-3	I 0	I 0	190-100	90-100	45-90	0-15	0-14	NP
	50-80	•	SP, SP-SM	A-2, A-3	I 0	I 0	90-100	•	•	•	0-14	NP
	i	i	i '	i '	i İ	i	i	i İ	i	i	i	i
193503:	i	i	i	i	i İ	i	i	i İ	i	i	i	i
Spinks	I 0-5	Sand	SP-SM, SP	A-3	I 0	I 0	185-100	85-100	40-85	0-15	0-14	NP
-		Sand, fine sand	SP-SM, SP	A-3, A-2	I 0	I 0	185-100	85-100	40-85	0-35	0-14	NP
	•	Sand, fine sand	SP-SM, SP	A-3, A-2	I 0	i 0	185-100	•	•	•	•	I NP
	•	Loamy fine sand, loamy	SP-SM, SM, SI	. ,	i 0	i o	85-100	•	•	•	0-14	•
	, -: - -	sand, fine sand, sand	1	·	 I	 I	1	,	.	i	, I	i
	I 62-72	Loamy fine sand, loamy	SP-SM, SM, SI	PIA-3, A-2	I 0	i 0	185-100	85-100	40-85	I 0-55	0-14	, I NP
	-	sand, fine sand, sand	1	·	 I	 I	1	,	.	1	, I	i
	I 72-80	Sand, fine sand	SP-SM, SP	A-1, A-3, A-2	, I 0	, I 0	75-100	75-100	135-85	0-35	0-14	l NP
		1	1	1			1					·

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	1	Cla	ssi	ficat	ion		Fragi	ments	P		ge pass	_	 Liquid	 Plas-
and soil name	ı -	İ	i			ı		i	>10	3-10	Ī	ı	ı	ı	limit	
	l	1	Uni	fied		l	AASHTC)	in	in	4	10	40	200	1	lindex
	In	1	I			I			Pct	Pct	I	1	1	1	Pct	I
	I	1	1			I		- 1		1	I	I	I	1	1	1
193503:		I	1			1		-		1	1	1	1	1	1	I
Shavenaugh		Sand	SP-SM,			A-3			0	•	•	•	150-80	•	0-14	NP
		Sand, gravelly sand	SP-SM,			A-3,			0	•	•	•	150-80	•	0-14	NP
		Sand, gravelly sand	SP-SM,			A-1,			0	•	•	•	150-80	•	•	NP
		Sand, gravelly sand	SP-SM,			A-1,			0				150-80		0-14	NP
	•	Sand, gravelly sand	SP-SM,	SP		A-1,		- I	0	•	•	•	150-80	•	•	NP
	34-44 -	Loamy sand, gravelly	SP-SM			A-2,	A-3,	W-T	0	1 0	55-95	55-95	35-80	1 0-30	0-14	NP
	 44 00	loamy sand	I CD CM	CD4	a D	1 2	a 1		0	I I 0	120 05	120 05	1 0 00	1 0 20	1 0 14	I I NP
	1 44-80	Gravelly sand, very gravelly sand, very	GP-GM,	GM,	GP	A-3,	A-I		U	1 0	130-85	130-85	0-80	0-30	0-14	I NP
	 	gravelly sand, very gravelly loamy sand,	!			1				1	!	!	1	1	1	1
	 	stratified sand to	!			!				! !				 	!	
	! 	gravelly sand	i					i		i	i	i	<u> </u>	i	i	i i
	' 	graverry band	i			i		ï		i	i	i	i	i i	i	i i
193504:	İ	i	i			i		i		i	i	i	i	i	i	i
Spinks	0-5	Sand	SP-SM,	SP		A-3		i	0	0	85-100	85-100	40-85	0-15	0-14	NP
_	J 5-10	Sand, fine sand	SP-SM,	SP		A-3,	A-2		0	0	85-100	85-100	40-85	0-35	0-14	NP
	10-17	Sand, fine sand	SP-SM,	SP		A-3,	A-2	- 1	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	Loamy fine sand, loamy	SP-SM,	SM,	SP	A-3,	A-2	- 1	0	0	85-100	85-100	40-85	0-55	0-14	NP
	l	sand, fine sand, sand	1			I		- 1		I	1	1	I	I	1	I
	62-72	Loamy fine sand, loamy	SP-SM,	SM,	SP	A-3,	A-2	- 1	0	0	85-100	85-100	40-85	0-55	0-14	NP
	l	sand, fine sand, sand	1			I		- 1		I			I	I	1	1
	72-80	Sand, fine sand	SP-SM,	SP		A-1,	A-3,	A-2	0	1 0	75-100	75-100	35-85	0-35	0-14	NP
	l	!				l 				!					!	
Shavenaugh		Sand	SP-SM,			A-3			0	•	•	•	150-80	•	0-14	NP
		Sand, gravelly sand	SP-SM,			A-3,			0	•	•	•	150-80	•	0-14	NP
		Sand, gravelly sand	SP-SM,			A-1,			0				150-80			NP NP
		Sand, gravelly sand Sand, gravelly sand	SP-SM,			A-1, A-1,			0		•	•	50-80 50-80	•	•	I NP
		Loamy sand, gravelly	ISP-SM,	SP		. ,	A-3,	ا 1 1 ـ م	-		•	•	135-80	•	•	I NP
	24-44	loamy sand	I SE-SM			A-2, 	A-3,	V-T		1 0	122-32	122-32	122-00	1 0-30	1 0-14	NE
	ı I 44-80	Gravelly sand, very	GP-GM,	GM.	GP	I IA-3.	A-1	i	0	1 0	130-85	130-85	I 0-80	I 0-30	0-14	I NP
	, 11 00 I	gravelly sand, very	1	J11,	0-	111		ï		i	1	1	1	1	1 0 11	112
	' 	gravelly loamy sand,	i			i		i		i	i	i	i	i	i	i
	I	stratified sand to	i			i		i		i	i	i	i	i	i	i
	İ	gravelly sand	i			i		i		i	i	i	i	i	i	i
	l	Ī	İ			ĺ		ĺ		İ	ĺ	ĺ	ĺ	İ	İ	İ
193505:	I	1	1			I		- 1		I	I	I	I	I	I	I
Spinks	0-5	Sand	SP-SM,	SP		A-3		- 1	0	0	85-100	85-100	40-85	0-15	0-14	NP
1		Sand, fine sand	SP-SM,	SP		A-3,		- 1	0				40-85			NP
		Sand, fine sand	SP-SM,			A-3,		- 1	0				40-85			NP
	17-62	Loamy fine sand, loamy	SP-SM,	SM,	SP	A-3,	A-2	- 1	0	1 0	85-100	85-100	40-85	0-55	0-14	NP
	l	sand, fine sand, sand	1				_	ı	_	1	I	I	1	1	1	1
	62-72	Loamy fine sand, loamy	SP-SM,	SM,	SP	A-3,	A-2	I	0	1 0	85-100	85-100	40-85	0-55	0-14	NP
	=0 00	sand, fine sand, sand		~-					_					1		
	72-80	Sand, fine sand	SP-SM,	SP		A-1,	A-3,	A-2	0	1 0	175-100	175-100	35-85	0-35	0-14	NP
	I	I	I			I		- 1		I	I	I	I	I	I	I

Table 14.-Engineering Properties-Continued

and soil name 193505: Shavenaugh	5-8 8-16 16-28 28-34 34-44		Uni SP-SM, SP-SM, SP-SM, SP-SM, SP-SM, SP-SM, GP-GM,	SP SP SP		 A-3 A-3, A-1, A-1, A-2,	A-3 A-3 A-3, A-1	0	0 0 0 0	70-95 70-95 70-95 70-95	70-95 70-95	50-80 50-80 50-80 50-80	0-15 0-15		ticity index NP NP NP NP
	0-5 5-8 8-16 16-28 28-34 34-44	Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Loamy sand, gravelly loamy sand Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to		SP SP SP SP		 A-3 A-3, A-1, A-1, A-2,	A-1 A-3 A-3 A-3 A-3, A-1	Pct	Pct	 	 	 	 	Pct 	 NP NP NP
	0-5 5-8 8-16 16-28 28-34 34-44	Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Loamy sand, gravelly loamy sand Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to	SP-SM, SP-SM, SP-SM, SP-SM, SP-SM	SP SP SP		A-3, A-1, A-1, A-1, A-2,	A-3 A-3 A-3, A-1			70-95 70-95 70-95 70-95	70-95 70-95 70-95 70-95	50-80 50-80 50-80 50-80	0-15 0-15 0-15	0-14 0-14 0-14 0-14	NP NP NP
	5-8 8-16 16-28 28-34 34-44	Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Loamy sand, gravelly loamy sand Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to	SP-SM, SP-SM, SP-SM, SP-SM, SP-SM	SP SP SP		A-3, A-1, A-1, A-1, A-2,	A-3 A-3 A-3, A-1	0 0 0 0	0 0 0 0	70-95 70-95 70-95 70-95	70-95 70-95 70-95 70-95	50-80 50-80 50-80 50-80	0-15 0-15 0-15	0-14 0-14 0-14	NP NP NP
	5-8 8-16 16-28 28-34 34-44	Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Loamy sand, gravelly loamy sand Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to	SP-SM, SP-SM, SP-SM, SP-SM, SP-SM	SP SP SP		A-3, A-1, A-1, A-1, A-2,	A-3 A-3 A-3, A-1	0 0 0 0	0 0 0 0	70-95 70-95 70-95 70-95	70-95 70-95 70-95 70-95	50-80 50-80 50-80 50-80	0-15 0-15 0-15	0-14 0-14 0-14	NP NP NP
Snavenaugn	5-8 8-16 16-28 28-34 34-44	Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Loamy sand, gravelly loamy sand Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to	SP-SM, SP-SM, SP-SM, SP-SM, SP-SM	SP SP SP		A-3, A-1, A-1, A-1, A-2,	A-3 A-3 A-3, A-1	0 0 0 0	0 0 0 0	70-95 70-95 70-95 70-95	70-95 70-95 70-95 70-95	50-80 50-80 50-80 50-80	0-15 0-15 0-15	0-14 0-14 0-14	NP NP NP
	8-16 16-28 28-34 34-44	Sand, gravelly sand Sand, gravelly sand Sand, gravelly sand Loamy sand, gravelly loamy sand Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to	SP-SM, SP-SM, SP-SM, SP-SM	SP SP SP		A-1, A-1, A-1, A-2,	A-3 A-3 A-3, A-1	0 0 0	0 0 0	70-95 70-95 70-95	70-95 70-95 70-95	50-80 50-80 50-80	0-15 0-15	0-14 0-14	NP NP
	16-28 28-34 34-44	Sand, gravelly sand Sand, gravelly sand Loamy sand, gravelly loamy sand Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to	SP-SM, SP-SM, SP-SM	SP		A-1, A-1, A-2,	A-3 A-3 A-3, A-1	i 0	, 0 0	70-95 70-95	70-95 70-95	50-80 50-80	0-15	0-14	, NP
	28-34 34-44	Sand, gravelly sand Loamy sand, gravelly loamy sand Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to	SP-SM			A-2, 	A-3, A-1	•	•	•	•	•	0-15	I 0-14	I NP
	I	loamy sand Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to	i	GM,		A-2, 	A-3, A-1	0	0	155-95	LEE AF			1 0 72	
	44-80 	gravelly sand, very gravelly loamy sand, stratified sand to	GP-GM, 	GM,	GP	A-3,	3 1	1	I		55-95 	35-80 	0-30 	0-14 	NP
	 	gravelly loamy sand, stratified sand to	 				A-I	0	J 0	30-85	30-85	0-80	0-30	0-14	NP
	 	stratified sand to	i			l I		 	 	 	 	 	 	 	
	 	gravelly sand	-			i		i	İ	i	i	į.	İ	i	i
	l		1			l		I	I	I	I	I	I	I	I
193506:			!					Į.	l		1	!	l	1	!
Spinks	ı I 0-5	 Sand	SP-SM,	СD		I IA−3		I I 0	I I 0	185-100	185-100	 40-85	ı 0-15	I I 0-14	I I NP
эртикэ		Sand, fine sand	ISP-SM,			A-3,	A-2		•	•	•	140-85	•	•	I NP
	•	Sand, fine sand	SP-SM,			A-3,		•	•	•	•	•	•	•	I NP
		Loamy fine sand, loamy sand, fine sand, sand	SP-SM,					, o , o	, , , , ,	•	•	40-85 	•	0-14 	NP
	62-72 	Loamy fine sand, loamy sand, fine sand, sand	SP-SM,	SM,	SP	A-3, 	A-2	0 	, 0 	85-100 	85-100 	40-85 	0-55 	0-14 	NP
	72-80 	Sand, fine sand	SP-SM,	SP		A-1,	A-3, A-2	J 0	J 0	75-100	75-100 	35-85 	0-35 	0-14 	NP
Shavenaugh	I 0-5	Sand	SP-SM,	SP		A-3		i 0	I 0	185-95	185-95	150-80	0-15	0-14	, NP
		Sand, gravelly sand	SP-SM,			A-3,	A-1	I 0	•	•	•	150-80	•	0-14	NP
		Sand, gravelly sand	SP-SM,			A-1,		0		70-95	70-95	50-80	0-15	0-14	NP
	16-28	Sand, gravelly sand	SP-SM,	SP		A-1,	A-3	0	0	70-95	70-95	150-80	0-15	35 0-14 35 0-14 35 0-14 35 0-14 35 0-14 35 0-14 35 0-14 35 0-14 35 0-14 36 36 0-14 36 36 36 36 36 36 36 3	NP
	28-34	Sand, gravelly sand	SP-SM,	SP		A-1,	A-3	0	J 0	70-95	70-95	50-80	0-15	0-14	NP
	34-44 	Loamy sand, gravelly loamy sand	SP-SM			A-2, 	A-3, A-1	I 0 I	0 	55-95 	55-95 	35-80 	0-30 	0-14 	NP
	44-80 	Gravelly sand, very gravelly sand, very gravelly loamy sand, stratified sand to gravelly sand	GP-GM, 	GM,	GP	A-3, 	A-1	0 	0 	30-85 	30-85 	0-80 	0-30 	0-14 	NP
100507	!	!	!			l		!	!	1	1	1	l ·	1	!
193507:	I I 0-5	 Sand	 SP-SM,	g D		l IA-3		I I 0	I I 0	185-100	185-100	 40-85	I I 0−15	 0-14	I INP
Spinks	•	Sand Sand, fine sand	SP-SM,			A-3 A-3,	7-2		•	•	•	40-85 40-85	•	0-14 0-14	I NP
		Sand, fine sand	SP-SM,			A-3, A-3,		1 0	•	•	•	140-85	•	0-14	I NP
		Loamy fine sand Loamy	SP-SM,					1 0				140-85		0-14	•
	, 1, 02 	sand, fine sand, sand	I DM,	OII,	51	11 J ,	2	i	İ	1	1	1	, 0 55 I	0 14	
	62-72	Loamy fine sand, loamy	SP-SM,	SM,	SP	A-3,	A-2	0	0	85-100	85-100	 40-85	0-55	0-14	NP
		sand, fine sand, sand	1	_ ′		ļ , ,			ļ <u>.</u>	<u> </u>	I		l		I
	72-80 	Sand, fine sand	SP-SM,	SP		A-1, 	A-3, A-2	0 	0 	75-100 	75-100 	35-85 	0-35 	0-14 	NP

Table 14.—Engineering Properties—Continued

	l		Classi	Frag	ments	P	ercenta	1	1			
Map unit symbol	Depth	USDA texture	1	l		1	sieve	Liquid	Plas-			
and soil name	l	I	1	1	>10	3-10	1	1	1	1	limit	ticity
		I	Unified	AASHTO	in	in	4	10	40	200	1	index
	In	1	1	1	Pct	Pct	I	1	I	1	Pct	1
		I	1	1			1	1	1	I		1
.93507:	l	I	1	1	l	I	1	1	1	1	1	1
Shavenaugh	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-80	0-15	0-14	NP
	J 5-8	Sand, gravelly sand	SP-SM, SP	A-3, A-1	0	0	70-95	70-95	50-80	0-15	0-14	NP
	8-16	Sand, gravelly sand	SP-SM, SP	A-1, A-3	0	0	70-95	70-95	50-80	0-15	0-14	NP
	16-28	Sand, gravelly sand	SP-SM, SP	A-1, A-3	0	0	70-95	70-95	50-80	0-15	0-14	NP
	28-34	Sand, gravelly sand	SP-SM, SP	A-1, A-3	0	0	70-95	70-95	50-80	0-15	0-14	NP
	34-44	Loamy sand, gravelly	SP-SM	A-2, A-3, A-1	0	0	55-95	55-95	35-80	0-30	0-14	NP
	l	loamy sand		1	l	1	1	1	1	I	1	1
	44-80	Gravelly sand, very	GP-GM, GM, GE	P A-3, A-1	0	0	30-85	30-85	0-80	0-30	0-14	NP
	l	gravelly sand, very		1	l	1	1	1	1	1	1	1
	l	gravelly loamy sand,		1	l	1	1	1	1	1	1	1
!	l	stratified sand to		1	l	1	1	1	1	1	1	1
	l	gravelly sand	1	1	l	1	1	1	1	1	1	1
	l	I	1	1	l	1	1	1	1	1	1	1
.93508:	l	I	1	1	l	1	1	1	1	1	1	1
		•	PT	A-8	0	1 0	100	100	100	90-100	0-0	NP
		Marly silt loam	ML	A-4	0	1 0	100	100	90-100	70-90	25-35	NP-10
	34-38	Marly silt loam	ML	A-4	0	1 0	100	100	90-100	70-90	25-35	NP-10
	38-62		SP, SP-SM	A-3	0	1 0	100	100	50-90			
	62-80	Clay	CL, CH	A-6, A-7	0	1 0	100	100	90-100	80-100	40-55	20-35
	l	I		1	l	1	1	1	1	1	1	I
.93509:	l	I		1	l	1	1	1	1	I	1	1
Boyer		Fine sandy loam	SC-SM, SM	A-2, A-4	0	•	•	•	35-70	•	•	•
 	3-4	Sandy clay loam,	SC-SM, SM	A-2, A-4	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	l	gravelly sandy loam		1	l	1	1	1	1	I	1	1
		Gravelly sandy loam,	SC-SM, SC,	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
		sandy clay loam	CL-ML	1		1	1	1	1	1	1	1
		Gravelly sandy loam,	SC-SM, SC,	A-4, A-2	0	1 0	55-99	55-99	35-70	15-55	10-40	NP-20
		sandy clay loam	CL-ML	1		1	1	1	1	1	1	1
	30-45	Very gravelly sand,	SP, SP-SM,	A-3, A-2, A-1	0	1 0	30-85	30-85	0-75	0-35	0-14	NP
	l	sand, gravelly sand,	GP, GP-GM	1	l	I	I	1	1	I	1	1
		gravelly loamy sand							!	!	1	!
		Stratified gravelly	SP, SP-SM,	A-3, A-2, A-1	0	1 0	130-85	130-85	0-75	0-35	0-14	NP
		sand to sand, very	GP, GP-GM			1	1	1	1	1	1	1
		gravelly sand,	Į.			1	1	1	1	1	1	1
	I	gravelly loamy sand	1	1	I	1	1	1	1	1	1	1

Table 14.—Engineering Properties—Continue	Table	14.	-Engineering	Properties	-Continue
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Map unit symbol	 Depth	USDA texture	Classi	fication	Frag: 	ments	F		nge pass number-	-	 Liquid	 Plas-
and soil name	l	1	1	1	>10	3-10	ī	ī	ī	ī	limit	ticity
	l	I	Unified	AASHTO	in	in	4	10	40	200	1	index
	In	1		1	Pct	Pct	ī	ī	ī	ī	Pct	ī
		1	I	I			1	1	1	I		I
193509:	l	1	1	I	l	1	1	1	1	I	1	1
Shavenaugh	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	185-95	50-80	0-15	0-14	NP
	5-8	Sand, gravelly sand	SP-SM, SP	A-3, A-1	0	0	70-95	70-95	50-80	0-15	0-14	NP
	8-16	Sand, gravelly sand	SP-SM, SP	A-1, A-3	0	0	70-95	70-95	50-80	0-15	0-14	NP
	•	Sand, gravelly sand	SP-SM, SP	A-1, A-3		0	70-95	70-95	50-80	0-15	0-14	•
		Sand, gravelly sand	SP-SM, SP	A-1, A-3				70-95		0-15	•	•
	34-44 	Loamy sand, gravelly loamy sand	SP-SM 	A-2, A-3, A-1	0 	0 	55-95 	55-95 	35-80 	0-30 	0-14 	NP
	44-80	Gravelly sand, very	GP-GM, GM, GE	P A-3, A-1	0	0	30-85	30-85	0-80	0-30	0-14	NP
	l	gravelly sand, very	1	I	l	1	1	1	1	I	1	1
	l	gravelly loamy sand,	1	1		1	1	1	1	1	1	1
	l	stratified sand to	1	1		I	1	1	1	1	1	1
	l	gravelly sand	I	1	l	I	I	1	1	I	1	1
	l	I	I	1	l	I	1	1	1	I	1	I
193510:		!		!	l _	!	!	!		!		!
Boyer		Fine sandy loam	SC-SM, SM	A-2, A-4	0	•	•	•	•	•	10-20	•
	3-4	Sandy clay loam,	SC-SM, SM	A-2, A-4	0	1 0	155-99	155-99	135-70	115-55	10-40	NP-20
		gravelly sandy loam	100.00	12.4.2.0	1		I	1	105 70	115 55	110 40	1277 00
	4-14	Gravelly sandy loam,	SC-SM, SC,	A-4, A-2	0	0	55-99	155-99	135-70	125-25	10-40	NP-20
	1 14 20	sandy clay loam	CL-ML	12.4.20	I I 0	1 0	1	1	125 70	115 55	110 40	1370 00
	14-30	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2			122-33	122-99	135-70	112-22	10-40	INP-20
	 20_45	Very gravelly sand,	CL-ML SP, SP-SM,	 A-3, A-2, A-1	I I 0	I I 0	130-02	130-02	I I 0-75	1 0-32	1 0-14	I NP
	1 20-43	sand, gravelly sand,	GP, GP-GM	A-3, A-2, A-1		1 0	120-02	120-02	1 0-75	1 0-33	1 0-14	NE
	! !	gravelly loamy sand	GF, GF GM		! 		;	1	<u> </u>	:	<u> </u>	<u> </u>
	I 45-80	Stratified gravelly	SP, SP-SM,	A-3, A-2, A-1	0	1 0	130-85	130-85	0-75	I 0-35	0-14	l NP
	, <u>1</u> 5 66	sand to sand, very	GP, GP-GM	1	ı	i	1	1	1 0 75	1	1 0 11	112
	' 	gravelly sand,	1	i	' 	i	i	i	i	i	i	i
	i I	gravelly loamy sand	i	i	i	i	i	i	i	i	i	i
	İ	1	i	i	ĺ	i	i	i	i	i	i	i
Shavenaugh	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	185-95	150-80	0-15	0-14	NP
	5-8	Sand, gravelly sand	SP-SM, SP	A-3, A-1	0	0	70-95	70-95	50-80	0-15	0-14	NP
	8-16	Sand, gravelly sand	SP-SM, SP	A-1, A-3	0	0	70-95	70-95	50-80	0-15	0-14	NP
	16-28	Sand, gravelly sand	SP-SM, SP	A-1, A-3	0	0	70-95	70-95	50-80	0-15	0-14	NP
	28-34	Sand, gravelly sand	SP-SM, SP	A-1, A-3	0	0	70-95	70-95	50-80	0-15	0-14	NP
	34-44	Loamy sand, gravelly	SP-SM	A-2, A-3, A-1	0	0	55-95	55-95	35-80	0-30	0-14	NP
	l	loamy sand	1	1		I	I	1	1	I	1	I
	44-80	Gravelly sand, very	GP-GM, GM, GE	P A-3, A-1	0	0	30-85	30-85	1 0-80	0-30	0-14	NP
	l	gravelly sand, very	!	1	l	1	1	1	1	1	1	1
	l	gravelly loamy sand,	!	!		1	!	!	1	!	1	!
	l	stratified sand to	!	!		I .	!	!	!	!	1	!
	I	gravelly sand	I	I	l	I	I	I	I	I	I	I

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Classi	fication	Frag 	ments	P	ercenta sieve	ge pass number-	-	 Liquid	 Plas-
and soil name	I	1	1	1	>10	3-10	ī	1	ı	ī	limit	ticity
	I	1	Unified	AASHTO	in	in	4	10	40	200	I	index
	In	T	1		Pct	Pct	Ī	ı	ı	ı	Pct	ı
		1	1				I	I	I	I		I
193511:	l	Ì	İ	İ	l	İ	İ	İ	İ	İ	İ	İ
Boyer	0-3	Fine sandy loam	SC-SM, SM	A-2, A-4	0	0	55-99	55-99	35-70	15-55	10-20	NP-10
	3-4	Sandy clay loam,	SC-SM, SM	A-2, A-4	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	l	gravelly sandy loam	1	1	l	1	1	I	I	I	I	1
	4-14	Gravelly sandy loam,	SC-SM, SC,	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	l	sandy clay loam	CL-ML	1	l	1	1	1	I	I	1	1
	14-30	Gravelly sandy loam,	. , ,	A-4, A-2	0	1 0	55-99	55-99	35-70	15-55	10-40	NP-20
		sandy clay loam	CL-ML	1	Ι.	1	1	1	1	1	1	I
	30-45	Very gravelly sand,	SP, SP-SM,	A-3, A-2, A-1	0	0	130-85	30-85	0-75	0-35	0-14	NP
	l	sand, gravelly sand,	GP, GP-GM	!		!	!	!	!	!	!	!
	1 45 00	gravelly loamy sand				1	100.05	100.05			1	l
	45-80	Stratified gravelly	SP, SP-SM,	A-3, A-2, A-1	0	1 0	30-85	30-85	0-75	0-35	0-14	NP
	 	sand to sand, very gravelly sand,	GP, GP-GM			!	!	1	1	!	1	!
	l I	gravelly sand, gravelly loamy sand	1	1	l I		!	1	1	! !	1	!
	! !	Graverry roamy sand	<u> </u>	1		<u> </u>		<u> </u>	<u>'</u>	! !	<u> </u>	<u> </u>
Shavenaugh	ı I 0-5	 Sand	SP-SM, SP	 A-3	l 0	i 0	1 185-95	1 185-95	1 150-80	ı I 0-15	 0-14	l NP
Snavenaugn		Sand, gravelly sand		A-3, A-1	1 0		170-95	•	•		0-14	l NP
		Sand, gravelly sand		A-1, A-3	. 0		170-95	•	•		•	
		Sand, gravelly sand		A-1, A-3	0		170-95	•	•		•	
		Sand, gravelly sand		A-1, A-3	0		70-95	•	•		•	
		Loamy sand, gravelly		A-2, A-3, A-1	0	0	55-95	55-95	35-80	0-30	0-14	NP
	I	loamy sand	1	1	l	I	I	I	I	I	I	I
	44-80	Gravelly sand, very	GP-GM, GM, GP	A-3, A-1	0	0	30-85	30-85	0-80	0-30	0-14	NP
	l	gravelly sand, very	1	1	l	1	1	I	I	I	I	I
	l	gravelly loamy sand,	1	1	l	1	1	1	1	I	1	1
	l	stratified sand to	1	1	l	1	1	I	I	I	I	1
	l	gravelly sand	1	1	l	I	I	I	I	I	I	I
	<u> </u>	!	!	!	l	!	!	!	!	!	!	!
193513:	0 4		1.00	17.0	. ^	I I 0	1 100	1 100	1 100	100 100	1	
Dair		Muck Mucky loam, loam, mucky	PT	A-8 A-2	0 0	1 0	100 100	•	•	90-100 30-75	•	NP
	4 <u>-</u> /	sandy loam	I SC-SM	A-2			1 100	1 100	100-90	130-75	115-20	IND-IO
	ı ı 7–11	Sand	SP, SP-SM	 A-2, A-3	I 0	1 0	190-100	1 190-100	1 145-90	I I 0-15	 0-14	l NP
	1 11-21	•		A-2, A-3	1 0		190-100	•	•		0 14 0-14	l NP
	21-50	•		A-2, A-3	1 0		190-100	•	•	•	•	l NP
	50-80	•	SP, SP-SM	A-2, A-3	0		90-100	•	•		•	
		i	. , <u></u>	·		i	İ	i		İ	i	i
Adrian	0-7	Muck	PT	A-8		0	100	100	100	90-100	0-0	NP
	7-20	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	20-35	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	35-80	Sand	SP-SM, SP	A-3	0	0	100	100	50-70	0-15	0-14	NP
	I	1	1		ĺ	1	1	I	I	I	1	1

Table 14.—Engineering Properties—Continued

Man unit combe?	Deret-	I HODA tot	Classi	ficat	ion	Frag	ments	Pe	ercenta		_	 T d a== d d	 D3 = :
Map unit symbol	Depth	USDA texture	!			>10	1 2 10	!	sleve	number-	-	Liquid	
and soil name		;	 Unified	-	AASHTO	>10 in	3-10 in	I I 4	I I 10	I I 40	I I 200		ticity index
	 In	<u> </u>	1	i 		Pct	Pct		<u>'</u>	<u> </u>	1	 Pct	1
		i	i İ	i			; ——	i.	I	I	i I	i —	i I
193514:		i	i	i			i	i	I	i	i	i	i
Platteriver	0-1	Highly decomposed plant	PT	ĺ		0	0	100	100	100	90-100		NP
		material	1	1			I	I	I	I	I	1	I
	1-3	Sand	SP-SM, SP	A-3			0	90-100	90-100	50-90	0-15	0-14	NP
	_	Sand	SP-SM, SP	A-3			•	90-100	•	•		•	NP
	14-20	•	SP-SM, SP	A-3			•	90-100	•	•	•	•	•
	20-29	•	SP-SM, SP	A-3			•	190-100	•	•		•	NP
	29-80	Sand	SP-SM, SP	A-3		0	1 0	90-100	90-100	50-90	0-15	0-14	NP
Pipestone	l 0−2	 Sand	 SP-SM, SP	I A-3,	A-2	l I 0	1 0	 85-100	I 185-100	I 150-90	I I 0-35	 0-14	I NP
ripescone		Sand, fine sand	SP-SM, SP	A-3,			•	185-100				•	l NP
		Sand, fine sand	SP-SM, SP	IA-3			•	85-100				0-14	•
		Sand, fine sand	SP-SM, SP	A-3			•	85-100				•	NP
	24-32	Sand, fine sand	SP-SM, SP	A-3		0		85-100					NP
	32-80	Sand, fine sand	SP-SM, SP	A-3		0	1 0	85-100	85-100	50-90	0-35	0-14	NP
		!	!	!			!	!	ļ	!	!	1	1
202010:	0 10	1361-	1.00	13.0		l I 0	1 0	1 100	l . 100	I I 100	100 100	1 0 0	
Houghton	12-26		PT PT	A-8 A-8		0	1 0	100 100	•	•	90-100 40-100	•	NP NP
•	26-80	• • •	PT	IA-8		0	1 0	1 100	•	•	40-100 40-100	•	I NP
		İ	İ	i			į i	i	i	İ	i	i	i
Adrian		Muck	PT	A-8		0	0	100			90-100		NP
	7-20	Muck	PT	A-8		0	1 0	100		90-100	40-100	0-0	NP
	20-35	• • •	PT	A-8		0	1 0		•	•	40-100	•	NP
	35-80	Sand	SP-SM, SP	A-3		0	1 0	100	100	50-70	0-15	0-14	NP
202016:		;	 	-				1	 	 	! !	 	
Spinks	0-5	Sand	SP-SM, SP	 A-3		0	i 0	185-100	85-100	140-85	0-15	0-14	l NP
		Sand, fine sand	SP-SM, SP	IA-3,	A-2		•	185-100	•	•		•	NP
		Sand, fine sand	SP-SM, SP	A-3,			•	185-100	•	•	•	•	NP
	17-62	Loamy fine sand, loamy	SP-SM, SM, SE	P A-3,	A-2	0	0	85-100	85-100	40-85	0-55	0-14	NP
		sand, fine sand, sand	1	1			1	1	l	I	I	1	I
	62-72	Loamy fine sand, loamy	SP-SM, SM, SE	P A-3,	A-2	0	1 0	85-100	85-100	40-85	0-55	0-14	NP
	70.00	sand, fine sand, sand					1 0				0 05	1 0 14	
	/2-80	Sand, fine sand	SP-SM, SP	IA-I,	A-3, A-2	0	1 0	75-100	1 75-100	135-85	0-35	0-14	NP
Tekenink, sandy		i i	i İ	i			<u> </u>	<u> </u>		! 	! 	i	i I
substratum	0-8	Loamy fine sand	SM, SC-SM	A-2,	A-4	0	0	90-100	90-100	65-95	15-50	0-14	NP
	8-16	Loamy sand, loamy fine	SM, SC-SM	A-2,	A-4	0	0	90-100	90-100	45-95	15-50	0-14	NP
		sand	1	1			I	I	I	I	I	I	I
		Sandy loam	SM, SC-SM	A-2,		0		90-100					3-10
	21-49	Sandy loam, loamy sand,	SM, SC-SM	A-2,	A-4	0	1 0	90-100	90-100	45-95	10-50	0-25	NP-10
		loamy fine sand	1	1	_	!	1	1				I	1
		Sandy loam	SM, SC-SM	A-2,			•	190-100	•	•		•	3-10
		Sand, loamy sand Loamy sand, sand	SM, SP-SM, SE SP-SM, SP, SM			0		185-100				0-14 0-14	NP NP

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	 USDA texture	Classi	fication	Frag	ments	P	ercenta sieve	ge pass number-	_	 Liquid	 . Plas-
and soil name	_ 	I .	1	1	>10	3-10	Ī	1	1	ī	limit	ticity
	l	İ	Unified	AASHTO	in	in	4	10	40	200	İ	lindex
	In	T	I	1	Pct	Pct	ī	ı	ı	ī	Pct	ī
		1	1	1	1	1	I	I	I	I	1	1
631170:	l	I	1	1	1	1	1	1	1	1	1	1
Fogg		Sand		A-2, A-3	0		75-100			0-30	0-14	NP
		Loamy sand, sand		A-2, A-3	0	0-3	75-100	•	•	0-30	0-14	NP
		Sand	• •	A-3	0	•	75-100	•	•		0-14	•
	13-21		• •	A-3	1 0		75-100			0-30	•	NP
	21-34	•		A-3	0	•	75-100	•	•	•	0-14	NP
	34-43 	Loamy sand, sandy loam, loamy fine sand, loam	SC-SM, SP-SM	A-2, A-3 	0 	0-3 	75-100 	75-100 	35-90 	10-65 	0-30 	NP-15
	43-48 	Loamy sand, sandy loam, loam, loamy fine sand	SP-SM, SC-SM	A-2, A-3 	0 	0-3 	75-100 	75-100 	35-90 	10-65 	0-30 	NP-10
	48-55	Sandy loam, loam	SC, SC-SM	A-2, A-4	0	0-3	75-100	75-100	35-90	0-65	0-30	NP-15
		Loamy sand, sand	SM, SP-SM	A-2, A-3	J 0	0-3 	75-100	75-100 	35-90 	0-30 	0-14 	NP
Benzonia	l 0-5	Sand	SP-SM, SP	A-3, A-2	i 0	i 0	185-100	1 185-100	140-90	0-15	0-14	NP
		Sand		A-3, A-2	1 0	1 0	185-100	•	•	•	0-14	•
	11-15	•		A-3, A-2	i 0	i 0	85-100	•	•		•	•
	15-20	•		A-3, A-2	i 0		85-100				0-14	
	20-27	•		IA-3, A-2	i 0		185-100			•	0-14	•
	27-35	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	35-80	Loamy sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
631171:	! 	 		i	1			! 	! 	1	i	
Fogg	0-2	Sand	SP-SM, SM	A-2, A-3	1 0	0-3	75-100			0-30	0-14	NP
	•	Loamy sand, sand	• •	A-2, A-3	1 0	•	75-100	•	•	0-30	•	NP
		Sand	• •	A-3	1 0	•	75-100	•	•		0-14	NP
	13-21	•	• •	A-3	0		75-100					NP
	21-34	•	SP-SM, SP	A-3	0		75-100			•	0-14	NP
	34-43	Loamy sand, sandy loam,	SC-SM, SP-SM	A-2, A-3	0	0-3	75-100	75-100	35-90	110-65	0-30	NP-15
	1 40 40	loamy fine sand, loam		1	1	1		1	105.00	1 0 0	1	
	43-48		SP-SM, SC-SM	A-2, A-3	1 0	0-3	75-100	1/2-100	35-90	110-65	1 0-30	NP-10
	 40 FF	loam, loamy fine sand	100 00 014	12024	1 0	1 0 2	175 100	175 100	125 00	1 0 65	1 0 20	INTO 1E
		Sandy loam, loam		A-2, A-4	I 0	0-3 0-3	75-100	•	•	0-65	0-30	NP-15
	l	Loamy sand, sand	SM, SP-SM 	A-2, A-3 	i o	U-3 	75-100 	/3-100		l 0-30	U-14 	NP
Benzonia	0-5	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
		Sand		A-3, A-2	0	1 0	85-100			0-15	•	NP
	11-15	•		A-3, A-2	0	•	85-100	•	•	•	•	•
	15-20	•		A-3, A-2	•		85-100				0-14	•
	20-27			A-3, A-2	•	0	85-100					
	27-35	•		A-3, A-2	1 0	0	85-100	•	•	•	0-14	•
	35-80 	Loamy sand, sand	SP-SM, SM	A-3, A-2 	I 0	0 	85-100 	85-100 	40-90 	5-30 	0-14 	NP

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Classi	fication	Frag	ments	Po	ercenta		-	 Liquid	 Plas-
and soil name	·	1	i	1	>10	I 3-10	i 	<u> </u>	ī	1	limit	
33==3	i	i	Unified	I AASHTO	l in	l in	i 4	I 10	I 40	i 200	1	lindex
	l In	i	1	1	Pct	l Pct		<u> </u>	 	 	 Pct	1
	¦ ===	1		-	====	<u> </u>	1	1	1	1	1	
631172:	l I	1	!	!	1	!	1	1	!	1	1	!
Fogg	I I 0-2	 Sand	I CD CM CM	 A-2, A-3	1 0	I I 0-3	175 100	 75 100	135 00	1 0-30	I 0-14	I I NP
£0gg	l 2-7	Loamy sand, sand	SP-SM, SM SP-SM, SM	A-2, A-3	1 0		•		•	1 0-30	•	•
	•	Sand		A-2, A-3	1 0		•		•	1 0-30	•	•
		•	SP-SM, SP	•	1 0	•	•	•	•	•		I NP
	13-21	•	SP-SM, SP	A-3	'					0-30		•
	21-34	•	SP-SM, SP	A-3	I 0					0-30		NP
	34-43	Loamy sand, sandy loam,	ISC-SM, SP-SM	A-2, A-3	1 0	0-3	1/5-100	1/2-100	35-90	10-65	1 0-30	NP-15
	. 42 40	loamy fine sand, loam		1 2 2 2 2	1	1 0 0	175 100	 75 100	125 00	110 65	1 0 00	1 10
	43-48		SP-SM, SC-SM	A-2, A-3	1 0	0-3	75-100	175-100	35-90	110-65	0-30	NP-10
		loam, loamy fine sand			1	1			105.00	1 0 65	1	
	•	Sandy loam, loam	SC, SC-SM	A-2, A-4	0	0-3	75-100			0-65		NP-15
	55-80	Loamy sand, sand	SM, SP-SM	A-2, A-3	1 0	0-3	75-100	175-100	135-90	0-30	0-14	NP
_		!	1	!	!		!	l 		!	!	1
Benzonia		Sand	SP-SM, SP	A-3, A-2	0	0	85-100	•	•	•		NP
		Sand	SP-SM, SP	A-3, A-2	0	0	85-100			0-15	0-14	NP
	11-15	• • • •	SP-SM, SP	A-3, A-2		0	85-100	•	•	•		•
	15-20	•	SP-SM, SP	A-3, A-2	•	•	85-100	•	•	•	0-14	•
	20-27	•	SP-SM, SP	A-3, A-2	•		85-100					•
	27-35	·	SP-SM, SP	A-3, A-2	•		85-100					•
	35-80	Loamy sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	l	1	1	1	I	1	I	I	l	ı	1	l
631173:	l	I	1	1	1	1	1	I	l	1	1	I
Fogg	0-2	Sand	SP-SM, SM	A-2, A-3	0	•	75-100		•	0-30		NP
	2-7	Loamy sand, sand	SP-SM, SM	A-2, A-3	0		75-100				•	NP
		Sand	SP-SM, SP	A-3		•	•		•	0-30	•	NP
	13-21	•	SP-SM, SP	A-3	•	0-3	75-100	75-100	35-90	0-30	0-14	NP
	21-34	•	SP-SM, SP	A-3	1 0	0-3	75-100	75-100	35-90	0-30		NP
	34-43	Loamy sand, sandy loam,	SC-SM, SP-SM	A-2, A-3	1 0	0-3	75-100	75-100	35-90	10-65	0-30	NP-15
		loamy fine sand, loam	1	1	1		1	I	1	1		1
	43-48	Loamy sand, sandy loam,	SP-SM, SC-SM	A-2, A-3	1 0	0-3	75-100	75-100	35-90	10-65	0-30	NP-10
		loam, loamy fine sand	1	1	1	1	1	I	1	1	1	1
	48-55	Sandy loam, loam	SC, SC-SM	A-2, A-4	0	0-3	75-100	75-100	35-90	0-65	0-30	NP-15
	55-80	Loamy sand, sand	SM, SP-SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	l	1	1	1	1	1	1	I	1	1	1	1
Benzonia	0-5	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	5-11	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	11-15	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	15-20	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	20-27	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	27-35	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	35-80	Loamy sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	l	1	1	1	1	1	1	1	I	1	1	1

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Classi	fication	Frag	ments	P	ercenta sieve	ge pass number-	-	 Liquid	 Plas-
and soil name	I	1	1	1	>10	3-10	Ī	ı	ī	ī	- ∣ limit	ticity
	I	1	Unified	AASHTO	in	in	4	10	40	200	1	index
	In	1	I	I	Pct	Pct	ī	I	ı	ī	Pct	ı
631174:	!	!	1	1	1	!	!	!	1	!	!	!
		10	100 04 04	1202	1 0	1 0 2	175 100	 75 100	125 00	1 0 20	1 0 14	
Fogg		Sand	SP-SM, SM	A-2, A-3	I 0		75-100				0-14	NP
	2-7	Loamy sand, sand Sand	SP-SM, SM	A-2, A-3	1 0		75-100		•	•	•	NP
	13-21	·	SP-SM, SP	A-3	1 0		•	•	•	•	0-14	•
	13-21	•	SP-SM, SP SP-SM, SP	A-3 A-3	1 0						0-14 0-14	
	•	Loamy sand, sandy loam,			1 0	I 0-3	175-100		•	•	•	NP-15
	34-43	loamy fine sand, loam	SC-SM, SP-SM	A-2, A-3	1 0	0-3 	1/3-100	 	33-90	110-65	0-30	 NP-13
	43-48	Loamy sand, sandy loam,	SP-SM, SC-SM	A-2, A-3	0	0-3	75-100	75-100	35-90	10-65	0-30	NP-10
	I	loam, loamy fine sand	1	I i	I	I	1	I	I	1	1	I
	48-55	Sandy loam, loam	SC, SC-SM	A-2, A-4	0	0-3	75-100	75-100	35-90	0-65	0-30	NP-15
	55-80	Loamy sand, sand	SM, SP-SM	A-2, A-3	1 0	0-3	75-100	75-100	35-90	0-30	0-14	NP
Benzonia	I I 0-5	 Sand	 SP-SM, SP	 A-3, A-2	I I 0	I I 0	 85-100	I 185-100	I I 40 – 90	I I 0-15	 0-14	 NP
		Sand	SP-SM, SP	A-3, A-2	i 0	1 0	185-100	•	•	•	•	I NP
	11-15	•	SP-SM, SP	A-3, A-2	i o	1 0	•	•	•	•	0-14	•
	15-20	•	SP-SM, SP	A-3, A-2	•	i 0					0-14	
	20-27		SP-SM, SP	A-3, A-2	•	1 0					0-14	
	27-35	•	SP-SM, SP	A-3, A-2	•	i 0	•		•	•	0-14	•
	•	Loamy sand, sand	SP-SM, SM	A-3, A-2	0	•	•	•	•	•	0-14	•
680939:	l		1		1	1	1	l	I	1	1	1
Fern	ı I 0-9		SP-SM, SM	 A-3, A-2	1 0	1 0	1 185-100	I 185-100	150-90	5-15	I 0-14	I NP
rem	•	Sand, fine sand, loamy	SP-SM, SM	A-3, A-2	1 0	1 0	185-100		•	•	0-14	I NP
	1 9 10	fine sand, loamy sand	I SH, SH	1 3, 1 2			102 100	102 100	100 90	1 2 13	1 0 14	ME
	 10-24	·	SM, SP-SM	A-3, A-2	1 0	. 0	185-100	1 185–100	150-90	1 5-15	I 0-14	I NP
	•	Loamy sand, loam, loamy		A-6, A-7	1 0		185-100		•	•	•	1 5-30
	23 23 	fine sand, clay loam,	I CE, CE ME	I 0, A ,	i		1	103 100	1	1 3 00	1 0 43	1 3 30
	i	fine sand	i	i	i	i	i	i	i	i	i	i
	I 29-42	Loam, clay loam	CL	 A-6, A-7	i o	i 0	185-100	185-100	170-95	150-80	15-45	10-30
		Clay loam, loam	CL	A-7, A-6	i o	i 0					115-45	
		Clay loam, loam	ICL	A-7, A-6	i 0	i 0	•		•	•	115-45	•
	İ	i - '	i	i ′	i	i	i	i	i	i	i	i
Spinks	0-5	Sand	SP-SM, SP	A-3	0	0	185-100	85-100	140-85	0-15	0-14	NP
	5-10	Sand, fine sand	SP-SM, SP	A-3, A-2	0	1 0	85-100	85-100	40-85	0-35	0-14	NP
	10-17	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	Loamy fine sand, loamy	SP-SM, SM, SP	A-3, A-2	0	0	85-100	85-100	40-85	0-55	0-14	NP
	I	sand, fine sand, sand	1	1	1	I	I	I	I	1	1	I
	62-72	Loamy fine sand, loamy	SP-SM, SM, SP	A-3, A-2	0	0	85-100	85-100	40-85	0-55	0-14	NP
	I	sand, fine sand, sand	1	1	I	I	1	I	I	1	1	1
	72-80	Sand, fine sand	SP-SM, SP	A-1, A-3, A-2	0	0	75-100	75-100	35-85	0-35	0-14	NP
	I	1	1	1	1	1	1		1	1	1	1

Table 14.—Engineering Properties—Continued

Map unit symbol	 Depth	USDA texture	Class	ification	Frag 	ments	l P	ercenta sieve	ge pass number-	_	 Liquid	 Plas-
and soil name	ı bepen	l consule	<u> </u>	<u> </u>	>10	I 3-10		1	1			ticity
and soll name	! 	i	Unified	AASHTO	in	in	4	1 10	1 40	200		index
	In	i	i	<u> </u>	l Pct	Pct	i 	i 	i	i	Pct	i i
·	_	i	i	i	; ——	i —	i	i	i i	i	; —	i
680943:	! 	İ	i	i	i	i	i	i	i	i	i	i
Milnichol	0-2	 Fine sand	SP-SM, SP	A-3, A-2	I 0	I 0-5	90-100	190-100	145-80	I 0-35	0-14	, I NP
		Fine sand, sand	SP-SM, SP	A-3, A-2	i o	1 0-5	90-100	•	•		•	l NP
i		Sand, fine sand	SP-SM, SP	A-3, A-2	i o		190-100					•
		Sand, fine sand	SP-SM, SP	A-3, A-2	i o		90-100	•	•		•	•
i		Sand, fine sand	SP-SM, SP	A-3, A-2	i 0		90-100					I NP
i		Sand, fine sand	SP-SM, SP	A-3, A-2	i o	1 0-5	190-100				•	•
i		Stratified loamy fine	SC, SC-SM	A-4	i 0	1 0-5	90-100	•	•		•	NP-10
i	1	sand to fine sandy loam		i	i	i	1	i	1	i	i	1
,	50-68	Clay loam, silty clay	CT	A-4, A-7, A-6	0 	0-5 	90-100 	90-100 	85-100 	65-95 	30-50 	5-30
i	68-80	Silt loam, clay loam,	icı	A-7, A-6, A-4	I 0	0-5	190-100	190-100	175-100	175-95	130-50	5-30
ļ		silty clay loam	!	!	İ		!					
680945:	 	1 1	1		 	 	1	i	 	 	1	
Fern	0-9	Sand	SP-SM, SM	A-3, A-2	0	1 0	85-100	85-100	50-90	5-15	0-14	NP
 	9-10 	Sand, fine sand, loamy fine sand, loamy sand	SP-SM, SM 	A-3, A-2 	0 	I 0	85-100 	85-100 	50-90 	5-15 	0-14 	NP
!	10-24	Sand	SM, SP-SM	A-3, A-2	0	0	85-100	85-100	50-90	5-15	0-14	NP
 	24-29 	Loamy sand, loam, loamy fine sand, clay loam, fine sand	CL, CL-ML 	A-6, A-7 	0 	0 	85-100 	85-100 	50-95 	5-80 	0-45 	5-30
1	29-42	Loam, clay loam	CL	A-6, A-7	0	0	85-100	85-100	70-95	50-80	15-45	10-30
1	42-50	Clay loam, loam	CL	A-7, A-6	0	0	85-100	85-100	70-95	50-80	15-45	10-30
!	50-80	Clay loam, loam	CL	A-7, A-6	0	1 0	85-100	85-100	70-95	50-80	15-45	10-30
680946:	i	i	i	i	Ϊ.	i	i	i	i	İ	i	i
Fern		Sand	SP-SM, SM	A-3, A-2	1 0	•	85-100	•	•		•	NP
1	9-10 	Sand, fine sand, loamy fine sand, loamy sand	SP-SM, SM 	A-3, A-2 	0 	0 	85-100 	85-100 	50-90 	5-15 	0-14 	NP
!	10-24	•	SM, SP-SM	A-3, A-2	1 0	•	85-100	•	•	•	•	NP
1	24-29 	Loamy sand, loam, loamy fine sand, clay loam,	CL, CL-ML	A-6, A-7 	0 	I 0	85-100 	85-100 	50-95 	5-80 	0-45 	5-30
,	00.40	fine sand		1	I	1	105 100	105 466	100.05	1		
,		Loam, clay loam	CL	A-6, A-7	1 0		85-100					
,		Clay loam, loam	CL	A-7, A-6	0	1 0	85-100	•	•	•	•	•
,	50-80	Clay loam, loam	CT	A-7, A-6	I 0	1 0	85-100	185-100	170-95	150-80	115-45	110-30

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	 USDA texture	Class	ification	Frag	ments	P		ge pass	_	 Liquid	 Plas-
and soil name	I	1	1	1	>10	3-10	ī	ı	ī	ı	limit	ticity
	l	1	Unified	AASHTO	in	in	4	10	40	200	1	index
	In	1	I	ı	Pct	Pct	I	ı	ı	I	Pct	ı
680971:	 		1		l	1	1		1		1	1
Nessen	I 0-4	 Sand	SP-SM, SP	 A-3	1 0	i 0	1 185-95	I 185-95	1 150-85	 0-15	 0-14	I NP
Nebben		Sand	SP-SM, SP	IA-3	i 0	1 0	185-95	•	•	•	•	l NP
	11-15	•	SP-SM, SP	IA-3	,	1 0	185-95	•	•	•	•	l NP
	15-24	•	SP-SM, SP	IA-3	, -	1 0	185-95					•
	24-39	•	SP-SM, SP	IA-3	i 0	1 0	185-95		•		0-14	
	•	Gravelly sand,	GP-GM,	A-3, A-1	,	1 0	150-85	•	•	•	0-14	l NP
	1	stratified sand to	SP-SM, SP	1	i	i	1	1	1	1	0 =-	, -:
	' 	gravelly sand,	1	i	i	i	i	i	i	i	i	i
	I	gravelly loamy sand,	i	i	i	i	i	i	i	i	i	i
	I	I sand	i	i	i	i	i	i	i	i	i	i
	44-80	Stratified sand to	GP-GM,	A-3, A-1	i o	i 0	50-85	50-85	50-85	0-15	0-14	NP
	I	gravelly sand, sand,	SP-SM, SP	i ′	i	i	i	i	i	i	i	i
	İ	gravelly sand	i	İ	i	i	i	İ	i	İ	i	i
Kaleva	l I 0-3	 Sand	 SP-SM, SP	 A-3	I I 0	I I 0	 85-100	 85_100	140-90	 0-15	 0-14	l INP
nareva	I 3-9	Sand	SP-SM, SP	IA-3	,	1 0	185-100	•	•	•	0-14	l NP
		Sand	SP-SM, SP	IA-3	,	1 0	185-100				•	l NP
	11-16	•	SP-SM, SP	IA-3	,	1 0	185-100	•	•	•	•	•
	16-21	•	SP-SM, SP	IA-3		1 0	185-100					l NP
	21-70	•	SP-SM, SP	A-3	i 0	1 0	185-100	•	•	•	•	l NP
	70-80	•	SP-SM, SP	A-3	1 0	0	85-100				0-14	NP
680972:	 		1	1	I				1		1	
Nessen	 0-4	Sand	SP-SM, SP	IA-3	i 0	i 0	1 185-95	1 185-95	150-85	0-15	 0-14	l NP
Nessen	•	Sand	SP-SM, SP	IA-3	•	1 0	185-95		•		0-14	l NP
	11-15	•	SP-SM, SP	IA-3			185-95	•	•	•		l NP
	15-24	•	SP-SM, SP	IA-3	, -	i 0	185-95					l NP
	24-39	•	SP-SM, SP	A-3	i o	i 0	85-95		•		0-14	l NP
	•	Gravelly sand,	GP-GM,	A-3, A-1	i o	i 0	150-85				0-14	I NP
	I	stratified sand to	SP-SM, SP	i ′	i	i	i	i	i	i	i	i
	l	gravelly sand,	i	İ	İ	İ	İ	İ	İ	İ	İ	İ
	I	gravelly loamy sand,	1	1	I	1	1	I	I	I	I	I
	l	sand	1	1	I	1	1	I	1	I	1	I
	44-80	Stratified sand to	GP-GM,	A-3, A-1	1 0	0	50-85	50-85	50-85	0-15	0-14	NP
	I	gravelly sand, sand,	SP-SM, SP	1	I	1	1	I		I	1	I
	l	gravelly sand	!	1	ļ.	!	!	!	!	!	!	!
Kaleva	I I 0-3	 Sand	 SP-SM, SP	 A-3	I I 0	I I 0	 85-100	ı 85−100	I 40-90	 0-15	 0-14	I NP
	3-9	Sand	SP-SM, SP	A-3	•	i 0	85-100		•		•	NP
		Sand	SP-SM, SP	A-3	•	i 0	85-100					NP
	11-16	•	SP-SM, SP	A-3	0	1 0	185-100					NP
	16-21		SP-SM, SP	A-3	i o	j 0	85-100				0-14	NP
	21-70	Sand	SP-SM, SP	A-3	i o	j 0	85-100				0-14	NP
	70-80	Sand	SP-SM, SP	A-3	1 0	0	85-100	85-100	40-90	0-15	0-14	NP
	I	1	1	1	1	I	1	I	I	I	I	I

Table 14.—Engineering Properties—Continued

Map unit symbol	 Depth	USDA texture	Class	ification	Frag	ments	P		ge pass: number-	-	 Liquid	 Plas-
and soil name	<u>.</u> -	1	i	1	>10	I 3-10	i	ī	ī		. –	ticity
	i	i	Unified	AASHTO	in	in	4	10	40	I 200	i	lindex
	In	Ī	l	İ	Pct	Pct	Ī	Ī	Ī	l	Pct	Ī
COOOEO	!	!	!	1	!	!	1	!	!	!	!	!
680973:	1			1	!	1	1	105.05	1		1	!
Nessen	•	Sand	SP-SM, SP	A-3	1 0	1 0	85-95	•	•		0-14	NP
	•	Sand	SP-SM, SP	A-3	0	0	85-95			0-15	0-14	NP
	11-15	•	SP-SM, SP	A-3	•	0	•		150-85	•		NP
	15-24	•	SP-SM, SP	A-3	•	1 0			50-85			
	24-39	•	SP-SM, SP	A-3	1 0	1 0	•	•	50-85	•	•	NP
	39-44	Gravelly sand,	GP-GM,	A-3, A-1	1 0	1 0	50-85	50-85	50-80	0-30	0-14	NP
	I	stratified sand to	SP-SM, SP	I	I	I	1	1	1	l	I	1
	I	gravelly sand,	1	I	I	1	1	1	1	l	1	1
	 	gravelly loamy sand, sand	1		1	1	1	1	1	 -	1	1
	I 44_00	Stratified sand to	 GP-GM,	 A-3, A-1	1 0	1 0	150-05	150-05	1 150-85	Ι Ι Λ_15	0-14	I NP
	1 44-00	gravelly sand, sand,	SP-SM, SP	A-3, A-1	0	1 0	120-62	120-62	120-62	1 0-13	1 0-14	I NE
	1		SF-SM, SF	-	-	!	1	!	!	! !	!	!
	! 	gravelly sand	i	i i	i		i	<u> </u>		! 		<u> </u>
Kaleva	0-3	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-90	0-15	0-14	NP
	J 3-9	Sand	SP-SM, SP	A-3	1 0	0	85-100	85-100	40-90	0-15	0-14	NP
	J 9-11	Sand	SP-SM, SP	A-3	1 0	0	85-100	85-100	40-90	0-15	0-14	NP
	11-16	Sand	SP-SM, SP	A-3	1 0	1 0	85-100	85-100	40-90	0-15	0-14	NP
	16-21	Sand	SP-SM, SP	A-3	1 0	1 0	85-100	85-100	40-90	0-15	0-14	NP
	21-70	Sand	SP-SM, SP	A-3	1 0	0	85-100	85-100	40-90	0-15	0-14	NP
	70-80	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	140-90	0-15	0-14	NP
680974:			1		1		1		1	 		1
Nessen	0-4	Sand	SP-SM, SP	 A-3	1 0	. 0	 85-95	185-95	1 150-85	 0-15	0-14	NP
1.00001	•	Sand	SP-SM, SP	IA-3		1 0	185-95				0-14	I NP
	11-15	•	SP-SM, SP	A-3	, ,	i 0	•	•	150-85	•		I NP
	15-24	•	SP-SM, SP	IA-3		1 0			150-85			•
	24-39	• • • •	SP-SM, SP	A-3	, ,	1 0			150-85			
	•	Gravelly sand,	GP-GM,	A-3, A-1	1 0	1 0			150-80		0-14	I NP
	1	stratified sand to	SP-SM, SP	1		i	1	1	1	1	1 0 11	1
	i	gravelly sand,	1	i	i	i	i	i	i	i	i	i
	i	gravelly loamy sand,	<u> </u>	i	i	i	i	i	<u> </u>		i	i
	i	sand	<u> </u>	i	i	i	i	i	<u> </u>		i	i
	1 44-80	Stratified sand to	GP-GM,	 A-3, A-1	1 0	i 0	150-85	150-85	1 150-85	ı I 0-15	0-14	l NP
	1	gravelly sand, sand,	SP-SM, SP	1		i	1	1	1	1 0 10	1 0 11	1
	! !	gravelly sand	1 51 511, 51	<u> </u>	i	i	i	i	<u> </u>		i	<u> </u>
	i i	graverry same	İ	i	i	i	i	i	<u> </u>	' 	i	i
Kaleva	0-3	Sand	SP-SM, SP	A-3	i o	0	85-100	85-100	40-90	0-15	0-14	NP
	3-9	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-90	0-15	0-14	NP
	9-11	Sand	SP-SM, SP	A-3	, , 0	0			40-90	0-15	0-14	NP
	11-16	Sand	SP-SM, SP	A-3	, , 0	0			40-90		0-14	NP
	16-21	Sand	SP-SM, SP	A-3	, , 0	0	85-100	85-100	40-90	0-15	0-14	NP
	21-70	Sand	SP-SM, SP	A-3	, , 0	0			40-90	0-15	0-14	NP
	70-80	Sand	SP-SM, SP	A-3	, , 0	0			40-90		0-14	NP
	I	1	1	1	1	1	1	1	I .	ı	I.	1

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	 USDA texture	Classi	fication	Frag	ments	P	ercenta sieve	ge pass number-	_	 Liquid	 Plas-
and soil name	I	1	ı	1	>10	3-10	ı	ī	ı	ī	 limit	ticity
	l	I	Unified	AASHTO	in	in	4	10	40	200	1	index
	In	1	1	1	Pct	Pct	I	1	1	1	Pct	1
		I	1	1		1	1	1	1	I	1	1
893251:	l	I	I	1	l	I	I	1	1	1	1	1
Boyer		Fine sandy loam		A-2, A-4	0			55-99				
	3-4	Sandy clay loam,	SC-SM, SM	A-2, A-4	0	1 0	55-99	55-99	35-70	115-55	110-40	NP-20
	414	gravelly sandy loam	100.0% 00	12 4 2 0	l I 0	1 0	 F	1	125 70	115 55	110 40	
	4-14 	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2		0	122-99	55-99	135-70	112-22	110-40	INP-20
	I I 1/1-30	Gravelly sandy loam,	•	 A-4, A-2	I I 0	I I 0	1 155-99	ı 155-99	1 135-70	I 115-55	110-40	INTD-2∩
	l 14 30	sandy clay loam	CL-ML	A 4, A 2			133 33	100 99	133 70	1 3 33	1 40	I ZU
	I 30-45	Very gravelly sand,		A-3, A-2, A-1	, I 0	i 0	130-85	 30-85	0-75	0-35	0-14	l NP
	, I	sand, gravelly sand,	GP, GP-GM	1	İ	i			1	i	i	i
	İ	gravelly loamy sand	i '	i	İ	i	i	i	i	i	i	i
	45-80	Stratified gravelly	SP, SP-SM,	A-3, A-2, A-1	0	0	30-85	30-85	0-75	0-35	0-14	NP
	I	sand to sand, very	GP, GP-GM	1	l	I	1	1	1	I	1	I
	l	gravelly sand,	1	1	l	1	I	1	I	1	1	1
	l	gravelly loamy sand	!	1		1	1	1	1	1	1	1
61 1	^ -	101		1.7. 2		1	105.05	105.05	150.00			
Shavenaugh	•	Sand Sand, gravelly sand		A-3 A-3, A-1] 0 I 0	•	•	85-95 70-95	•	•	•	NP NP
		Sand, gravelly sand		A-1, A-3	1 0			170-95 170-95				•
		Sand, gravelly sand		A-1, A-3	1 0	•	•	170-95	•	•	•	•
		Sand, gravelly sand		A-1, A-3	1 0		•	170-95	•	•	•	•
		Loamy sand, gravelly		A-2, A-3, A-1		•	•	155-95	•	•	0-14	•
	I	loamy sand	i	i , ,	İ	i	i	į	į	i	i	İ
	44-80	Gravelly sand, very	GP-GM, GM, GP	A-3, A-1	0	0	30-85	30-85	0-80	0-30	0-14	NP
	I	gravelly sand, very	1	1	l	I	1	1	1	I	1	I
	l	gravelly loamy sand,	1	1	l	1	1	1	1	1	1	1
	l	stratified sand to	1	1	l	I	I	I	I	I	1	I
	!	gravelly sand	!			!	!	!	!	!	!	!
894062:	 	1			 	1	 		1	1	1	1
Remus	I 0-9	 Fine sandy loam	SC-SM, SC	 A-2, A-4	I I 0	1 0	1 180-100	 80-100	I 150-85	1 130-50	1 110-25	I I 3-10
Nemus		Loamy sand, loam, fine		A-2, A-4	1 0			80-100				
	, , <u>-</u>	sandy loam	1	I,	İ	i	1	1	1	1	1	1
	15-24	Sandy loam, loam, sandy	SM, SC, CL-ML	A-2, A-4		0	80-100	80-100	50-95	10-75	0-40	NP-20
	l	clay loam, fine sandy	i	İ	ĺ	İ	İ	ĺ	ĺ	İ	İ	İ
	l	loam, loamy sand	1	1	l	I	I	1	1	1	1	1
	24-35		SC, CL-ML	A-2, A-4, A-6	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	l	loam, loam, loamy	I	1	l	I	I	1	1	1	1	1
		sand, fine sandy loam										
		Loam, sandy clay loam		A-4, A-6	0			180-100				
	1 66-80	Loam, sandy clay loam, sandy loam	SC, CL-ML	A-4, A-6	0	0	180-T00	80-100	100-95	125-75	115-40	1 1-20
	I I	Sandy Toam	1	1	 	1	1	1	1	1	1	1
	ı	I	I	1	1	1	1	1	1	1	1	1

Table 14.-Engineering Properties-Continued

!	l	I	Classi:	fication	Frag	ments	Pe	ercenta		-	1	I
Map unit symbol	Depth	USDA texture	I		<u> </u>		<u> </u>	sieve 1	number-		Liquid	
and soil name	l	I	I	l	>10	3-10	I	l	Ι .	1	limit	-
	<u> </u>	<u> </u>	Unified	AASHTO	in	in	4	10	40	200	<u> </u>	index
ļ.	I In	I	I	l	Pct	Pct	I	I	I	I	Pct	I
		I .	1	<u> </u>	l	1	1	l	I		1	1
894062:						!						!
Spinks		Sand		A-3	0		85-100			0-15	0-14	NP
		Sand, fine sand	. ,	A-3, A-2	0		185-100					NP
		Sand, fine sand		A-3, A-2	l 0 I 0		185-100					NP
 	1 17-62	Loamy fine sand, loamy	SP-SM, SM, SP	A-3, A-2	. 0	1 0	85-100	182-100	140-85	1 0-55	0-14	NP
	 62_72	sand, fine sand, sand Loamy fine sand, loamy	SP-SM, SM, SP	 	I I 0	I I 0	 85-100	 05_100	 40_05	I I 0-55	I I 0-14	I INP
	02-72 	sand, fine sand, sand	I SE-SM, SM, SE	A-3, A-2 		1 0	102-100	1	140-03	1 0-33	1 0-14	NE
	I I 72-80	Sand, fine sand	SP-SM, SP	 A-1, A-3, A-2	I 0	i I 0	 75-100	I 175-100	I 135-85	1 0-35	0-14	I NP
	, , <u>,</u> 00	I	1			1	1 73 100	73 ±00	1	1 0 33	1 0 14	1 112
894063:	! 	i	i	i	' 	i	<u> </u>	i	i	i	i	i
Remus	0-9	 Fine sandy loam	SC-SM, SC	 A-2, A-4	I 0	i 0	80-100	80-100	150-85	130-50	110-25	3-10
		Loamy sand, loam, fine		A-2, A-4	i 0	•	180-100	•	•	•	•	•
ī		sandy loam	i ,	İ	i	i	i	İ	İ	i	i	i
ļ	15-24	Sandy loam, loam, sandy	SM, SC, CL-ML	A-2, A-4		0	80-100	80-100	50-95	110-75	0-40	NP-20
j		clay loam, fine sandy	i i	İ	l	İ	Ì	İ	İ	İ	İ	İ
· · · · · · · · · · · · · · · · · · ·	l	loam, loamy sand	1	I	I	I	I	I	I	1	1	I
· ·	24-35	Sandy clay loam, sandy	SC, CL-ML	A-2, A-4, A-6	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
· ·	l	loam, loam, loamy	1	l	l	I	1	I	I	1	1	1
!		sand, fine sandy loam	1	I	l	I		l	l	1	1	1
!		Loam, sandy clay loam		A-4, A-6	0		80-100	•	•	•	•	•
!	66-80	. , ,	SC, CL-ML	A-4, A-6	0	1 0	80-100	80-100	60-95	25-75	15-40	1-20
		sandy loam	1				1			1	1	1
!						!						
Spinks		Sand	. ,	A-3	0		85-100	•	•	•	•	NP
		Sand, fine sand		A-3, A-2	0		185-100					NP
ſ		Sand, fine sand		A-3, A-2	l 0 I 0		185-100					NP NP
	1 17-62	Loamy fine sand, loamy sand, fine sand, sand	SP-SM, SM, SP	A-3, A-2		1 0	85-100	182-100	140-85	1 0-55	0-14	I NP
	I I 62-72	Loamy fine sand, sand	SP-SM, SM, SP	 	I I 0	1 0	 85-100	I I 85-100	I I // Λ _ Ω 5	1 0-55	0-14	I NP
	02 /2 	sand, fine sand, sand	SE SM, SM, SE	I	1	1	100 100	100 100	1 40 03	1 0 33	1 0 14	ME
,	1 1 72-80	Sand, fine sand	SP-SM, SP	 A-1, A-3, A-2	, I 0	I 0	75-100	175-100	135-85	0-35	0-14	l NP
	, , <u>,</u> 00	I	1	1	ı	i	1	75 ±00	1	1	1	112
894064:	i	i	i	i	i i	i	i	i	i	i	i	i
Fern	0-9	Sand	SP-SM, SM	A-3, A-2	I 0	I 0	85-100	85-100	50-90	5-15	0-14	NP
i	9-10	Sand, fine sand, loamy		A-3, A-2	0	0	85-100	85-100	50-90	5-15	0-14	NP
ļ	l	fine sand, loamy sand	İ	İ	l	ĺ	Ì	İ	ĺ	İ	Ì	İ
· · · · · · · · · · · · · · · · · · ·	10-24	Sand	SM, SP-SM	A-3, A-2	0	0	85-100	85-100	50-90	5-15	0-14	NP
!	24-29	Loamy sand, loam, loamy	CL, CL-ML	A-6, A-7	0	0	85-100	85-100	50-95	5-80	0-45	5-30
!	l	fine sand, clay loam,	1	I	l	I	I	l	I	1	1	I
!	•	fine sand	1	l	l	I	I	l	I	1	1	I
, i		Loam, clay loam		A-6, A-7	0	1 0	85-100	85-100	70-95	50-80	15-45	10-30
					I 0	1 0	10F 100	105 100	170 05			110 20
		Clay loam, loam Clay loam, loam	•	A-7, A-6 A-7, A-6	I 0		85-100 85-100				15-45	

Table 14.—Engineering Properties—Continued

 Map unit symbol	l	I	Classi	fication	Frag	ments	l Po	s Percentage passing sieve number				I
	Depth	USDA texture	1		<u> </u>			sieve	number-	_	Liquid	Plas-
and soil name		I	1	1	>10	3-10	1		1	1		ticity
!	<u> </u>	<u> </u>	Unified	AASHTO	in	in	4	10	40	200	<u> </u>	index
	In In	I	1	1	Pct	Pct	I	1	I	1	Pct	I
	l	!	1	!	l	1	1	1	1	1	1	1
894064:		!				!						
Remus				A-2, A-4	0	0	180-100					
!	9-15	Loamy sand, loam, fine	SC-SM, SC	A-2, A-4	1 0	1 0	180-100	180-100	50-95	30-75	0-30	NP-15
!		sandy loam				!						
!	15-24	Sandy loam, loam, sandy	SM, SC, CL-ML	A-2, A-4	I 0	1 0	180-100	180-100	150-95	110-75	0-40	NP-20
!		clay loam, fine sandy	!	!	!	!	!	!	!	!	!	!
!		loam, loamy sand		1	l ,	1	1	100 100		140 55		
	24-35		SC, CL-ML	A-2, A-4, A-6	I 0	1 0	180-100	180-100	150-95	110-75	0-40	INP-20
		loam, loam, loamy	!		!	!	!	!	!	!	!	!
	1 25 66	sand, fine sandy loam		12.4.2.6	1	1	100 100	100 100	1 60 05	105 75	115 40	1 1 00
		Loam, sandy clay loam		A-4, A-6	I 0 I 0	1 0	180-100					
	66-80	Loam, sandy clay loam,	ISC, CL-ML	A-4, A-6	. 0	. 0	180-100	180-100	160-95	125-75	115-40	1 1-20
,	 	sandy loam	!	1	!	!	!	!	!	!		!
894065: I			!	1	!	!	!	!	!	!		!
Fern	I I 0-9	 Sand	SP-SM, SM	 A-3, A-2	I I 0	1 0	185-100	105 100	1 50 00	1 5 15	1 0 14	I NP
rern		Sand, fine sand, loamy		A-3, A-2		,	185-100	•	•	•	0-14	
, ,	1 3-10	fine sand, loamy sand	ISP-SM, SM	A-3, A-2		1 0	102-100	102-100	120-30	1 2-13	1 0-14	I NE
,	I I 10-24	·	SM, SP-SM	 A-3, A-2	I 0	i 0	185-100	105_100	150-00	I I 5_15	1 0-14	I NP
,		Loamy sand, loam, loamy		A-6, A-7	1 0	•	185-100		•	•	•	•
,	23 23	fine sand, clay loam,	I CH, CH MH	I 0, A /	1	1 0	103 100	102 100	120 32	1 3 00	1 0 -33	1 2 20
,	! 	fine sand		! !	! !		<u> </u>	<u> </u>		<u> </u>	<u> </u>	
ļ		Loam, clay loam	CL	A-6, A-7	i I 0	i 0	85-100	185-100	170-95	150-80	115-45	110-30
ļ		Clay loam, loam		A-7, A-6	1 0	1 0	185-100					
ļ		Clay loam, loam		A-7, A-6	1 0		185-100					
ļ	1	I	1	1	,	i	1	1	1	1	1	1
Remus	ı I 0-9	 Fine sandy loam	SC-SM, SC	A-2, A-4	, I 0	i 0	180-100	180-100	150-85	130-50	110-25	i 3-10
1	•	Loamy sand, loam, fine		A-2, A-4	1 0	1 0	180-100		•	•	•	•
ī	2 _0	sandy loam	1	1	İ	i	1	1	1	1		1
ī	15-24	Sandy loam, loam, sandy	ISM. SC. CL-ML	A-2. A-4	i 0	i 0	180-100	180-100	150-95	10-75	I 0-40	INP-20
i		clay loam, fine sandy	1	1	i	i	1	i	i	1	1	1
i	İ	loam, loamy sand	i	i	i i	i	i	i	i	i	i	i
i	24-35	Sandy clay loam, sandy	ISC, CL-ML	A-2, A-4, A-6	i 0	i 0	180-100	180-100	150-95	10-75	I 0-40	INP-20
i	İ	loam, loam, loamy	i i	i , , , i	i	i	i	i	i	i	i	i
i	İ	sand, fine sandy loam	i	i	i İ	i	i	i	i	i	i	i
i	35-66		SC, CL-ML	A-4, A-6	0	0	80-100	80-100	160-95	25-75	15-40	1-20
j		Loam, sandy clay loam,		A-4, A-6			180-100					
j	l	sandy loam	i i	1	I	I	1	I	I	1	1	I
j	l	1	1	1	I	I	1	I	I	1	1	I

Table	14	Engineering	Pron	erties	-Continued

	l	!	Classi	fication	Frag	ments	P	ercenta		_	1	!
Map unit symbol	Depth	USDA texture	I		<u> </u>		<u> </u>	sieve	number-		Liquid	
and soil name	I	1	1	1	>10	3-10	1	1	1	1		ticity
	I	1	Unified	AASHTO	in	in	4	10	40	200	I	index
	In	1	I	I	Pct	Pct	ī	ı	Ī	ī	Pct	Ī
	. —	1	1	I			I.	ĺ	I	I		I
894104:	i	i	i	i	i	i	i	i	i	i	i	i
Mollineaux	I 0-6	Loamy sand	SP-SM, SM	A-3, A-2	i 0	i 0	85-100	185-100	145-90	I 5-35	I 0-14	I NP
	•	· -	SP-SM, SM	A-3, A-2	i o	•	185-100	•	•	•	•	l NP
	 i	sand, sand, fine sand	1	1	i	i	i	i	1	i	i	i
	I 9–15	Loamy sand, loamy fine	SP-SM, SM	A-3, A-2	i 0	i o	85-100	185-100	145-90	I 5-35	0-14	l NP
	1	sand, fine sand, sand	1	1		i	1	1	1	1	1 0 11	1
	ı I 15-27	Loamy sand, loamy fine	SP-SM, SM	A-3, A-2	i I 0	i 0	1 185-100	1 185-100	1 145-90	1 5-35	0-14	l NP
	1 13 27	sand, fine sand, sand	I SE SE, SE	I 3, A 2	1	1	102 100	102 100	1 23 30	1 2 22	1 0 14	l NE
	I I 27 20	Loamy sand, sand, fine	SP-SM, SM	 A-3, A-2	I 0	1 0	1 185-100	105 100	145 00	1 5 25	1 0 14	I INP
	21-30	· -	SP-SM, SM	A-3, A-2		1 0	102-100	102-100	143-90	1 5-35	1 0-14	I NP
	1 20 64	sand, loamy fine sand	107	1 7 7 7 4	1	1 ^	105 100	105 100	170 05	1 70	120 45	I
		Loam, clay loam	CL	A-7, A-6, A-4		•	185-100	•	•	•	•	5-25
	64-80		SP-SM, SM	A-3, A-2	1 0	1 0	185-100	182-100	145-90	5-35	0-14	NP
	!	sand, sand, fine sand	!	!	!	!	!	!	!	!	!	!
	!	!	1		!	!	!		!		!	
Remus	•	Fine sandy loam	SC-SM, SC	A-2, A-4	1 0	•	•	•	•	•	10-25	•
	9-15	Loamy sand, loam, fine	SC-SM, SC	A-2, A-4	1 0	1 0	180-100	80-100	50-95	30-75	0-30	NP-15
	I	sandy loam	1	1	l	1	I	I	l	1	ı	I
	15-24	Sandy loam, loam, sandy	SM, SC, CL-ML	A-2, A-4	1 0	1 0	80-100	80-100	50-95	10-75	0-40	NP-20
	I	clay loam, fine sandy	1	1	l	1	I				I	
	I	loam, loamy sand	1	1	l	1	I				I	1
	24-35		SC, CL-ML	A-2, A-4, A-6	0	0	180-100	80-100	50-95	10-75	0-40	NP-20
	I	loam, loam, loamy	1	1	l	1	I				1	
	I	sand, fine sandy loam	1	1	l	1	I				1	
	35-66	Loam, sandy clay loam	SC, CL-ML	A-4, A-6	0	0	80-100	80-100	60-95	25-75	15-40	1-20
	66-80	Loam, sandy clay loam,	SC, CL-ML	A-4, A-6	0	0	80-100	80-100	60-95	25-75	15-40	1-20
	I	sandy loam	1	1	I	1	I	1	I	1	I	I
	I	1	1	1	I	1	I	I	I	1	1	I
894105:	I	1	1	1	I	1	I	I	I	1	1	I
Mollineaux	0-6	Loamy sand	SP-SM, SM	A-3, A-2	0	1 0	85-100	85-100	45-90	5-35	0-14	NP
	l 6-9	Loamy sand, loamy fine	SP-SM, SM	A-3, A-2	0	1 0	185-100	185-100	145-90	5-35	0-14	NP
	i İ	sand, sand, fine sand	i '	i ,	i İ	i	i	i	i	i	i	i
	I 9-15	Loamy sand, loamy fine	SP-SM, SM	A-3, A-2	I 0	i 0	85-100	185-100	45-90	I 5-35	i 0-14	NP
	i	sand, fine sand, sand	i	i -,	i	i	i	i	i	i	i	i
	I 15-27	Loamy sand, loamy fine	SP-SM, SM	A-3, A-2	i 0	i 0	85-100	185-100	145-90	I 5-35	I 0-14	I NP
	<i></i> I	sand, fine sand, sand		== = = = = = = = = = = = = = = = = =	i	i	1		, ₋	1	1	 I
	27-38	Loamy sand, sand, fine	SP-SM, SM	A-3, A-2	i I 0	i 0	1 185-100	185-100	145-90	1 5-35	0-14	l NP
	, 2, 30 I	sand, loamy fine sand	I	I 3, A 2			1	100 100	1 23 30	1 3 33	1 0 14	1 442
	1 38-64	Loam, clay loam	I CL	 A-7, A-6, A-4	I 0	1 0	 85-100	185_100	170-05	150-70	130-45	I 5-25
		·	SP-SM, SM	A-7, A-6, A-4 A-3, A-2	1 0		185-100					5-25 NP
	1 04-00		SF-SM, SM	A-3, A-2		1 0	192-100	102-100	1-23-30	1 2-35	1 0-14	I NE
	I	sand, sand, fine sand	1	1	1	1	1	1	I	1	1	I

Table 14.-Engineering Properties-Continued

Map unit symbol	 Depth	USDA texture	Classi	ficat	cion		Frag 	ments	P	ercenta sieve	ge pass number-	-	 Liquid	 Plas-
and soil name	I	1	1	ī			>10	3-10	ī	ī	ī	ī	limit	ticity
	I	1	Unified	l	AASHTO)	in	in	4	10	40	200	1	index
	In	T	ı	ı			Pct	Pct	ī	ī	ī	ī	Pct	ī
	ı —	1	1	I		-	ı ——	1	1	1	I	1	1	1
894105:	l	I	1	I		-	l	1	1	1	1	1	1	1
Remus	0-9	Fine sandy loam	SC-SM, SC	A-2,	A-4	-	0	0	80-100	80-100	50-85	30-50	10-25	3-10
	9-15	Loamy sand, loam, fine	SC-SM, SC	A-2,	A-4	-	0	0	80-100	80-100	50-95	30-75	0-30	NP-15
	l	sandy loam	1	I			l	1	1	1	1	1	1	1
	15-24	Sandy loam, loam, sandy	SM, SC, CL-ML	A-2,	A-4		0	1 0	80-100	80-100	50-95	10-75	0-40	NP-20
	l	clay loam, fine sandy	1	I			l	1	1	1	1	1	1	1
	I	loam, loamy sand	1	l		- 1	l	1	1	1	1	1	1	
	24-35	Sandy clay loam, sandy	SC, CL-ML	A-2,	A-4,	A-6	0	1 0	80-100	80-100	50-95	10-75	0-40	NP-20
	I	loam, loam, loamy	1	I			l	1	1	1	I	1	1	
	l	sand, fine sandy loam	1	I		I	Ι.	1	1	1	1	1	1	1
		Loam, sandy clay loam		A-4,			0						15-40	
	66-80		SC, CL-ML	A-4,	A-6		0	1 0	80-100	80-100	160-95	25-75	15-40	1-20
	!	sandy loam	!	l				!	!	!		!	!	!
004465	!	!	!	!				!	!	!	!	!	!	!
894165:	l			I				1	105 400	105 100	1 40 05	1 0 15	1 0 1 4	
Spinks	•	Sand	, .	A-3	- 0		0 0	•	•	185-100	•	•	0-14	NP
		Sand, fine sand		A-3,			I 0	•	•	85-100	•	•	•	NP NP
		Sand, fine sand		A-3,			1 0			185-100				
	1 17-02	Loamy fine sand, loamy sand, fine sand, sand	SP-SM, SM, SP	A-3,	A-2			1 0	102-100	102-100	140-65	1 0-55	0-14	I NP
	I I 62-72	Loamy fine sand, loamy	SP-SM, SM, SP	y = 3 	7 2		I I 0	1 0	105_100	1 185-100	140-05	1 0-55	I 0-14	I NP
	02-72 	sand, fine sand, sand	I SE-SM, SM, SE	A-J,	A-2		,	1 0	102-100	102-100	140-02	1 0-33	1 0-14	I NE
	I I 72-80	Sand, fine sand	SP-SM, SP	ι ΙΣ – 1	A-3,	Δ-2	I 0	1 0	175-100	175-100	1 135-85	1 0-35	0-14	I NP
	72 00 	I	1	11	п Э,			i	175 100	175 100	1	1 0 33	1 0 14	1 442
Tekenink, sandy	i I	i	i	i		ï	i	i	i	i	i	i	i	i
substratum	I 0-8	Loamy fine sand	SM, SC-SM	' A-2,	A-4	ï	0	i 0	190-100	90-100	165-95	115-50	0-14	i NP
	•	· =		A-2,		i	0	•	•	90-100	•	•	•	l NP
	İ	sand	İ	i ´		i	i	i	i	i	i	i	i	i
	16-21	Sandy loam	SM, SC-SM	A-2,	A-4	i	0	0	90-100	90-100	55-90	115-40	110-25	3-10
		Sandy loam, loamy sand,		A-2,		i	0	0	90-100	90-100	45-95	110-50	0-25	NP-10
	I	loamy fine sand	1	I			l	1	I	1	I	I	1	I
	49-62	Sandy loam	SM, SC-SM	A-2,	A-4		0	0	90-100	90-100	55-80	25-40	10-25	3-10
	62-72	Sand, loamy sand	SM, SP-SM, SP	A-2,	A-3	-	0	0	85-100	85-100	40-80	0-25	0-14	NP
	72-80	Loamy sand, sand	SP-SM, SP, SM	A-2,	A-3	-	0	0	85-100	85-100	40-80	0-25	0-14	NP
	l	1	1	l		-	l	1	1	1	I	1	1	1
899682:	l	1	1	l		- 1	l	1	1	1	1	1	1	1
Kaleva	•	Sand		A-3		- 1	0	•	•	85-100	•	•	•	NP
	•	Sand	. ,	A-3		- 1	0			85-100				NP
	•	Sand		A-3			0	•	•	•	•	•	0-14	•
	11-16	·	. ,	A-3		- 1	0			85-100			0-14	•
	16-21		. ,	A-3		- 1				85-100				NP
	21-70	·	, .	A-3			0	•	•	85-100	•	•	•	NP
	70-80	Sand	SP-SM, SP	A-3			0	1 0	185-100	85-100	40-90	0-15	0-14	NP
	I	I	I	I			l	I	I	I	1	I	I	I

Table 14.-Engineering Properties-Continued

	I	1	Class	ification	Frag	ments	P	ercenta	ge pass	ing	1	1
Map unit symbol	Depth	USDA texture	1		1		1	sieve	number-	-	Liquid	Plas-
and soil name	I	1	1	1	>10	3-10	ī	ı	ī	ī	limit	ticity
	I	1	Unified	AASHTO	in	in	4	10	40	200	1	index
	In	1	1	1	Pct	Pct	Ϊ	ı	ī	ī	Pct	ī
		1	1	ĺ			I	1	I	1		I
899722:	İ	i	i	i	i	i	i	i	i	i	i	i
Goodharbor	0-1	Sand	SP-SM, SP	A-3	0	0	80-100	80-100	40-90	0-15	0-14	NP
	1-3	Sand, fine sand	SP-SM, SP	A-3	0	0	80-100	80-100	40-90	0-15	0-14	NP
	3-23	Sand, fine sand	SP-SM, SP	A-3	0	0	80-100	80-100	140-90	0-15	0-14	NP
	23-40	Sand, fine sand	SP-SM, SP	A-3	0	0	80-100	80-100	40-90	0-15	0-14	NP
	40-80	Sand, fine sand	SP-SM, SP	A-3	0	0	80-100	80-100	40-90	0-15	0-14	NP
	I	1	1	1	1	I	I	I	I	1	1	I
899731:	I	1	1	1	1	1	1	I	I	1	1	I
Covert	0-1	Sand	SP-SM, SP	A-3, A-2	0	0	90-100	90-100	45-90	0-15	0-14	NP
	1-8	Sand	SP-SM, SP	A-3, A-2	0	0	90-100	90-100	45-90	0-15	0-14	NP
	8-18	Sand	SP, SP-SM	A-3, A-2	0	0	90-100	90-100	45-90	0-15	0-14	NP
	18-25	Sand	SP, SP-SM	A-3, A-2	0	0	90-100	90-100	45-90	0-15	0-14	NP
	25-29	Sand	SP, SP-SM	A-3, A-2	0	0	90-100	90-100	45-90	0-15	0-14	NP
	29-38	Sand	SP-SM, SP	A-3, A-2	0	0	90-100	90-100	45-90	0-15	0-14	NP
	38-47	Sand	SP, SP-SM	A-3, A-2	0	0	90-100	90-100	45-90	0-15	0-14	NP
	47-80	Sand	SP, SP-SM	A-3, A-2	0	0	90-100	90-100	45-90	0-15	0-14	NP
	I	1	1		1	1	1	1	1	1	1	I
Pipestone	0-2	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	50-90	0-35	0-14	NP
	2-9	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	50-90	0-35	0-14	NP
	9-12	Sand, fine sand	SP-SM, SP	A-3	0	0	85-100	85-100	50-90	0-35	0-14	NP
	12-24	Sand, fine sand	SP-SM, SP	A-3	0	0	85-100	85-100	50-90	0-35	0-14	NP
	•	Sand, fine sand	SP-SM, SP	A-3	0	0	85-100	85-100	50-90	0-35	0-14	NP
	32-80	Sand, fine sand	SP-SM, SP	A-3	0	0	85-100	85-100	50-90	0-35	0-14	NP
	I	1	1	1	1	1	1	1	1	1	1	1
899733:	l	1	1	1	1	1	1	1	1	1	1	1
Covert	•	Sand	SP-SM, SP	A-3, A-2	0	0	90-100	90-100	45-90	0-15	0-14	NP
	1-8	Sand	SP-SM, SP	A-3, A-2	•	0	90-100	90-100	45-90	0-15	0-14	NP
	•	Sand	SP, SP-SM	A-3, A-2		•	90-100	90-100	45-90	0-15	0-14	•
	18-25	•	SP, SP-SM	A-3, A-2		•	90-100	90-100	45-90	0-15	0-14	•
	25-29	Sand	SP, SP-SM	A-3, A-2		0	90-100	90-100	45-90	0-15	0-14	NP
	29-38	•	SP-SM, SP	A-3, A-2		•	90-100	90-100	45-90	0-15	0-14	•
	38-47	•	SP, SP-SM	A-3, A-2	, ,		•	•	•	•	0-14	•
	47-80	Sand	SP, SP-SM	A-3, A-2	1 0	0	90-100	90-100	45-90	0-15	0-14	NP
	I	1	1		1	1	1	1	1	1		I
Dair	•	Muck	PT	A-8	1 0	0	100		•	90-100		NP
	4-7	Mucky loam, loam, mucky	SC-SM	A-2	1 0	1 0	100	100	60-90	30-75	15-20	NP-10
	l .	sandy loam	1	1	1	Ι .	1	1	1	1	1	I
	•	Sand	SP, SP-SM	A-2, A-3	0		90-100	•	•	0-15	0-14	NP
	11-21	•	SP, SP-SM	A-2, A-3	•		90-100				•	NP
	21-50	• • • • • • • • • • • • • • • • • • • •	SP, SP-SM	A-2, A-3	•	•	90-100	•	•	•		•
	50-80	Sand	SP, SP-SM	A-2, A-3	1 0	1 0	90-100	90-100	45-90	0-15	0-14	NP
	I	1	1	1	1	I	1	I	I	1	1	1

Table 14.—Engineering Properties—Continued

	1	Class:	ification	Fragments	Percentage passing	T T
Map unit symbol Depth	USDA texture	1		1	sieve number	Liquid Plas-
and soil name	1	ı	I	>10 3-10		limit ticity
1	1	Unified	AASHTO	in in	4 10 40 200	index
In	1	ī	T	Pct Pct		Pct
ı —	1	1	1	1 — 1 —		1
899734:	1	1	1	1 1		1 1
Benzonia 0-5	Sand	SP-SM, SP	A-3, A-2	0 0	85-100 85-100 40-90 0-15	0-14 NP
5-11	Sand	SP-SM, SP	A-3, A-2	0 0	85-100 85-100 40-90 0-15	0-14 NP
11-15	Sand	SP-SM, SP	A-3, A-2	0 0	85-100 85-100 40-90 0-15	0-14 NP
15-20	Sand	SP-SM, SP	A-3, A-2	0 0	85-100 85-100 40-90 0-15	0-14 NP
20-27	Sand	SP-SM, SP	A-3, A-2	0 0	85-100 85-100 40-90 0-15	0-14 NP
27-35	Sand	SP-SM, SP	A-3, A-2	0 0	85-100 85-100 40-90 0-15	0-14 NP
35-80	Loamy sand, sand	SP-SM, SM	A-3, A-2	0 0	85-100 85-100 40-90 5-30	0-14 NP
<u> </u>	1	1	<u> </u>	1	<u> </u>	1 1

Table 15.-Physical Soil Properties

(Sand, silt, and clay values are shown either as a range or as a representative value (rv). Absence of an entry indicates that data were not estimated. Soil properties are measured or inferred from direct observations in the field or laboratory)

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available		Organic
and soil name		!		. !	bulk	(Ksat)	water	swell	matter
	<u> </u>	!		<u> </u>	density	<u> </u>	capacity	potential	
	In In	Pct	Pct	Pct	g/cc	In/hr I	In/in	Pct	Pct
190775:]]	 	 						
Adrian	0-8	I 10	I 50 I	40 i	0.30-0.55	0.2-5.9	0.35-0.45	i i	75-90
	8-24	10	65	25 I	0.30-0.55	0.2-5.9	0.24-0.45	i i	80-95
	24-60	94	1 1	0-10	1.40-1.65	5.9-20.0	0.03-0.10	0.0-2.9	0.0-0.5
Houghton	 0-10	 10	50	40	0.10-0.35		0.35-0.45		75-90
_	10-60	10	65	25 I	0.10-0.35	0.2-5.9	0.35-0.45		80-95
190777:]]	 	 						
Alcona	0-8	67	23	5-15	1.10-1.60	0.6-5.9	0.12-0.18	0.0-2.9	1.0-3.0
	8-12	85	7	2-15	1.25-1.70	0.6-5.9	0.10-0.17	0.0-2.9	0.6-1.0
	12-18	•			1.35-1.70			0.0-2.9	0.0-0.5
	18-24	•			1.35-1.70			0.0-2.9	0.0-0.5
	24-60	84	4	5-18	1.50-1.70	0.6-2.0	0.08-0.20	0.0-2.9	0.0-0.5
Richter	0-8	67	23	5-15	1.20-1.50	2.0-5.9	0.12-0.15	0.0-2.9	2.0-4.0
	8-27	64	20	10-22	1.35-1.60	0.6-2.0	0.10-0.18	0.0-2.9	0.0-0.5
	27-60	85	7	2-15	1.60-1.70	0.6-2.0	0.08-0.13	0.0-2.9	0.0-0.5
190778:) 	! 						i i	
Alcona		67	23		1.10-1.60			0.0-2.9	1.0-3.0
	8-12	•	7		1.25-1.70		0.10-0.17		0.6-1.0
	12-18	•	4		1.35-1.70			0.0-2.9	0.0-0.5
	18-24	•	19		1.35-1.70		0.13-0.20		0.0-0.5
	24-60 	84 	4	5-18 I	1.50-1.70	0.6-2.0 	0.08-0.20	0.0-2.9	0.0-0.5
Richter	0-8	67	23	5-15	1.20-1.50	2.0-5.9	0.12-0.15	0.0-2.9	2.0-4.0
	8-27	64	20	10-22	1.35-1.60	0.6-2.0	0.10-0.18	0.0-2.9	0.0-0.5
	27-60	85	7	2-15	1.60-1.70	0.6-2.0	0.08-0.13	0.0-2.9	0.0-0.5
190779:	 	 	 						
Alpena	0-4	67	23	5-15	1.25-1.55	2.0-20.0	0.05-0.14	0.0-2.9	2.0-4.0
	4-60	91	4	0-10	1.25-1.65	20.0-20.0	0.02-0.04	0.0-2.9	0.0-0.5
190780:	 	 	 						
Au Gres	0-12	J 95	1	0-8	1.30-1.55	5.9-20.0	0.07-0.10	0.0-2.9	2.0-4.0
	12-24	J 90	2	1-15	1.50-1.70	5.9-20.0	0.06-0.09	0.0-2.9	0.6-1.0
	24-60	95	1 1	0-8	1.50-1.70	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
Kalkaska	 0-7	 94	1		1.25-1.45		0.05-0.09	0.0-2.9	1.0-4.0
į	7-15	91	2	0-15	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	1.0-3.0
į	15-32	94	1	0-10	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	32-60	I 94	1 1	0-101	1.35-1.50	5.9-20.0	0.04-0.06	1 0.0-2.9 1	0.0-0.5

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name			 I I		bulk	(Ksat)	water	swell	matter
	İ	İ	i i	i	density	i i	capacity	potential	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
			. — .			ı — ı		. — .	
190781:						l I		1 1	
Bach	0-8	45	42	8-18	1.15-1.50	0.6-2.0	0.20-0.24	0.0-2.9	2.0-6.0
	8-19	30	55		1.30-1.60		0.16-0.24		0.0-0.5
	19-60	5	77	8-27	1.35-1.70	0.2-0.6	0.10-0.18	0.0-2.9	0.0-0.5
100700			. !			! !		!!!	
190782: Deer Park	I I 0-1	l I 94		0 101	1.30-1.55		0.04-0.07	1 0 0 2 0 1	0.5-1.0
Deer Park	U-1 1-4	94 94			1.40-1.60	5.9-20.0 5.9-20.0	0.04-0.07		0.5-1.0
	I 4-60				1.40-1.55	5.9-20.0 5.9-20.0	0.03-0.06		0.0-0.5
190783:	1 00	7.	:	0 10	1.10 1.00	, 3.3 <u>2</u> 0.0 ,	0.03 0.03	1 0.0 2.5 1	0.0 0.5
Deer Park	0-1	94	i 1 i	0-10	1.30-1.55	5.9-20.0	0.04-0.07	0.0-2.9	0.5-1.0
	1-4	94	1 1	0-10	1.40-1.60	5.9-20.0	0.03-0.06	0.0-2.9	0.0-0.5
	4-60	94	1 1	0-10	1.40-1.55	5.9-20.0	0.03-0.05	0.0-2.9	0.0-0.5
190784:			l I			l I		1 1	
Deer Park		94	1		1.30-1.55			0.0-2.9	0.5-1.0
	1-4	94	1		1.40-1.60		0.03-0.06		0.0-0.5
	4-60	94	1	0-10	1.40-1.55	5.9-20.0	0.03-0.05	0.0-2.9	0.0-0.5
D	l I 0-6	l I 94	 1	0 10	0 00 1 60		0 07 0 10	1 0 0 0 0 1	4 0 15
Roscommon	I 6-60	•			0.90-1.60 1.45-1.70	5.9-20.0 5.9-20.0	0.07-0.18	0.0-2.9	4.0-15 0.0-0.5
	0-00 	l 3 4	<u>+</u>	0-10	1.45-1.70	5.9-20.0 	0.05-0.09	1 0.0-2.9	0.0-0.5
190787:		' 				i		i i	
East Lake	0-8	79	16	0-10	1.30-1.60	5.9-20.0	0.09-0.12	0.0-2.9	0.5-2.0
	8-26	79	16	0-10	1.30-1.60	5.9-20.0	0.07-0.10	0.0-2.9	0.0-0.5
	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
190788:						l l		1 1	
East Lake	0-8	79	16		1.30-1.60			0.0-2.9	0.5-2.0
	8-26		16		1.30-1.60		0.07-0.10		0.0-0.5
100700	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
190789: East Lake	I I 0-8	l I 79	I 16 I	0 101	1.30-1.60		0 00 0 12	I 0.0-2.9 I	0.5-2.0
East Lake	0-6 8-26		16 I		1.30-1.60		0.09-0.12		0.0-0.5
	26-60	•	1 4 1		1.50-1.65	1 20.0-20.0	0.02-0.06		0.0-0.5
190790:		-	i	0 -0		,	0.02		
East Lake	0-8	79	16	0-10	1.30-1.60	5.9-20.0	0.09-0.12	0.0-2.9	0.5-2.0
	8-26	79	16	0-10	1.30-1.60	5.9-20.0	0.07-0.10	0.0-2.9	0.0-0.5
	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
						l l		1 1	
190791:						I I		1	
Eastport	•	94	1		1.40-1.60		0.07-0.09		1.0-2.0
	3-26		1 1		1.40-1.60		0.06-0.08		0.0-0.5
	26-60	96	2	0-4	1.40-1.55	5.9-20.0	0.03-0.06	0.0-2.9	0.0-0.5
190792:	 	 	ı 					, ! , !	
Edwards	I 0-30	I 10	ı 50 i	40	0.10-0.35	ı	0.35-0.45	: ¦	75-90
	30-60	6	1 70 I		0.05-0.20	0.1-0.2	0.20-0.22	0.0-3.0	1.0-24
			i i			i i		i i	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available		Organic
and soil name	I	I	1	I	bulk	(Ksat)	water	swell	matter
1	I			<u>I</u>	density	<u> </u>	capacity	potential	
I	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
100704	ļ	ļ		I		<u> </u>		!!!	
190794:	ا				4 00 4 65		0 10 0 15		
Emmet	0-8	68 I	24		1.30-1.65			0.0-2.9	1.0-3.0
!	8-26		15		1.40-1.70			0.0-2.9	0.0-0.5
!	26-32		18		1.50-1.75			0.0-2.9	0.0-0.5
I	32-60	67 I	23	5-15	1.50-1.75	0.6-5.9	0.08-0.14	0.0-2.9	0.0-0.5
Leelanau	0-8	82	9	2-15	1.35-1.60	5.9-20.0	0.07-0.10	0.0-2.9	1.0-2.0
i	8-28	82	9	2-15	1.30-1.60	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
i	28-36 I	66 i	19 i	10-20	1.30-1.70	2.0-5.9	0.06-0.14	1 0.0-2.9 1	0.0-0.5
i	36-60 I	82 j	9	2-15	1.50-1.70		0.05-0.10	0.0-2.9	0.0-0.5
 190795	ļ							!!!	
Emmet	0-8 I	68 I	24	3_12	1.30-1.65	2.0-5.9	0 12-0 15	1 0.0-2.9	1.0-3.0
Entitle	8-26 I	67 I	15		1.40-1.70		0.11-0.14		0.0-0.5
· ·	26-32		18		1.50-1.75	0.6-2.0		1 0.0-2.9 1	0.0-0.5
;	32-60 I	67 I	23		1.50-1.75		0.11-0.18		0.0-0.5
i i	32-00	0, 1	23	J-15	1.50-1.75	0.6-5.9 	0.08-0.14	0.0-2.9	0.0-0.5
Leelanau	0-8	82 I	9	2-15	1.35-1.60	5.9-20.0	0.07-0.10	0.0-2.9	1.0-2.0
1	8-28	82 J	9	2-15	1.30-1.60	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
1	28-36	66 I	19	10-20	1.30-1.70	2.0-5.9	0.06-0.14	0.0-2.9	0.0-0.5
i	36-60 I	82 I	9	2-15	1.50-1.70	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
 190796:	l I	l I						! !	
Emmet	0-8 i	68 I	24	3-12	1.30-1.65	2.0-5.9	0.12-0.15	0.0-2.9	1.0-3.0
i	8-26 i	67 i	15 i		1.40-1.70		0.11-0.14	1 0.0-2.9 1	0.0-0.5
i	26-32 i	61 i	18		1.50-1.75		0.11-0.18	1 0.0-2.9 1	0.0-0.5
i	32-60	67	23		1.50-1.75		0.08-0.14		0.0-0.5
 Leelanau	0-8 I	82 I	9 I	0.151	1 25 1 60		0 07 0 10		1 0 0 0
Leelanau	8-28 I				1.35-1.60 1.30-1.60			1 0.0-2.9	1.0-2.0
!	28-36 I		9 19						0.0-0.5
 	36-60 I	82 I	9 1		1.30-1.70 1.50-1.70			0.0-2.9 0.0-2.9	0.0-0.5 0.0-0.5
i	i	i	i	i		i i		i i	
190797:	ا	- 1							
Emmet	0-8	68 I	24		1.30-1.65			0.0-2.9	1.0-3.0
!	8-26		15		1.40-1.70			0.0-2.9	0.0-0.5
1	26-32		18		1.50-1.75			0.0-2.9	0.0-0.5
	32-60	67 I	23	5-15	1.50-1.75	0.6-5.9	0.08-0.14	0.0-2.9	0.0-0.5
Leelanau	0-8 I	82 J	9	2-15	1.35-1.60	5.9-20.0	0.07-0.10	0.0-2.9	1.0-2.0
i	8-28	82	9	2-15	1.30-1.60	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
i	28-36 I	66	19	10-20	1.30-1.70	2.0-5.9	0.06-0.14	0.0-2.9	0.0-0.5

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability			Organic
and soil name		[bulk	(Ksat)	water	swell	matter
		<u> </u>			density	<u> </u>	capacity	potential	
	In In	Pct	Pct	Pct	g/cc	In/hr	<u>In/in</u>	Pct	Pct
190799:]] 		; ;	
Emmet	0-8	i 68 i	24	1 3-12 i	1.30-1.65	' 2.0-5.9	0.12-0.15	0.0-2.9	1.0-3.0
	8-26	•	15		1.40-1.70			1 0.0-2.9 1	0.0-0.5
	26-32	•	18		1.50-1.75			1 0.0-2.9 1	0.0-0.5
	32-60		23		1.50-1.75		0.08-0.14		0.0-0.5
	İ	i i	i	İ		i i		i i	
Leelanau	0-8	82	9	2-15	1.35-1.60	5.9-20.0	0.07-0.10	0.0-2.9	1.0-2.0
	8-28	82	9	2-15	1.30-1.60	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
	28-36	66	19	10-20	1.30-1.70	2.0-5.9	0.06-0.14	0.0-2.9	0.0-0.5
	36-60	82	9	2-15	1.50-1.70	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
190801:] 	 	 	 					
Emmet	0-8	I 68 I	24	3-12	1.30-1.65	2.0-5.9	0.12-0.15	1 0.0-2.9 1	1.0-3.0
	8-26	•			1.40-1.70		0.11-0.14		0.0-0.5
	26-32	I 61	18		1.50-1.75		0.11-0.18	1 0.0-2.9 1	0.0-0.5
į	32-60	67	23	5-15	1.50-1.75	0.6-5.9	0.08-0.14	0.0-2.9	0.0-0.5
Mancelona	l I 0-8	l 67	l I 23	 5_15	1.35-1.65		0 08-0 12	1 0.0-2.9 1	0.5-3.0
Mancelona	8-25	•	1 23		1.30-1.65			1 0.0-2.9 1	0.6-1.0
	25-30	•	15		1.30-1.65			1 0.0-2.9 1	0.0-0.5
	30-60	•	4		1.45-1.65		0.02-0.04		0.0-0.5
190803:						!!!		!!	
Emmet	I I 0-8	I 68 I	l 24	1 2 12 1	1.30-1.65	I 2.0-5.9 I	0 12 0 15	1 0.0-2.9 1	1.0-3.0
Emme C	0-6 8-26		15		1.40-1.70		0.12-0.13		0.0-0.5
	26-32		18		1.50-1.75			1 0.0-2.9 1	0.0-0.5
	32-60		1 23		1.50-1.75		0.11-0.18		0.0-0.5
	32-00 	l 67	23	J 5-15	1.50-1.75	l 0.6-5.9	0.08-0.14	0.0-2.9	0.0-0.5
Mancelona	0-8	67	23	5-15	1.35-1.65	2.0-5.9	0.08-0.12	0.0-2.9	0.5-3.0
	8-25	82	9	2-15	1.30-1.65	5.9-20.0	0.06-0.12	0.0-2.9	0.6-1.0
	25-30	67	15	10-25	1.30-1.65	2.0-5.9	0.06-0.16	0.0-2.9	0.0-0.5
	30-60	91	4	0-10	1.45-1.65	20.0-20.0	0.02-0.04	0.0-2.9	0.0-0.5
190805:] 	 	 	 		1			
Emmet	0-8	68	24	3-12 i	1.30-1.65	2.0-5.9	0.12-0.15	0.0-2.9	1.0-3.0
	8-26	•	15		1.40-1.70			1 0.0-2.9 1	0.0-0.5
j	26-32		18		1.50-1.75		0.11-0.18		0.0-0.5
İ	32-60	•	23		1.50-1.75		0.08-0.14		0.0-0.5
Omena	l I 0-8	l I 67	l 23	 	1.20-1.60	 2.0-5.9	0 11-0 15		1.0-2.0
Omena	0-8 8-14		23		1.40-1.70		0.11-0.15		0.0-0.5
	8-14 14-60		20 23		1.40-1.70		0.10-0.15		0.0-0.5
	14-00	1 0/ 	ı 23 	3-T2	1.50-1.60	2.0-3.9 	0.00-0.12	0.0-2.9	0.0-0.5
	,								

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name	l	1 1		l I	bulk	(Ksat)	water	swell	matter
	<u> </u>	l		lI	density	l	capacity	potential	
	In In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190806:	 			 		 		! !	
Emmet	ı I 0-8	ı 68 i	24	' ' 3-12	1.30-1.65	l 2.0-5.9 l	0.12-0.15	1 0.0-2.9 1	1.0-3.0
Zinine C	8-26		15		1.40-1.70			0.0-2.9	0.0-0.5
	26-32		18		1.50-1.75			0.0-2.9	0.0-0.5
	32-60		23		1.50-1.75			0.0-2.9	0.0-0.5
Omena	l I 0-8	l 67 l	23	 5-15	1.20-1.60		0.11-0.15	1 0.0-2.9 1	1.0-2.0
	8-14	I 67 I	20		1.40-1.70			1 0.0-2.9 1	0.0-0.5
	14-60	67	23		1.50-1.80	2.0-5.9	0.08-0.12		0.0-0.5
190807:	l I	 		 					
Emmet	' 0-8	68	24	3-12	1.30-1.65	2.0-5.9	0.12-0.15	0.0-2.9	1.0-3.0
	8-26	67	15	10-25	1.40-1.70		0.11-0.14	0.0-2.9	0.0-0.5
	26-32	61	18	10-22	1.50-1.75	0.6-2.0	0.11-0.18	0.0-2.9	0.0-0.5
	32-60	67	23	5-15	1.50-1.75	0.6-5.9	0.08-0.14	0.0-2.9	0.0-0.5
Omena	I 0-8	I 67 I	23		1.20-1.60		0.11-0.15	0.0-2.9	1.0-2.0
	8-14	67	20	8-18	1.40-1.70	0.6-2.0	0.10-0.15	0.0-2.9	0.0-0.5
	14-60	67	23	5-15	1.50-1.80	2.0-5.9	0.08-0.12	0.0-2.9	0.0-0.5
190808:	 	 		 					
Emmet	0-8	68	24	3-12	1.30-1.65	2.0-5.9	0.12-0.15	0.0-2.9	1.0-3.0
	8-26	67	15	10-25	1.40-1.70	2.0-5.9	0.11-0.14	0.0-2.9	0.0-0.5
	26-32	61	18	10-22	1.50-1.75	0.6-2.0	0.11-0.18	0.0-2.9	0.0-0.5
	32-60	67	23	5-15	1.50-1.75	0.6-5.9	0.08-0.14	0.0-2.9	0.0-0.5
Omena	I 0-8	I 67 I	23		1.20-1.60		0.11-0.15	0.0-2.9	1.0-2.0
	8-14	67	20	8-18	1.40-1.70	0.6-2.0	0.10-0.15	0.0-2.9	0.0-0.5
	14-60	67	23	5-15	1.50-1.80	2.0-5.9	0.08-0.12	0.0-2.9	0.0-0.5
190809:	 	l 		 					
Emmet	l 0−8	68	24	3-12	1.30-1.65	2.0-5.9	0.12-0.15	0.0-2.9	1.0-3.0
	8-26	67	15	10-25	1.40-1.70	2.0-5.9	0.11-0.14	0.0-2.9	0.0-0.5
	26-32	61	18	10-22	1.50-1.75	0.6-2.0	0.11-0.18	0.0-2.9	0.0-0.5
	32-60	67	23	5-15	1.50-1.75	0.6-5.9	0.08-0.14	0.0-2.9	0.0-0.5
Omena	 0-8	 67	23	5-15	1.20-1.60	2.0-5.9	0.11-0.15	0.0-2.9	1.0-2.0
	8-14	67	20	8-18	1.40-1.70	0.6-2.0	0.10-0.15	0.0-2.9	0.0-0.5
	14-60	67	23	5-15	1.50-1.80	2.0-5.9	0.08-0.12	0.0-2.9	0.0-0.5
190811:	! 	' ' 							
Hettinger	0-8	40	38	18-27	1.35-1.55	0.6-2.0	0.17-0.25	0.0-2.9	2.0-10
	8-23		49		1.35-1.55	0.2-0.6		0.0-2.9	0.0-0.5
190812:	23-60	18	48	27-50	1.50-1.75	0.1-0.2	0.10-0.20	0.0-2.9	0.0-0.5
Hettinger	I I 0-8	I 40 I	38	ı 18-27!	1.35-1.55		0 17-0 25	0.0-2.9	2.0-10
neccinger	0-6 8-23		49		1.35-1.55	0.6-2.0 0.2-0.6		1 0.0-2.9	0.0-0.5
	1 23-60		48		1.50-1.75	0.2 0.0 0.1-0.2		1 0.0-2.9 1	0.0-0.5
	, 00 	, <u>-</u> 0		. <i>- ,</i> 501	2.00 2.70	, , 	0.20 0.20		0.0 0.0

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available		Organic
and soil name		[bulk	(Ksat)	water	swell	matter
	<u> </u>	! !		!	density			potential	
	In In	Pct	Pct	Pct	g/cc	I In/hr I	In/in	Pct	Pct
100010.						!		!!!	
190812: Tonkey	I I 0-8	I 44	41	10_20	1.10-1.50	I 2.0-5.9 I	0.20-0.24	1 0.0-2.9 1	4.0-7.0
TOTIKEY	8-20		4		1.30-1.80			0.0-2.9	0.0-0.5
	20-60		23		1.60-1.80			1 0.0-2.9 1	0.0-0.5
	1 20 00	1 0,	23	0 201	1.00 1.00	2.0 20.0 	0.05 0.19	1 0.0 2.9 1	0.0 0.3
190814:	! 	i i		i		i		i i	
Kalkaska	0-7	I 94 i	1	0-10	1.25-1.45	5.9-20.0	0.05-0.09	0.0-2.9	1.0-4.0
	7-15	91	2	0-15	1.35-1.45	5.9-20.0 j	0.06-0.08	0.0-2.9	1.0-3.0
i	15-32	94	1	0-10	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
I	32-60	94	1 1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
190815:		I 1		I		I I		1 1	
Kalkaska	0-7	94	1		1.25-1.45			0.0-2.9	1.0-4.0
I	7-15		2	0-15	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	1.0-3.0
1	15-32		1 1		1.35-1.45			0.0-2.9	0.5-2.0
I	32-60	94	1 1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
190816:		I 1		I		l I		1 1	
Kalkaska		94	1		1.25-1.45			0.0-2.9	1.0-4.0
I	7-15		2		1.35-1.45			0.0-2.9	1.0-3.0
	15-32		1		1.35-1.45			0.0-2.9	0.5-2.0
400045	32-60	94	1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
190817:		1 04			1 05 1 45		0 05 0 00		1 0 4 0
Kalkaska	-	94	1 1		1.25-1.45			0.0-2.9	1.0-4.0
	7-15		2		1.35-1.45			0.0-2.9	1.0-3.0
	15-32 32-60		1 1		1.35-1.45 1.35-1.50			0.0-2.9 0.0-2.9	0.5-2.0 0.0-0.5
190818:	32-60	1 94	1	0-101	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
Kalkaska	I I 0-7	I 94	1		1.25-1.45		0 05-0 09	1 0.0-2.9 1	1.0-4.0
Naikaska	7-15		2		1.35-1.45			0.0-2.9	1.0-3.0
	15-32		1		1.35-1.45			0.0-2.9	0.5-2.0
	32-60		1		1.35-1.50			1 0.0-2.9 1	0.0-0.5
190819:	1	1	_	0 10	1.55 1.50	1 0.5 20.0 1	0.01 0.00	1 0.0 2.5 1	0.0 0.5
Kalkaska	0-7	I 79 I	16	0-10	1.30-1.60	5.9-20.0	0.09-0.12	0.0-2.9	0.5-2.0
	7-15		2		1.35-1.45			0.0-2.9	1.0-3.0
i	15-32	94	1		1.35-1.45			1 0.0-2.9 1	0.5-2.0
	32-60	94	1	0-10	1.35-1.50	5.9-20.0 j	0.04-0.06	0.0-2.9	0.0-0.5
i	l	İ		i		İ		i i	
East Lake	8-0	79	16	0-10	1.30-1.60	5.9-20.0	0.09-0.12	0.0-2.9	0.5-2.0
I	8-26	79	16	0-10	1.30-1.60	5.9-20.0	0.07-0.10	0.0-2.9	0.0-0.5
1	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
1	l	I 1		l I		1		1	
190820:		1 1		 		1		1 1	
Kiva	0-6	67	19		1.20-1.60			0.0-2.9	0.5-2.0
	6-20		19		1.30-1.60	0.6-2.0		0.0-2.9	0.0-0.5
	20-60	91	6	0-5	1.50-1.70	20.0-20.0	0.02-0.04	0.0-2.9	0.0-0.5
								1 1	
Mancelona		67	23		1.35-1.65			0.0-2.9	0.5-3.0
l	8-25		9		1.30-1.65			0.0-2.9	0.6-1.0
	25-30	67	15		1.30-1.65			0.0-2.9	0.0-0.5
	30-60	91	4	0-10	1.45-1.65	20.0-20.0	0.02-0.04	0.0-2.9	0.0-0.5
		I				ı I		ı I	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available		Organic
and soil name					bulk	(Ksat)	water	swell	matter
		<u> </u>	<u> </u>	<u> </u>	density	<u> </u>		potential	
	In In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190821:	 	 		 					
Kiva	0-6	l 67	19	1 10-181	1.20-1.60	' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	0.10-0.15	0.0-2.9	0.5-2.0
	6-20	67	19		1.30-1.60			1 0.0-2.9 1	0.0-0.5
	20-60		6	0-5		20.0-20.0	0.02-0.04		0.0-0.5
Mancelona	l l 0-8	l 67	l I 23	l 5-151	1.35-1.65		0.08-0.12	 0.0-2.9	0.5-3.0
	8-25	82	9		1.30-1.65			0.0-2.9	0.6-1.0
	25-30	67	15		1.30-1.65			0.0-2.9	0.0-0.5
	30-60	91	4		1.45-1.65	20.0-20.0		0.0-2.9	0.0-0.5
190823:] 			
Kiva	0-6	67	19	10-18	1.20-1.60	' 0.6-2.0	0.10-0.15	0.0-2.9	0.5-2.0
	6-20		19		1.30-1.60	0.6-2.0		0.0-2.9	0.0-0.5
	20-60	91	6	0-5	1.50-1.70	20.0-20.0	0.02-0.04	0.0-2.9	0.0-0.5
Mancelona	l l 0-8	l 67	l I 23	 5-15	1.35-1.65		0.08-0.12	 0.0-2.9	0.5-3.0
	8-25	82	9		1.30-1.65		0.06-0.12	1 0.0-2.9 1	0.6-1.0
	25-30	67	15	10-25	1.30-1.65	2.0-5.9	0.06-0.16	0.0-2.9	0.0-0.5
	30-60	91	4		1.45-1.65	20.0-20.0	0.02-0.04	0.0-2.9	0.0-0.5
190826:	 	 	 	 					
Leelanau	0-8	82	9	2-15	1.35-1.60	5.9-20.0 I	0.07-0.10	0.0-2.9	1.0-2.0
	8-28	82	9	2-15	1.30-1.60	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
	28-36	66	19	10-20	1.30-1.70	2.0-5.9	0.06-0.14	0.0-2.9	0.0-0.5
	36-60	82	9	2-15	1.50-1.70	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
East Lake	 0-8	l 79	 16		1.30-1.60		0.09-0.12	0.0-2.9	0.5-2.0
	8-26	79	16	0-10	1.30-1.60	5.9-20.0	0.07-0.10	0.0-2.9	0.0-0.5
	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
190827:]]]	 						
Leelanau	0-8	82	9	2-15	1.35-1.60	5.9-20.0 I	0.07-0.10	0.0-2.9	1.0-2.0
	8-28	82	9	2-15	1.30-1.60	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
	28-36	66	19	10-20	1.30-1.70	2.0-5.9	0.06-0.14	0.0-2.9	0.0-0.5
	36-60	82	9	2-15	1.50-1.70	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
East Lake	 0-8	l 79	 16		1.30-1.60		0.09-0.12	0.0-2.9	0.5-2.0
	8-26	79	16	0-10	1.30-1.60	5.9-20.0	0.07-0.10	0.0-2.9	0.0-0.5
	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
190828:	 	 	 			ı 		ı 	
Leelanau	0-8	82	9	2-15	1.35-1.60	5.9-20.0	0.07-0.10	0.0-2.9	1.0-2.0
	8-28	82	9	2-15	1.30-1.60	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
	28-36	66	19	10-20	1.30-1.70	2.0-5.9	0.06-0.14	0.0-2.9	0.0-0.5
	36-60	82	9	2-15	1.50-1.70	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
East Lake	0-8	 79	16		1.30-1.60		0.09-0.12	0.0-2.9	0.5-2.0
	8-26	79	16	0-10	1.30-1.60	5.9-20.0	0.07-0.10	0.0-2.9	0.0-0.5
	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
	l			ı		ı l		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available	Shrink-	Organic
and soil name			l		bulk	(Ksat)	water	swell	matter
	<u> </u>	<u> </u>	<u> </u>	<u> </u>	density	<u> </u>		potential	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
						!		1 !	
190829:					4 05 4 60		0 00 0 10		
Leelanau		82	9		1.35-1.60			0.0-2.9	1.0-2.0
	8-28 28-36		9		1.30-1.60			0.0-2.9 0.0-2.9	0.0-0.5 0.0-0.5
	36-60		19 9		1.30-1.70 1.50-1.70			1 0.0-2.9	0.0-0.5
	30-00	1 02	ן ו	2-15	1.50-1.70	5.9-20.0 	0.05-0.10	1 0.0-2.9	0.0-0.5
East Lake	ı I 0-8	1 79	l 16	ı ı ı 0–10 ı	1.30-1.60	5.9-20.0	0 09-0 12	1 0.0-2.9 1	0.5-2.0
Labe Lake	8-26		16		1.30-1.60			1 0.0-2.9 1	0.0-0.5
j	26-60		4		1.50-1.65			1 0.0-2.9 1	0.0-0.5
		i i	i İ	i i		i i		i i	
190830:		İ		i i		İ		i i	
Leelanau	0-8	82	9	2-15	1.35-1.60	5.9-20.0	0.07-0.10	0.0-2.9	1.0-2.0
	8-28	82	9		1.30-1.60		0.05-0.10	0.0-2.9	0.0-0.5
	28-36	66	19	10-20	1.30-1.70	2.0-5.9	0.06-0.14	0.0-2.9	0.0-0.5
1	36-60	82) 9	2-15	1.50-1.70	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
	l	1	1			I I		1	
East Lake	0-8	79	16		1.30-1.60			0.0-2.9	0.5-2.0
	8-26		16		1.30-1.60			0.0-2.9	0.0-0.5
	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
190831:	l i	!	 	!!!				!!!	
Lupton	 0-10	1 10	I 50	ı 1 I 40 I	0.10-0.35	I 0.2-5.9	0.35-0.45		75-90
Lup con	10-60		l 65	l 25 I	0.10-0.35		0.35-0.45		80-95
	1 10 00	1 1	l 03	, <u>2</u> 5 ,	0.10 0.33	1 0.2 3.3 1	0.55 0.45	; ;	00 33
Markey	0-20	i 10	I 50	I 40 I	0.10-0.35	I 0.2-5.9 I	0.35-0.45	i i	75-90
	20-60		1		1.40-1.65	5.9-20.0 I	0.03-0.08	0.0-2.9	0.0-0.5
İ	1	i i	l	l i		i i		i i	
190832:		1 1	ĺ	l I		I I		1 1	
Mancelona	0-8	67	23	5-15	1.35-1.65	2.0-5.9	0.09-0.14	0.0-2.9	0.5-3.0
	8-25	•	9	2-15	1.30-1.65	5.9-20.0	0.06-0.12	0.0-2.9	0.6-1.0
	25-30		15		1.30-1.65			0.0-2.9	0.0-0.5
	30-60	91	4	0-10	1.45-1.65	20.0-20.0	0.02-0.04	0.0-2.9	0.0-0.5
190833:		! !	!	! !		! !		! !	
Mancelona	0-8	67	23		1.35-1.65			0.0-2.9	0.5-3.0
	8-25		9		1.30-1.65			0.0-2.9	0.6-1.0
	25-30 30-60		15 4		1.30-1.65 1.45-1.65			0.0-2.9 0.0-2.9	0.0-0.5 0.0-0.5
190834:	30-60	1 21	4	1 0-101	1.45-1.65	20.0-20.0	0.02-0.04	1 0.0-2.9 1	0.0-0.5
Mancelona	ı I 0-8	1 79 I	ı I 16	I 10-10I	1.35-1.65	ı 2.0-5.9 I	0 08-0 12	1 0.0-2.9 1	0.5-3.0
Hancerona	8-25		1 9		1.30-1.65			1 0.0-2.9 1	0.6-1.0
	25-30	•	1 15		1.30-1.65			1 0.0-2.9 1	0.0-0.5
	30-60		1 4		1.45-1.65			1 0.0-2.9 1	0.0-0.5
		<u>-</u>	, <u>-</u> I	, , <u>- </u>		, , 			
East Lake	0-8	79	16	0-10	1.30-1.60	5.9-20.0	0.09-0.12	0.0-2.9	0.5-2.0
j	8-26	79	16	0-10	1.30-1.60	5.9-20.0	0.07-0.10	0.0-2.9	0.0-0.5
į	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
	l	1	l			I I		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available		Organic
and soil name					bulk	(Ksat)	water	swell	matter
		<u> </u>		 	density	<u> </u>	capacity	potential	
	In In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190835:]			 				! !	
Mancelona	 0-8	I 79 I	16	0-101	1.35-1.65		0.08-0.12	1 0 0-2 9 1	0.5-3.0
Mancerona	8-25	l 82 I	9		1.30-1.65			1 0.0-2.9 1	0.6-1.0
	25-30		15		1.30-1.65	1 2.0-5.9 1		1 0.0-2.9 1	0.0-0.5
	30-60		4		1.45-1.65	1 20.0-20.0 1	0.02-0.04		0.0-0.5
		 				i i		i i	
East Lake	0-8	79	16	0-10	1.30-1.60	5.9-20.0	0.09-0.12	0.0-2.9	0.5-2.0
1	8-26	79	16	0-10	1.30-1.60	5.9-20.0	0.07-0.10	0.0-2.9	0.0-0.5
	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
190836:	<u> </u>							!!!	
Mancelona	 0-8	ı 1 1 79 1	16	0-101	1.35-1.65		0 08-0 12	1 0.0-2.9	0.5-3.0
Tanocrona	8-25		9		1.30-1.65			1 0.0-2.9 1	0.6-1.0
	25-30	67	15		1.30-1.65			1 0.0-2.9 1	0.0-0.5
	30-60		4		1.45-1.65		0.02-0.04		0.0-0.5
		' - '	- '	0 =0			0.02 0.01		0.0 0.0
East Lake	0-8	79	16	0-10	1.30-1.60	5.9-20.0	0.09-0.12	0.0-2.9	0.5-2.0
	8-26	I 79 I	16	0-10	1.30-1.60	5.9-20.0	0.07-0.10	1 0.0-2.9 1	0.0-0.5
į	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
190837:						! !		!!!	
Mancelona	I 0-8	ı 1 1 79 1	16		1.35-1.65	I 2.0-5.9 I	0.08-0.12	1 0 0-2 9 1	0.5-3.0
Mancelona	8-25		9		1.30-1.65			1 0.0-2.9 1	0.6-1.0
	25-30	1 67 I	15		1.30-1.65			1 0.0-2.9 1	0.0-0.5
	30-60		4		1.45-1.65		0.02-0.04		0.0-0.5
1	l			l		I I		1	
East Lake	0-8	79	16		1.30-1.60			0.0-2.9	0.5-2.0
	8-26		16		1.30-1.60	5.9-20.0		0.0-2.9	0.0-0.5
	26-60	91	4	0-10	1.50-1.65	20.0-20.0	0.02-0.06	0.0-2.9	0.0-0.5
190838:						; ;		; ;	
Mancelona	0-8	79	16	0-10	1.35-1.65	2.0-5.9	0.08-0.12	0.0-2.9	0.5-3.0
i	8-25	82	9	2-15	1.30-1.65	5.9-20.0	0.06-0.12	0.0-2.9	0.6-1.0
i	25-30	67	15	10-25	1.30-1.65	2.0-5.9	0.06-0.16	0.0-2.9	0.0-0.5
į	30-60	91	4	0-10	1.45-1.65	20.0-20.0	0.02-0.04	0.0-2.9	0.0-0.5
East Lake	l I 0-8	l 1 l 79 l	16		1.30-1.60	 5.9-20.0	0 00 0 12	1 0.0-2.9 1	0.5-2.0
East Lake	0-6 8-26		16		1.30-1.60			1 0.0-2.9 1	0.5-2.0
	26-60		4		1.50-1.65	20.0-20.0		1 0.0-2.9 1	0.0-0.5
	26-60 	JT	4	U-10	1.50-1.65	20.0-20.0 	0.02-0.06	0.0-2.9	0.0-0.5
190839:	İ	i i	i	i		i i		i i	
Mancelona	0-8	67	23	5-15	1.35-1.65	2.0-5.9	0.08-0.12	0.0-2.9	0.5-3.0
1	8-25	82	9	2-15	1.30-1.65	5.9-20.0	0.06-0.12	0.0-2.9	0.6-1.0
1	25-30	67	15	10-25	1.30-1.65	2.0-5.9	0.06-0.16	0.0-2.9	0.0-0.5
!	30-60	91	4	0-10	1.45-1.65	20.0-20.0	0.02-0.04	0.0-2.9	0.0-0.5
Richter	l I 0-8	l 67 l	23	 5_15	1.20-1.50		0 12-0 15	1 0.0-2.9 1	2.0-4.0
VICHOET	0-6 8-27		20		1.35-1.60	1 2.0-5.9 1 1 0.6-2.0 1		1 0.0-2.9 1	0.0-0.5
	27-60		7		1.60-1.70	0.6-2.0 0.6-2.0		1 0.0-2.9	0.0-0.5
	1 -7 00	, 05 	, ,	. 2 13	1.00 1.70	, 0.0 <u>2</u> .0	0.00 0.13	1 0.0 2.9 1	3.0 0.3

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name					bulk	(Ksat)	water	swell	matter
į		ı i	İ	İ	density	i i	capacity	potential	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
1	ı — ı	ı — ı		ı — ı		ı		ı — ı	
190840:				l I		I I		1 1	
Nester	0-6	29	54		1.25-1.60			0.0-2.9	1.0-3.0
	6-8	30	55		1.40-1.60			0.0-2.9	0.0-0.5
	8-28		55		1.40-1.65	•		3.0-5.9	0.0-0.5
190841:	28-60	8	55	35-40	1.55-1.70	0.1-0.2	0.10-0.17	3.0-5.9	0.0-0.5
Nester	I 0-6	l 29 l	54		1.25-1.60	ı ı ı 0.6-2.0 l	0 20-0 24	I 0.0-2.9 I	1.0-3.0
Nescei	l 6-8	1 29 I	55		1.40-1.60			1 0.0-2.9 1	
	8-28		55		1.40-1.65			3.0-5.9	0.0-0.5
	28-60		55		1.55-1.70			1 3.0-5.9 1	0.0-0.5
190842:		i		i i		i i		i i	
Nester	0-6	29	54	7-27	1.25-1.60	0.6-2.0	0.20-0.24	0.0-2.9	1.0-3.0
1	6-8	30	55	5-25	1.40-1.60			0.0-2.9	0.0-0.5
1	8-28		55		1.40-1.65			3.0-5.9	0.0-0.5
	28-60	8	55	35-40	1.55-1.70	0.1-0.2	0.10-0.17	3.0-5.9	0.0-0.5
190843:				[
Nester	0-6	29	54		1.25-1.60			0.0-2.9	1.0-3.0
	6-8	30 8	55		1.40-1.60			0.0-2.9	0.0-0.5
	8-28 28-60		55 55		1.40-1.65 1.55-1.70		0.08-0.17	3.0-5.9 3.0-5.9	0.0-0.5 0.0-0.5
190844:	20-00 		33	35-40	1.55-1.70	0.1-0.2 	0.10-0.17	1 3.0-3.9 1	0.0-0.5
Nester	I 0-6	l 29 I	54		1.25-1.60	' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	0.20-0.24	0.0-2.9	1.0-3.0
	6-8	30	55		1.40-1.60			0.0-2.9	
	8-28	8	55		1.40-1.65			3.0-5.9	0.0-0.5
	28-60	8	55	35-40	1.55-1.70	0.1-0.2	0.10-0.17	3.0-5.9	0.0-0.5
1						l l		1 1	
190847:				l I		I I		1 1	
Richter		67	23		1.20-1.50			0.0-2.9	2.0-4.0
	8-27		20		1.35-1.60			0.0-2.9	0.0-0.5
	27-60	85	7	2-15	1.60-1.70	0.6-2.0	0.08-0.13	0.0-2.9	0.0-0.5
Alcona	I 0-8	ı 67 I	23		1.10-1.60	ı	0 12-0 18		1.0-3.0
ATCONA	8-12		7		1.25-1.70			0.0-2.9	0.6-1.0
	12-18		4		1.35-1.70			0.0-2.9	0.0-0.5
i	18-24		19		1.35-1.70	•		0.0-2.9	0.0-0.5
i	24-60	84	4		1.50-1.70		0.08-0.20	0.0-2.9	0.0-0.5
I				l I		l I		1 1	
190848:				l I		I I		1 1	
Richter	8-0	67	23		1.20-1.50			0.0-2.9	2.0-4.0
	8-27		20		1.35-1.60			0.0-2.9	0.0-0.5
	27-60	85	7	2-15	1.60-1.70	0.6-2.0	0.08-0.13	0.0-2.9	0.0-0.5
Alcona	I I 0-8	I 67 I	 23	 	1.10-1.60	I 0.6-5.9 I	0 12-0 19	I 0.0-2.9 I	1.0-3.0
ATCOMA	0-8 8-12		23 7		1.25-1.70			0.0-2.9 0.0-2.9	0.6-1.0
	0-12 12-18				1.35-1.70			0.0-2.9	0.0-0.5
	18-24		19		1.35-1.70			1 0.0-2.9 1	0.0-0.5
	24-60		4		1.50-1.70			0.0-2.9	0.0-0.5
į	l i	ı İ	ı İ	İ		i i		i i	

Table 15.-Physical Soil Properties-Continued

and soil name	In	Det !		I .	bulk	(Ksat)	water	swell	matter
	<u>In</u>	Dot !					<u></u>	1	
	In	D~+ '		<u> </u>	density	<u> </u>	capacity	potential	
190849: Roscommon		Pct	Pct	Pct	g/cc	In/hr I	In/in	Pct	Pct
Roscommon	' 					l I			
i	0-6 j	94	1	0-10	0.90-1.60	5.9-20.0	0.07-0.18	0.0-2.9	4.0-15
	6-60	94	1	0-10	1.45-1.70	5.9-20.0	0.05-0.09	0.0-2.9	0.0-0.5
 Markey	0-20 I	10	50 I	40 I	0.10-0.35	 0.2-5.9	0.35-0.45		75-90
i	20-60	94	1	0-10		5.9-20.0	0.03-0.08	0.0-2.9	0.0-0.5
190850: I	I					 			
Sanilac	0-6 I	30	55 I	10-201	1.35-1.50	, 0.6-2.0	0 20-0 24	0.0-2.9	1.0-3.0
Janiiia	6-16		55 I		1.45-1.70		0.16-0.24		0.0-0.5
i	16-24		,		1.45-1.70		0.17-0.22		0.0-0.5
i	24-60		54		1.45-1.70		0.10-0.22		0.0-0.5
190851:	I								
Tonkey	0-8 i	67 i	20	8-181	1.10-1.60	' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	0.13-0.15	0.0-2.9	4.0-7.0
1	8-20 I	67	20		1.30-1.80		0.10-0.15		0.0-0.5
i	20-60	67	23		1.60-1.80			0.0-2.9	0.0-0.5
 Munuscong	0-10	67 I	∣ 23 I	5-15 I	1.30-1.65		0.13-0.15		2.0-3.0
_	10-24	67 i			1.30-1.70			1 0.0-2.9 1	0.0-0.5
į	24-60		42		1.35-1.70		0.08-0.18		0.0-0.5
 Iosco	0-8 I	83 I	∣ I ∣ 4 I	10-15	1.25-1.40	 5.9-20.0	0.10-0.12	1 0.0-2.9 1	1.0-4.0
i	8-27 I	91	2		1.35-1.60		0.06-0.11	1 0.0-2.9 1	0.0-1.0
i	27-34 I	18	52 i		1.50-1.70		0.16-0.20	1 3.0-5.9 1	0.0-0.5
į	34-60 I	18	52	15-35	1.50-1.70	0.2-0.6	0.17-0.20	3.0-5.9	0.0-0.5
190852:	I							 	
Tonkey	0-8 i	67 i	20 i	8-18	1.10-1.60	2.0-5.9	0.13-0.15	1 0.0-2.9	4.0-7.0
i	8-20 i	67 i	20	8-18	1.30-1.80	2.0-5.9	0.10-0.15	1 0.0-2.9 1	0.0-0.5
į	20-60 j	67	23	0-20	1.60-1.80	2.0-20.0	0.05-0.19	0.0-2.9	0.0-0.5
 Munuscong	0-10	67	 23	5-15	1.30-1.65		0.13-0.15	0.0-2.9	2.0-3.0
i	10-24 I	67 i	20		1.30-1.70		0.12-0.17	1 0.0-2.9 1	0.0-0.5
į	24-60	2	42	40-80	1.35-1.70	0.1-0.2	0.08-0.18	6.0-8.9	0.0-0.5
 Iosco	0-8	83 I		10-15	1.25-1.40	 5.9-20.0	0.10-0.12	0.0-2.9	1.0-4.0
i	8-27 j	91	2		1.35-1.60		0.06-0.11		0.0-1.0
i	27-34	18	52		1.50-1.70	0.2-0.6		3.0-5.9	0.0-0.5
į	34-60	18	52		1.50-1.70			3.0-5.9	0.0-0.5
190854:	l I								
Wallace	0-8 j	95 i	1	0-8 j	1.35-1.45	5.9-20.0	0.07-0.09	0.0-2.9	0.5-2.0
i	8-24	92	2		1.75-2.05		0.01-0.04		0.5-2.0
į	24-60 I	95 i	1	0-8	1.45-1.60	5.9-20.0	0.04-0.05	0.0-2.9	0.0-0.5

Table 15.-Physical Soil Properties-Continued

	. D. 17	1 0 1	0:3:						
Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available		Organic
and soil name		!!!			bulk	(Ksat)	water	swell	matter
		<u> </u>	Dat	l Det l	density			potential	Det.
	In In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190854:	l i	!!!				!		!!!	
Kalkaska	 0-7	 94	1	I 0_10I	1.25-1.45		0.05-0.09		1.0-4.0
Naikaska	7-15	1 91 1	2		1.35-1.45			0.0-2.9	1.0-3.0
	15-32		1		1.35-1.45			0.0-2.9	0.5-2.0
	32-60		1		1.35-1.50			0.0-2.9	0.0-0.5
		i i				i i i		i i i	
193237:		i i		ı i		i i		i i	
Thompsonville	0-5	86-100	0-10	0-9	1.30-1.50	5.9-20.0	0.07-0.09	0.0-2.9	3.0-5.0
ĺ	5-15	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
ĺ	15-29	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.06-0.08	0.0-2.9	1.0-3.0
ĺ	29-37	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
I	37-55	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
I	55-72	0-19	40-70	27-35	1.50-1.70	0.1-0.2	0.16-0.18	3.0-5.9	0.0-0.5
1	72-80	0-85	10-70	10-35	1.50-1.70	0.1-0.2	0.14-0.17	3.0-5.9	0.0-0.5
1		1 1				l I		1 1	
Milnichol	-	86-100			1.30-1.50			0.0-2.9	2.0-5.0
I	2-12				1.30-1.65			0.0-2.9	0.5-2.0
	12-15	86-100	0-10	0-9	1.30-1.65	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
	15-25	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	25-33				1.40-1.65			0.0-2.9	0.5-3.0
	33-47	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	47-50	45-85	0-45	0-19	1.50-1.70	0.2-5.9	0.08-0.17	0.0-2.9	0.0-0.5
	50-68		15-70		1.50-1.70			3.0-6.0	0.0-0.5
	68-80	0-45	15-80	12-35	1.50-1.70	0.2-0.6	0.14-0.22	0.0-6.0	0.0-0.5
100055		!!!				!!!		!!	
193255:			0 10		1 40 1 70		0 07 0 00		0 0 5 0
Spinks	0-5	86-100			1.40-1.70			0.0-2.9	2.0-5.0
	5-10				1.40-1.70			0.0-2.9	0.5-2.0
		86-100	0-10		1.40-1.70			0.0-2.9	0.5-2.0
	17-62				1.40-1.70			0.0-2.9	0.0-0.5
	62-72 72-80	71-100 86-100			1.40-1.70 1.40-1.70			0.0-2.9 0.0-2.9	0.0-0.5 0.0-0.5
	1 /2-80	1 80-1001	0-10	0-9	1.40-1.70	5.9-20.0 	0.05-0.07	0.0-2.9	0.0-0.5
Coloma	 0-3	 86-100	0-10	I 0-9 I	1.35-1.65	5.9-20.0	0 07-0 12	0.0-2.9	2.0-5.0
0010	3-4	71-100			1.35-1.65			0.0-2.9	0.5-2.0
	-	71-100			1.50-1.65			0.0-2.9	0.5-1.0
		71-100			1.50-1.65			0.0-2.9	0.5-1.0
	15-25	71-100	0-15		1.50-1.65			0.0-2.9	0.0-0.5
	25-40	71-100			1.50-1.65			0.0-2.9	0.0-0.5
	40-80	71-100			1.50-1.65	5.9-20.0 I		0.0-2.9	0.0-0.5
	10 00		0 _0			1 1	0.00 0.20	1	0.0 0.0
193256:		; '				i i		į į	
Spinks	0-5	86-100	0-10	0-9 i	1.40-1.70	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
· · · · · · · · · · · · · · · · · · ·	5-10	86-100	0-10	0-9 i	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
İ	10-17	86-100	0-10	0-9 i	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
i	17-62	71-100	0-15	3-14	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
į	62-72	71-100	0-15	3-14	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
	72-80	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
1	l	1 1				I I		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name	I	1 1		l I	bulk	(Ksat)	water	swell	matter
	1	1 1		<u> </u>	density	1	capacity	potential	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
	1	1				I I		1	
L93256:	1	1 1		l I		I I		1 1	
Coloma	J 0-3	86-100	0-10		1.35-1.65			0.0-2.9	2.0-5.0
	3-4	71-100	0-15		1.35-1.65			0.0-2.9	0.5-2.0
		71-100	0-15		1.50-1.65			0.0-2.9	0.5-1.0
		71-100	0-15		1.50-1.65			0.0-2.9	0.5-1.0
	15-25	71-100	0-15		1.50-1.65			0.0-2.9	0.0-0.5
	25-40	71-100	0-15		1.50-1.65			0.0-2.9	0.0-0.5
	40-80	71-100	0-15	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
193257:		!!!						!!!	
Spinks	I 0-5	86-100	0-10	I 1–01	1.40-1.70	ı	0.07-0.09	1 0.0-2.9 1	2.0-5.0
opino	5-10		0-10			5.9-20.0 5.9-20.0		1 0.0-2.9 1	0.5-2.0
	•	86-100	0-10		1.40-1.70			0.0-2.9	0.5-2.0
	17-62		0-15		1.40-1.70	5.9-20.0		1 0.0-2.9 1	0.0-0.5
		71-100	0-15		1.40-1.70			1 0.0-2.9 1	0.0-0.5
	•	86-100	0-10		1.40-1.70		0.05-0.07		0.0-0.5
	7 <u>2</u> 00	1 00 1001	0 10		1.40 1.70	3.3 20.0 	0.03 0.07	1 0.0 2.3 1	0.0 0.3
Coloma	0-3	86-100	0-10	0-9	1.35-1.65	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
	3-4	71-100	0-15	0-14	1.35-1.65	5.9-20.0	0.06-0.11	0.0-2.9	0.5-2.0
	4-8	71-100	0-15		1.50-1.65		0.05-0.10	0.0-2.9	0.5-1.0
	8-15	71-100	0-15		1.50-1.65			1 0.0-2.9 1	0.5-1.0
	15-25	71-100	0-15		1.50-1.65			1 0.0-2.9 1	0.0-0.5
	25-40	71-100	0-15		1.50-1.65	5.9-20.0		1 0.0-2.9 1	0.0-0.5
	40-80	71-100	0-15		1.50-1.65			0.0-2.9	0.0-0.5
	I	1		l I		I I		1 1	
193258:									
Spinks	0-5	86-100	0-10		1.40-1.70			0.0-2.9	2.0-5.0
	5-10	86-100	0-10		1.40-1.70	5.9-20.0		0.0-2.9	0.5-2.0
	10-17		0-10		1.40-1.70			0.0-2.9	0.5-2.0
	17-62		0-15		1.40-1.70			0.0-2.9	0.0-0.5
	62-72		0-15		1.40-1.70	5.9-20.0		0.0-2.9	0.0-0.5
	72-80	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
Coloma	I 0-3	86-100	0-10	ı 0-9 I	1.35-1.65	5.9-20.0	0.07-0.12	1 0.0-2.9 1	2.0-5.0
	3-4	71-100	0-15		1.35-1.65			1 0.0-2.9 1	0.5-2.0
	•	71-100	0-15		1.50-1.65			0.0-2.9	0.5-1.0
	8-15		0-15		1.50-1.65			1 0.0-2.9 1	0.5-1.0
	15-25	71-100	0-15		1.50-1.65			1 0.0-2.9 1	0.0-0.5
	25-40	71-100	0-15		1.50-1.65			1 0.0-2.9 1	0.0-0.5
	1 40-80		0-15		1.50-1.65	5.9-20.0	0.05-0.10	1 0.0-2.9 1	0.0-0.5
	i	i ii				i i		i i	
193260:	I	i i		ı İ		ı i		I İ	
Copemish	0-2	86-100	0-10		1.30-1.45			0.0-2.9	2.0-5.0
	2-7	86-100	0-10	0-9	1.30-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	7-11	86-100	0-10	0-9	1.30-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	11-28	86-100	0-10	0-9	1.75-2.00	2.0-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	28-36	86-100	0-10	0-9	1.75-2.00	2.0-20.0		0.0-2.9	0.5-3.0
	36-80	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	I	1 1		ı ı		1 1		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name	I			, <u>.</u>	bulk	(Ksat)	water	swell	matter
		i i			density	. ,, , I i	capacity	potential	
	In	l Pct I	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
	· —	; — ;			· <u></u>	;		i — i	
193262:		i i			i I	i i		i i	
Kaleva	0-3	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	3-9	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	9-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
	11-16	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	16-21	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	21-70	86-100	0-10	0-9	1.35-1.50	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	70-80	86-100	0-10	0-9	1.35-1.50	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
193263:	l	1 1		l	l	1		1 1	
Kaleva	0-3	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	3-9	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	9-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
	11-16	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	16-21	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	21-70	86-100	0-10	0-9	1.35-1.50	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	70-80				1.35-1.50			0.0-2.9	0.0-0.5
	i	i i		i	i İ	i i		i i	
193265:	l	i i		l	l	i i		i i	
Grattan	0-4	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	4-13	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	13-18	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	18-25	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	25-53	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
	53-80	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
193266:	l	1 1		l	l	1		1 1	
Grattan	0-4	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	4-13	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	13-18	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	18-25	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	25-53	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
	53-80	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
193267:	l	1 1		l	l	1		1 1	
Grattan	0-4	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	4-13	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	13-18	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	18-25	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	25-53	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
	53-80	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
193269:	l	I I		l	l	l I		1 1	
Grattan	0-4	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	4-13	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	13-18	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	18-25	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	25-53	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
	53-80	86-100	0-10	0-9	1.35-1.55	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	l	l I		l	l	l I		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available		Organic
and soil name		!!!		! !	bulk	(Ksat)	water	swell	matter
		<u> </u>			density	<u> </u>	capacity	potential	
١	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
		1 1				l I		1 1	
193270:		I I				l		1	
Covert	0-1	86-100	0-10		1.30-1.55		0.06-0.09		2.0-5.0
	1-8	86-100	0-10		1.30-1.60		0.06-0.08		0.5-2.0
	8-18		0-10		1.30-1.60			0.0-2.9	0.5-3.0
	18-25		0-10		1.30-1.60			0.0-2.9	0.5-3.0
	25-29		0-10		1.50-1.60			0.0-2.9	0.0-0.5
	29-38		0-10		1.45-1.65			0.0-2.9	0.0-0.5
		86-100	0-10		1.50-1.60			0.0-2.9	0.0-0.5
	47-80	86-100	0-10	0-9	1.50-1.60	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
100071		! !				<u> </u>		!!!	
193271:	0.0	1 06 100:	0 10		1 20 1 52		0 07 0 00	1 1	0 0 5 0
Pipestone	0-2	86-100	0-10		1.30-1.50			0.0-2.9	2.0-5.0
	2-9	86-100	0-10		1.30-1.70			0.0-2.9	0.5-2.0
	9-12		0-10		1.30-1.70			0.0-2.9	2.0-5.0
		86-100	0-10		1.40-1.70			0.0-2.9	0.5-3.0
		86-100	0-10		1.40-1.65			0.0-2.9	0.0-0.5
	32-80	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
100070		!!		. !		!		!!!	
193272:	0.4	I I	ΕO	I 40 I	0.30-0.50		0.35-0.45	!!	60-100
Dair	0-4 4-7	10 23-85	50 5-45		1.35-1.50		0.13-0.15		10-20
	7-11		0-10		1.40-1.60		0.13-0.13		0.5-1.0
	11-21		0-10		1.40-1.60			0.0-2.9	0.0-0.5
	21-50		0-10		1.40-1.60		0.05-0.07		0.0-0.5
	50-80		0-10		1.40-1.60		0.05-0.07		0.0-0.5
	30-80	1 90-1001	0-10	1 0-9 1	1.40-1.00	1 5.9-20.0	0.05-0.07	1 0.0-2.9 1	0.0-0.5
		: :		: :		;		: :	
Benona	0-2	 86-100	0-10	' ∩-9 i	1.30-1.55	5.9-20.0 I	0 07-0 12	0.0-2.9	2.0-5.0
Denona	2-6	86-100	0-10		1.30-1.55		0.06-0.08		0.5-2.0
	6-9	86-100	0-10		1.40-1.60			1 0.0-2.9	0.5-3.0
	9-17		0-10		1.40-1.60			1 0.0-2.9	0.5-3.0
	17-28		0-10		1.40-1.60			1 0.0-2.9 1	0.5-1.0
	28-46		0-10		1.40-1.60		0.06-0.08		0.5-1.0
i	46-80		0-15		1.55-1.65		0.06-0.10		0.0-0.5
193278: i			0 _0	:		0.0 _0.0	0.00 0.20	1	0.0 0.0
Benona	0-2	86-100	0-10	I 0-9 I	1.30-1.55	5.9-20.0 i	0.07-0.12	0.0-2.9	2.0-5.0
	2-6	86-100	0-10		1.30-1.55			0.0-2.9	0.5-2.0
i		86-100	0-10		1.40-1.60			0.0-2.9	0.5-3.0
i	9-17		0-10		1.40-1.60			0.0-2.9	0.5-3.0
i	17-28		0-10		1.40-1.60			0.0-2.9	0.5-1.0
i	28-46		0-10		1.40-1.60			1 0.0-2.9	0.5-1.0
·		71-100	0-15		1.55-1.65			1 0.0-2.9	0.0-0.5
:	10 00		0 10			. 3.3 20.0	3.00 0.10		3.0 0.3

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name	, <u>-</u>			<u></u>	bulk	(Ksat)	water	swell	matter
	i İ	i i		i i	density	. ,, , I I		potential	
	In	Pct	Pct	l Pct	g/cc	In/hr	In/in	Pct	Pct
	; —	i — i		; — ;	<u> </u>	i i		i — i	
193279:	i	i i		i i		i i		i i	
Benona	I 0-2	I 86-100	0-10	I 0-9 i	1.30-1.55	I 5.9-20.0 I	0.07-0.12	0.0-2.9	2.0-5.0
	I 2-6	86-100	0-10	0-14	1.30-1.55	5.9-20.0	0.06-0.08	1 0.0-2.9 1	0.5-2.0
	I 6-9	86-100	0-10		1.40-1.60		0.06-0.08	1 0.0-2.9 1	0.5-3.0
	I 9-17	86-100	0-10	I 0-9 i	1.40-1.60	5.9-20.0	0.06-0.08	1 0.0-2.9 1	0.5-3.0
	17-28	86-100	0-10	I 0-9 i	1.40-1.60	5.9-20.0	0.06-0.08	1 0.0-2.9 1	0.5-1.0
	28-46	86-100			1.40-1.60		0.06-0.08	0.0-2.9	0.5-1.0
	46-80	71-100	0-15	2-14	1.55-1.65	5.9-20.0	0.06-0.10	0.0-2.9	0.0-0.5
	İ	i i		i i		i i		i i	
193284:	I	1 1		I 1		l l		1 1	
Udorthents	0-80	45-85	5-45	7-19	1.40-1.60	0.2-0.6	0.20-0.22	0.0-2.9	2.0-5.0
	I	l I		I 1		l l		1 1	
Udipsamments	0-80	71-100	0-10	0-10	1.35-1.65	5.9-20.0	0.05-0.09	0.0-2.9	0.5-1.0
	I	l I		I		l I		1 1	
193285:	l	1 1		l 1				1	
Lumley	I 0-3	6	57	37	0.05-0.14		0.55-0.65	0.0-0.0	70-100
	J 3-6	6	57	37	0.05-0.14	0.2-5.9	0.55-0.65	0.0-0.0	70-100
	l 6-8	10	65		0.30-0.55			0.0-0.0	55-100
	8-20	10	65		0.30-0.55		0.35-0.45	0.0-0.0	55-100
	20-45		65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	45-53	10	65	25	0.13-0.23	0.2-5.9	0.35-0.45	0.0-0.0	70-100
	53-80	10	65	25	0.13-0.23	0.2-5.9	0.35-0.45	0.0-0.0	70-100
	I	l I		I 1		l l		1 1	
Makinen	0-4	10	65		0.30-0.55			0.0-0.0	55-100
	4-14		65		0.30-0.55			0.0-0.0	55-100
	14-22		65		0.30-0.55			0.0-0.0	55-100
	22-31		65	25				0.0-0.0	70-100
	31-80	86-100	0-10	0-10	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	!	!!		!		! !		!!!	
193286:		!!		!					
Histosols	•	10	65	25	0.30-0.55			0.0-0.0	55-100
	45-80	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
3	I 0 00		0.10		1 40 1 60		0 05 0 07	1 0 0 0 0 1	0 0 0 5
Aquents	. 0-80	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.05-0.07	1 0.0-2.9 1	0.0-0.5
193287:	!	!!!		!		! !		! !	
Quartzipsamments	ı I 0-80	ı 86-100	0-10		1.30-1.60	I 5.9-20.0 I	0.03-0.08	1 0 0 2 0 1	0.0-0.1
Quartzipsamments	1 0-80	90-100	0-10	1 0-5	1.30-1.60	5.9-20.0 	0.03-0.08	1 0.0-2.9 1	0.0-0.1
193288:								1 1	
Udipsamments	ı I 0-80	ı 71-100	0-10	I 0_10	1.35-1.65	ı	0.05-0.09	 0.0-2.9	0.5-1.0
odipsamments	1 0-80	/1-100	0-10	1 0-10	1.35-1.65	5.9-20.0 	0.05-0.09	1 0.0-2.9	0.5-1.0
193342:	' 	·		' '		! ! !		· !	
Gorvan	I 0-4	ı 5-50 I	50-80	 7-26	1.10-1.60	ı	0 20-0 24	0.0-2.9	2.0-20
001 van	0 1 4-11				1.48-1.80			1 0.0-2.9 1	2.0-5.0
	11-27			•	1.48-1.80			0.0-2.9	
	1 27-80				1.46-1.80			0.0-2.9	0.0-0.5
	, <i></i> 55	, 55 150 ₁	0 10	. ,		, 3.3 <u>2</u> 0.0	3.05 0.07	0.0 2.3	3.0 0.3
	•					. '			

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available		Organic
and soil name		!!	. !		bulk	(Ksat)	water	swell	matter
<u> </u>				!	density	1 - 1	capacity	potential	
I	<u>In</u>	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193342: I			ľ			! !		; ;	
Houghton	0-12	10	50 j	40	0.30-0.55	0.2-5.9	0.35-0.45	1 0.0-0.0 1	55-100
i	12-26	10	65	25 I	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
!	26-80	10	65 I	25 J	0.30-0.55	0.2-5.9	0.35-0.45	1 0.0-0.0 1	55-100
 Glendora	0-6	 71-90	3-15 I	0-14	1.00-1.35	l 5.9-20.0 l	0.10-0.12	1 0.0-2.9 1	10-20
i	6-9	71-100	3-15	0-14	1.40-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
i	9-30	86-100	0-15	0-14	1.40-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
İ	30-80	86-100	0-15	0-14	1.40-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
193349: I			l I	I				; ;	
Spinks	0-5	86-100	0-10 i	0-9 j	1.40-1.70	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
i	5-10	86-100	0-10 i	0-9 j	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
İ	10-17	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
I	17-62	71-100	0-15	3-14	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
I	62-72	71-100	0-15	3-14	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
!	72-80	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
 Coloma	0-3	 86-100	0-10 I	0-9 I	1.35-1.65		0.07-0.12	1 0.0-2.9 1	2.0-5.0
i	3-4	71-100	0-15	0-14	1.35-1.65	5.9-20.0	0.06-0.11	0.0-2.9	0.5-2.0
İ	4-8	71-100	0-15	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.5-1.0
I	8-15	71-100	0-15	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.5-1.0
I	15-25	71-100	0-15	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
I	25-40	71-100	0-15	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
ļ	40-80	71-100	0-15	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
193351:						! !		; ;	
Benona	0-2	86-100	0-10	0-9	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
I	2-6	86-100	0-10	0-14	1.30-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
I	6-9	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
I	9-17	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
I	17-28	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
I	28-46	86-100	0-10	0-9	1.40-1.60		0.06-0.08	0.0-2.9	0.5-1.0
I	46-80	71-100	0-15	2-14	1.55-1.65	5.9-20.0	0.06-0.10	0.0-2.9	0.0-0.5
193354:		i i	i	i				i i	
Quartzipsamments	0-80	86-100	0-10	0-5	1.30-1.60	5.9-20.0	0.03-0.08	0.0-2.9	0.0-0.1
193357:			¦	ı İ				; ;	
Shavenaugh	0-5	86-100	0-10	0-9	1.30-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
I	5-8	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-3.0
I	8-16	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-1.0
I	16-28	86-100	0-10		1.30-1.70			0.0-2.9	0.5-1.0
I	28-34	86-100	0-10		1.30-1.70			0.0-2.9	0.5-1.0
I	34-44	71-90	3-15		1.30-1.70			0.0-2.9	0.0-0.5
	44-80	I 71-100I	0-10 I		1.30-1.70	I 5.9-20.0 I	0.02-0.06		0.0-0.5

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Donth	Sand	Silt	Clar- !	Moist	Permeability	Available	Shrink-	Organic
and soil name	Depth	ı sandı	STTC	Clay	Moist bulk	Permeability (Ksat)	water	Shrink- swell	Organic matter
and sorr name	! 	, l			density	(MSGC) 		swell potential	maccel
	l In	l Pct I	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
	<u> </u>	: :			9,00	' / '		: :	
193359:	! 	i i				i		i i	
Shavenaugh	0-5	86-100	0-10	0-9 i	1.30-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
i	5-8	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-3.0
i	8-16	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-1.0
ĺ	16-28	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-1.0
1	28-34	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-1.0
I	34-44	71-90	3-15	5-14	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.0-0.5
1	44-80	71-100	0-10	0-9	1.30-1.70	5.9-20.0	0.02-0.06	0.0-2.9	0.0-0.5
193360:		I I	I			I I		1 1	
Shavenaugh		86-100	0-10	0-9				0.0-2.9	2.0-5.0
I	5-8	86-100	0-10		1.30-1.70	5.9-20.0		0.0-2.9	0.5-3.0
	8-16		0-10		1.30-1.70			0.0-2.9	0.5-1.0
	16-28	86-100	0-10		1.30-1.70			0.0-2.9	0.5-1.0
	28-34		0-10		1.30-1.70	5.9-20.0		0.0-2.9	0.5-1.0
	34-44		3-15		1.30-1.70			0.0-2.9	0.0-0.5
	44-80	71-100	0-10	0-9	1.30-1.70	5.9-20.0	0.02-0.06	0.0-2.9	0.0-0.5
193362:		: :				! !		: :	
Benzonia	 0-5	 86-100	0-10	l ∩_9 l	1.25-1.45	ı	0.07-0.09	0.0-2.9	2.0-5.0
Delizonia	5-11		0-10		1.35-1.45			0.0-2.9	0.5-2.0
	11-15		0-10		1.35-1.45			0.0-2.9	2.0-5.0
	15-20		0-10		1.35-1.45			0.0-2.9	2.0-5.0
i	20-27	86-100	0-10		1.35-1.45			0.0-2.9	0.5-3.0
i	27-35		0-10		1.35-1.45			1 0.0-2.9 1	0.5-3.0
i	35-80	71-100	0-10	0-14	1.35-1.45	5.9-20.0	0.06-0.11	0.0-2.9	0.0-0.5
193363:		1 1				l I		1 1	
Benzonia	0-5	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
I	5-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.05-0.08	0.0-2.9	0.5-2.0
1	11-15	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
I		86-100	0-10		1.35-1.45			0.0-2.9	2.0-5.0
I	20-27		0-10		1.35-1.45			0.0-2.9	0.5-3.0
I	27-35	86-100	0-10		1.35-1.45	5.9-20.0	0.00 0.00	0.0-2.9	0.5-3.0
	35-80	71-100	0-10	0-14	1.35-1.45	5.9-20.0	0.06-0.11	0.0-2.9	0.0-0.5
193364:			0.10		4 05 4 45		0 0 0 0 0 0		
Benzonia	0-5	86-100	0-10		1.25-1.45			0.0-2.9	2.0-5.0
	5-11 11-15		0-10		1.35-1.45			0.0-2.9	0.5-2.0
	15-20	86-100 86-100	0-10 0-10		1.35-1.45 1.35-1.45	5.9-20.0 5.9-20.0		0.0-2.9 0.0-2.9	2.0-5.0 2.0-5.0
		86-100 86-100	0-10		1.35-1.45			0.0-2.9	0.5-3.0
	27-35	86-100	0-10		1.35-1.45			0.0-2.9	0.5-3.0
	35-80	71-100	0-10		1.35-1.45	5.9-20.0 5.9-20.0	0.06-0.11		0.0-0.5
193365:	1 33 00	1 71 1001	0 10 1	1 0 141	1.33 1.43	3.5 <u>2</u> 0.0	0.00 0.11	1 0.0 2.5 1	0.0 0.5
Benzonia	0-5	86-100	0-10	 0-9	1.25-1.45	5.9-20.0	0.07-0.09	 0.0-2.9	2.0-5.0
	5-11		0-10		1.35-1.45	5.9-20.0 5.9-20.0		0.0-2.9	0.5-2.0
	-	86-100	0-10		1.35-1.45			0.0-2.9	2.0-5.0
		86-100	0-10		1.35-1.45			0.0-2.9	2.0-5.0
i	20-27	86-100	0-10		1.35-1.45	5.9-20.0		0.0-2.9	0.5-3.0
ĺ	27-35	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
į	35-80	71-100	0-10	0-14	1.35-1.45	5.9-20.0	0.06-0.11	0.0-2.9	0.0-0.5
		I I	1			I I		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available	Shrink-	Organic
and soil name		1		l	bulk	(Ksat)	water	swell	matter
		<u> </u>		<u> </u>	density	<u> </u>		potential	
I	<u>In</u>	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
		!!!				!!!		!!!	
193371:	0.4			10	0 20 0 50		0 25 0 45	!!	60 100
Dair	0-4 4-7	10 23-85	50 5-45	40	0.30-0.50 1.35-1.50	0.2-5.9 0.6-2.0	0.35-0.45 0.13-0.15	1 0.0-2.9 1	60-100 10-20
	7-11	23-65 86-100	0-10	7-26 0-9				1 0.0-2.9 1	0.5-1.0
	'	86-100	0-10	0-9		1 5.9-20.0 1 5.9-20.0		1 0.0-2.9	0.0-0.5
	21-50	86-100 86-100	0-10			5.9-20.0 5.9-20.0		1 0.0-2.9	0.0-0.5
· ·	50-80	86-100	0-10				0.05-0.07		0.0-0.5
¦	30 00	1 00 1001	0 10	091	1.40 1.00] 3.9 <u>2</u> 0.0	0.03 0.07	1 0.0 2.9 1	0.0 0.3
Pipestone	0-2	86-100	0-10	0-9 I	1.30-1.50	' 5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
		86-100	0-10				0.06-0.08	1 0.0-2.9 1	0.5-2.0
i	9-12	86-100	0-10	0-9 i	1.30-1.70	5.9-20.0	0.06-0.08	1 0.0-2.9 1	2.0-5.0
i	12-24	86-100	0-10	0-9 i	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
i	24-32	86-100	0-10	0-9 i		5.9-20.0		1 0.0-2.9 1	0.0-0.5
i	32-80	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
İ		i i		İ		i i		i i	
193423:		1 1		I		I I		1 1	
Benona	0-2	86-100	0-10	0-9	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
I	2-6	86-100	0-10	0-14	1.30-1.55	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
I	6-9	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
I	9-17	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
I	17-28	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
I	28-46	86-100	0-10	0-9	1.40-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
I	46-80	71-100	0-15	2-14	1.55-1.65	5.9-20.0	0.06-0.10	0.0-2.9	0.0-0.5
100404		!!		. !		!!!		!!	
193494:	0-3	I 06 1001	0-10	∣ 0-5 I	1.30-1.55	I I I 5.9-20.0 I	0.07-0.09	1 0.0-2.9 1	2.0-5.0
Nordhouse	3-11	86-100 86-100	0-10	0-5 0-5				0.0-2.9 0.0-2.9	0.5-2.0
!	11-40								
!		86-100	0-10	0-5				0.0-2.9	0.5-1.0
!	40-60 60-80	86-100 86-100	0-10 0-10				0.05-0.07 0.05-0.07		0.0-0.5 0.0-0.5
193496: I	60-60	1 99-1001	0-10	0-5	1.40-1.65	1 5.9-20.0	0.05-0.07	1 0.0-2.9 1	0.0-0.5
Nordhouse	0-3	86-100	0-10	0-5	1.30-1.55	5.9-20.0	0 07-0 09	1 0.0-2.9 1	2.0-5.0
NOTATIOUSE	3-11		0-10	0-5				1 0.0-2.9 1	0.5-2.0
· ·	11-40	86-100	0-10	0-5 1				1 0.0-2.9 1	0.5-1.0
· ·	40-60	•	0-10					0.0-2.9	0.0-0.5
i	60-80	86-100	0-10				0.05-0.07		0.0-0.5
193497:		1 00 1001	0 10		1.10 1.00	1 0.5 20.0 1	0.05 0.07	1 0.0 2.5 1	0.0 0.5
Nordhouse	0-3	86-100	0-10	0-5 I	1.30-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	3-11		0-10	0-5				1 0.0-2.9 1	0.5-2.0
i	11-40	86-100	0-10			5.9-20.0		1 0.0-2.9 1	0.5-1.0
i	40-60	86-100	0-10					1 0.0-2.9 1	0.0-0.5
i	60-80	86-100	0-10				0.05-0.07		0.0-0.5
193498:						<u></u>			
Nordhouse	0-3	86-100	0-10	0-5	1.30-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
· - '	3-11		0-10	0-5				1 0.0-2.9 1	0.5-2.0
i	11-40	86-100	0-10					0.0-2.9	0.5-1.0
i	40-60	86-100	0-10					0.0-2.9	0.0-0.5
i	60-80	86-100	0-10	0-5			0.05-0.07		0.0-0.5
i	l	ı i		i		i i		ı i	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name	, <u>-</u>	i i		<u>-</u>	bulk	(Ksat)	water	swell	matter
	I	i i			density	i	capacity	potential	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
	_	. — .				ı ı			
193498:	l	i i				İ		i i	
Platteriver	0-1	10	50	40		5.9-20.0			25-100
	1-3	86-100	0-10	0-5	1.30-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	3-14	86-100	0-10	0-5	1.40-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	14-20	86-100	0-10	0-5	1.50-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
		86-100			1.50-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
	29-80	86-100	0-10	0-5	1.50-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
Dair	l I 0-4	10	ΕO	1 40	0 20 0 50	 0.2-5.9	0 25 0 45	 	60 100
Dair		10 23-85	50 5-45		0.30-0.50 1.35-1.50		0.35-0.45 0.13-0.15		60-100 10-20
	•	23-85 86-100							0.5-1.0
	•	86-100 86-100			1.40-1.60 1.40-1.60		0.06-0.08	1 0.0-2.9	
		86-100 86-100			1.40-1.60	5.9-20.0 5.9-20.0	0.05-0.07		0.0-0.5
	21-30 50-80				1.40-1.60	5.9-20.0 5.9-20.0	0.05-0.07		0.0-0.5
	30 00 	1 00 1001	0 10	1	1.40 1.00	5.9 20.0 	0.03 0.07	1 0.0 2.9 1	0.0 0.5
193503:	' 	i i				i i		i i	
Spinks	I 0-5	86-100	0-10	0-9	1.40-1.70	I 5.9-20.0 I	0.07-0.09	0.0-2.9	2.0-5.0
1	5-10				1.40-1.70	I 5.9-20.0 I	0.06-0.08		0.5-2.0
	10-17	86-100	0-10	0-9	1.40-1.70	5.9-20.0 j	0.06-0.08	0.0-2.9	0.5-2.0
	17-62	71-100	0-15	3-14	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
	62-72	71-100	0-15	3-14	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
	72-80	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	l	1 1				l I		1 1	
Shavenaugh	•	86-100			1.30-1.55		0.07-0.09		2.0-5.0
		86-100		0-9	1.30-1.70	5.9-20.0	0.03-0.11		
		86-100			1.30-1.70	5.9-20.0	0.03-0.11		
	•	86-100			1.30-1.70	5.9-20.0	0.03-0.11		
		86-100			1.30-1.70	5.9-20.0		0.0-2.9	
		71-90			1.30-1.70		0.03-0.11		
	44-80	71-100	0-10	0-9	1.30-1.70	5.9-20.0	0.02-0.06	0.0-2.9	0.0-0.5
193504:	l I	 				 			
Spinks	ı I 0-5	86-100	0-10	0-9	1.40-1.70	' 5.9-20.0 I	0.07-0.09	0.0-2.9	2.0-5.0
Sp =5		86-100			1.40-1.70	5.9-20.0	0.06-0.08		
		86-100			1.40-1.70	5.9-20.0 I	0.06-0.08		
		71-100			1.40-1.70		0.06-0.08		
		71-100			1.40-1.70	I 5.9-20.0 I	0.06-0.08		
	•	86-100			1.40-1.70	5.9-20.0	0.05-0.07		0.0-0.5
	l	1 1				l l		1 1	
Shavenaugh		86-100			1.30-1.55		0.07-0.09		2.0-5.0
		86-100			1.30-1.70	5.9-20.0	0.03-0.11		
		86-100			1.30-1.70	5.9-20.0	0.03-0.11		
	•	86-100			1.30-1.70		0.03-0.11		
		86-100			1.30-1.70	5.9-20.0	0.03-0.11		
		71-90			1.30-1.70	5.9-20.0	0.03-0.11		
	44-80	71-100	0-10	0-9	1.30-1.70	5.9-20.0	0.02-0.06	0.0-2.9	0.0-0.5
	I	1 1		l I		ı l		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name	l	1 1	1		bulk	(Ksat)	water	swell	matter
		<u> </u>			density	l <u></u> l		potential	
I	In	Pct	Pct	Pct	g/cc	<u>In/hr</u>	<u>In/in</u>	Pct	Pct
1		I I]	I I		1	
193505:		1 1	1			I I		1 1	
Spinks	0-5	86-100	0-10	0-9				0.0-2.9	2.0-5.0
	5-10		0-10		1.40-1.70		0.06-0.08		0.5-2.0
		86-100	0-10		1.40-1.70			0.0-2.9	0.5-2.0
		71-100	0-15		1.40-1.70			0.0-2.9	0.0-0.5
		71-100	0-15		1.40-1.70			0.0-2.9	0.0-0.5
	72-80	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
Shavenaugh	ı I 0-5	ı 86-100	0-10	0-0	 1.30-1.55		0 07-0 09		2.0-5.0
Silavellaugii		86-100 86-100	0-10		1.30-1.33			0.0-2.9	0.5-3.0
		86-100	0-10		1.30-1.70			0.0-2.9	0.5-1.0
		86-100	0-10		1.30-1.70			0.0-2.9	0.5-1.0
		86-100	0-10		1.30-1.70			0.0-2.9	
i		71-90	3-15		1.30-1.70			0.0-2.9	0.0-0.5
i	44-80	71-100	0-10		1.30-1.70	5.9-20.0 j	0.02-0.06	0.0-2.9	0.0-0.5
I	l	1 1	1			l I		1 1	
193506:		1 1	1			I I		1 1	
Spinks	0-5	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
1		86-100	0-10		1.40-1.70		0.06-0.08		0.5-2.0
		86-100	0-10		1.40-1.70			0.0-2.9	
		71-100	0-15		1.40-1.70			0.0-2.9	0.0-0.5
		71-100	0-15		1.40-1.70			0.0-2.9	0.0-0.5
	72-80	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
Charranauah	I I 0-5	I 86-100I	0 10		 1 20 1 EE		0 07 0 00	1 0 0 2 0 1	2050
Shavenaugh		86-100 86-100	0-10 0-10		1.30-1.55 1.30-1.70			0.0-2.9 0.0-2.9	2.0-5.0 0.5-3.0
		86-100 86-100	0-10		1.30-1.70			0.0-2.9	
		86-100	0-10		1.30-1.70			0.0-2.9	
		86-100	0-10		1.30-1.70			0.0-2.9	0.5-1.0
		71-90	3-15		1.30-1.70			0.0-2.9	0.0-0.5
i	44-80		0-10		1.30-1.70		0.02-0.06		0.0-0.5
i		i i	Ì]	i i		i i	
193507:		1 1				I I		1 1	
Spinks	0-5	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
I		86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
1	10-17	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
I	17-62		0-15		1.40-1.70			0.0-2.9	0.0-0.5
1		71-100	0-15		1.40-1.70			0.0-2.9	0.0-0.5
	72-80	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
Ohanna i h		1 06 100:	0 10		1 20 1 55		0 07 0 00	1 0 0 0 0 1	2 0 5 2
Shavenaugh		86-100	0-10		1.30-1.55			0.0-2.9	2.0-5.0
		86-100	0-10					0.0-2.9	0.5-3.0
		86-100	0-10		1.30-1.70			0.0-2.9	
		86-100 86-100	0-10 0-10		1.30-1.70 1.30-1.70			0.0-2.9 0.0-2.9	0.5-1.0 0.5-1.0
		71-90	3-15		1.30-1.70			0.0-2.9 0.0-2.9	0.0-0.5
		71 30 71-100	0-10		1.30-1.70			0.0-2.9	
	, 00 I	, <u></u>				0.5 20.0	0.02	, <u>.</u> ., ,	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name	 	i		, <u>.</u> .	bulk	(Ksat)	water	swell	matter
	l	İ	l	ı i	density	i i	capacity	potential	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
		. —		. — ,		ı —— ı			
193508:		İ		i i		İ		i i	
Madaus	0-12	10	50	40	0.25-0.45	0.2-5.9	0.35-0.45	0.0-0.0	25-100
	12-34	0-50	50-80	7-25	0.25-0.45	0.1-0.2	0.20-0.22	0.0-2.9	10-20
	34-38	0-50	50-80	7-25	0.25-0.45	0.1-0.2	0.20-0.22	0.0-2.9	10-20
	38-62	86-100	0-10	0-9	1.50-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	62-80	0-45	10-39	40-70	1.55-1.70	0.1-0.2	0.08-0.10	6.0-8.9	0.0-0.5
	l	I I		l I		I I		1 1	
193509:	l	I I		l I		l I		1 1	
Boyer	0-3	45-85			1.35-1.60		0.16-0.18		2.0-5.0
		45-85	5-45		1.30-1.60		0.15-0.18		0.5-2.0
	4-14	•	5-45		1.35-1.60			0.0-5.9	0.0-0.5
		45-85			1.35-1.60			0.0-5.9	
	30-45	71-100	-		1.40-1.55	5.9-20.0		0.0-2.9	0.0-0.5
	45-80	71-100	0-14	0-14	1.40-1.55	5.9-20.0	0.02-0.10	0.0-2.9	0.0-0.5
					4 00 4 55		0 05 0 00		
Shavenaugh	•	86-100						0.0-2.9	2.0-5.0
		86-100			1.30-1.70			0.0-2.9	
		86-100			1.30-1.70			0.0-2.9	0.5-1.0
	•	86-100			1.30-1.70			0.0-2.9	
		86-100			1.30-1.70	5.9-20.0		0.0-2.9	
	34-44 44-80	71-90 71-100			1.30-1.70 1.30-1.70			0.0-2.9 0.0-2.9	0.0-0.5 0.0-0.5
	I 44-00	/1-100	0-10	1 0-9 1	1.30-1.70	1 5.9-20.0	0.02-0.00	1 0.0-2.9	0.0-0.5
193510:	! 		! 	: :		' ' ' '		: :	
Boyer	ı I 0-3	 45-85	5-45	, , , 7–191	1.35-1.60	' 0.6-2.0	0 16-0 18	0.0-2.9	2.0-5.0
0,0	3-4	45-85	5-45		1.30-1.60		0.15-0.18		0.5-2.0
		45-85			1.35-1.60			0.0-5.9	
		45-85			1.35-1.60			0.0-5.9	
	30-45	71-100			1.40-1.55			1 0.0-2.9 1	0.0-0.5
	45-80	•			1.40-1.55			1 0.0-2.9 1	0.0-0.5
	l	İ	l	ı i		i i		i i	
Shavenaugh	0-5	86-100	0-10	0-9	1.30-1.55	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	J 5-8	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-3.0
	8-16	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-1.0
	16-28	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-1.0
	28-34	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.5-1.0
	34-44	71-90	3-15	5-14	1.30-1.70	5.9-20.0	0.03-0.11	0.0-2.9	0.0-0.5
	44-80	71-100	0-10	0-9	1.30-1.70	5.9-20.0	0.02-0.06	0.0-2.9	0.0-0.5
	l					l l		1 1	
193511:	l					l l		1 1	
Boyer	0-3	45-85			1.35-1.60		0.16-0.18		2.0-5.0
	3-4	45-85	5-45		1.30-1.60			0.0-5.9	0.5-2.0
		45-85			1.35-1.60			0.0-5.9	
		45-85			1.35-1.60			0.0-5.9	
	30-45	•			1.40-1.55			0.0-2.9	
	45-80	71-100	0-14	0-14	1.40-1.55	5.9-20.0	0.02-0.10	0.0-2.9	0.0-0.5
	l	i				1 1		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability		Shrink-	Organic
and soil name					bulk	(Ksat)	water	swell	matter
	<u> </u>	<u> </u>			density	<u> </u>	capacity	potential	
	In In	Pct	Pct	Pct	g/cc	I In/hr I	In/in	Pct	Pct
193511:	l I	 							
Shavenaugh	0-5	86-100	0-10	0-9 1	1.30-1.55	5.9-20.0	0.07-0.09	1 0.0-2.9 1	2.0-5.0
		86-100			1.30-1.70	I 5.9-20.0 I	0.03-0.11		0.5-3.0
	8-16	86-100			1.30-1.70	•		1 0.0-2.9 1	0.5-1.0
		86-100			1.30-1.70	•		1 0.0-2.9 1	0.5-1.0
	28-34	86-100	0-10	0-9 i	1.30-1.70	5.9-20.0	0.03-0.11	1 0.0-2.9 1	0.5-1.0
	34-44	71-90	3-15	5-14	1.30-1.70	5.9-20.0	0.03-0.11	1 0.0-2.9 1	0.0-0.5
	44-80	71-100			1.30-1.70			0.0-2.9	0.0-0.5
100510		!!!		. !		!!		!!!	
193513:	l l 0-4	I 10 I	F0	40	0 20 0 50		0 25 0 45	!!!	60 100
Dair		10	50		0.30-0.50	•	0.35-0.45		60-100
	4-7 7-11	23-85	5-45		1.35-1.50	•		0.0-2.9	10-20
	•				1.40-1.60	•		0.0-2.9	0.5-1.0
	11-21 21-50	86-100			1.40-1.60	•	0.05-0.07		0.0-0.5
		86-100 86-100			1.40-1.60 1.40-1.60			0.0-2.9	0.0-0.5
	50-80 		0-10	0-9	1.40-1.60	5.9-20.0 	0.05-0.07	0.0-2.9	0.0-0.5
Adrian	0-7	10	50	40	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	7-20	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	20-35	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
j	35-80	86-100	0-10	0-10	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
193514:] i							!!!	
Platteriver	 0-1	' 10 I	50	40		5.9-20.0			25-100
riacteriver		10 86-100			1.30-1.55		0.07-0.09	1 0 0-2 9 1	2.0-5.0
	3-14				1.40-1.60			1 0.0-2.9 1	0.5-2.0
	-	86-100			1.50-1.65	5.9-20.0		1 0.0-2.9 1	0.5-1.0
	20-29				1.50-1.65			1 0.0-2.9 1	0.5-1.0
	29-80				1.50-1.65			0.0-2.9	0.0-0.5
j	Ì	i i		İ		i i		i i	
Pipestone		86-100			1.30-1.50			0.0-2.9	2.0-5.0
I		86-100			1.30-1.70			0.0-2.9	0.5-2.0
I		86-100			1.30-1.70			0.0-2.9	2.0-5.0
I		86-100			1.40-1.70			0.0-2.9	0.5-3.0
I	24-32				1.40-1.65			0.0-2.9	0.0-0.5
	32-80	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
202010:] 	1 				1			
Houghton	0-12	10	50	40	0.30-0.55	0.2-5.9	0.35-0.45	1 0.0-0.0 1	55-100
_	12-26	I 10 I	65	25	0.30-0.55	0.2-5.9	0.35-0.45	1 0.0-0.0 1	55-100
İ	26-80	10	65	25	0.30-0.55		0.35-0.45	0.0-0.0	55-100
Admina	l I 0-7	 10	F^	40	0 20 0 55		0 35 0 45		EE 100
Adrian	U-7 7-20		50 65	40	0.30-0.55			0.0-0.0	55-100
					0.30-0.55	0.2-5.9		0.0-0.0	55-100
	20-35 35-80	10 86-100	65 0-10	25				0.0-0.0	55-100 0.0-0.5
	33-80 	00-T00	0-10	0-10	1.40-1.65	5.9-20.0 	0.05-0.07	1 0.0-2.9	0.0-0.5
	l					1 1		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name	l sebou		5110	Ciay	bulk	reimeability (Ksat)	water	swell	matter
and both mane	' I	i i	ï	' '	density	(1.500) 		potential	ma coct
	l In	l Pct I	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
	<u> </u>	: :			9,00	¦ /		; ;	
202016:	! 	; ;				! ! ! !		; ;	
Spinks	I 0-5	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	5-10	86-100	0-10	0-9				0.0-2.9	0.5-2.0
j	10-17		0-10		1.40-1.70	5.9-20.0 I		0.0-2.9	0.5-2.0
j	17-62		0-15		1.40-1.70			1 0.0-2.9 1	0.0-0.5
j	62-72	71-100	0-15		1.40-1.70	I 5.9-20.0 I		1 0.0-2.9 1	0.0-0.5
j	72-80		0-10		1.40-1.70		0.05-0.07		0.0-0.5
	İ	i i		i		i i		i i	
Tekenink, sandy	l	i i	i	i		i i		i i	
substratum	0-8	71-90	5-25	0-14	1.30-1.60	2.0-5.9	0.10-0.12	0.0-2.9	2.0-5.0
	8-16	71-90	5-25	0-14	1.45-1.60	2.0-5.9	0.09-0.11	0.0-2.9	0.5-2.0
1	16-21	45-85	5-45	7-19	1.45-1.60	2.0-5.9	0.12-0.14	0.0-2.9	0.5-1.0
I	21-49	45-90	5-45	0-19	1.45-1.60	2.0-5.9	0.09-0.14	0.0-2.9	0.5-1.0
I	49-62	45-85	5-45	7-19	1.45-1.60	2.0-5.9	0.12-0.14	0.0-2.9	0.5-1.0
ĺ	62-72	71-100	0-15	0-14	1.45-1.60	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
	72-80	71-100	0-15	0-14	1.55-1.70	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
	l	l I	1	I		l I		1 1	
631170:	l	l I	1	l I		l l		1	
Fogg	0-2	86-100	0-10	0-9	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
	2-7	71-100	0-15	0-14	1.40-1.65	5.9-20.0	0.06-0.11	0.0-2.9	0.5-2.0
	7-13	86-100	0-10		1.40-1.65		0.06-0.08	0.0-2.9	2.0-5.0
	13-21	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	21-34	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
1	34-43	23-90	5-45		1.45-1.70			0.0-2.9	0.0-0.5
I	43-48		5-45		1.45-1.70			0.0-2.9	0.0-0.5
I	48-55	23-90	5-45		1.45-1.70			0.0-2.9	0.0-0.5
	55-80	76-100	0-15	0-14	1.40-1.65	2.0-20.0	0.06-0.11	0.0-2.9	0.0-0.5
Benzonia	l I 0-5	 86-100	0-10		1.25-1.45	 5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
Benzonia	0-5 5-11		0-10		1.35-1.45			0.0-2.9	0.5-2.0
	11-15	86-100 86-100	0-10		1.35-1.45			0.0-2.9	2.0-5.0
	15-20		0-10		1.35-1.45			0.0-2.9	2.0-5.0
	20-27		0-10		1.35-1.45			0.0-2.9	0.5-3.0
	27-35	86-100	0-10		1.35-1.45			0.0-2.9	0.5-3.0
	1 35-80		0-10		1.35-1.45		0.06-0.11		0.0-0.5
	33 00 	1 71 1001	0 10 1	0 14	1.33 1.43	3.3 <u>2</u> 0.0	0.00 0.11	1 0.0 2.3 1	0.0 0.5
631171:	i	i i		i		i i		i i	
Fogg	0-2	86-100	0-10	0-9 i	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
55	2-7	71-100	0-15		1.40-1.65			0.0-2.9	0.5-2.0
j	7-13	86-100	0-10		1.40-1.65			1 0.0-2.9 1	2.0-5.0
, i	13-21		0-10		1.40-1.65			0.0-2.9	0.5-3.0
i	21-34		0-10		1.40-1.65			0.0-2.9	0.5-3.0
	34-43	23-90	5-45		1.45-1.70			0.0-2.9	0.0-0.5
, i	43-48		5-45		1.45-1.70			0.0-2.9	0.0-0.5
	48-55	23-90	5-45		1.45-1.70			0.0-2.9	0.0-0.5
i	55-80		0-15		1.40-1.65	2.0-20.0	0.06-0.11		0.0-0.5
i	l	ı i	Ì	i		i i		i i	
		·				•		•	

Table 15.—Physical Soil Properties—Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available		Organic
and soil name			ļ		bulk	(Ksat)	water	swell	matter
	<u> </u>	<u> </u>		<u> </u>	density	<u> </u>	capacity	potential	
	In In	Pct	Pct	Pct	g/cc	In/hr	<u>In/in</u>	Pct	Pct
631171:	<u> </u> 	 	i					; ;	
Benzonia	0-5	86-100	0-10 i	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	5-11	86-100	0-10 i	0-9	1.35-1.45	5.9-20.0	0.05-0.08	0.0-2.9	0.5-2.0
i	11-15	86-100	0-10 i	0-9	1.35-1.45	5.9-20.0		0.0-2.9	2.0-5.0
	15-20	86-100	0-10 i	I 0-9 I	1.35-1.45	5.9-20.0	0.06-0.08	1 0.0-2.9 1	2.0-5.0
	20-27	86-100	0-10 i	I 0-9 I	1.35-1.45	5.9-20.0	0.06-0.08	1 0.0-2.9 1	0.5-3.0
i	27-35	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
İ	35-80	71-100	0-10	0-14	1.35-1.45	5.9-20.0	0.06-0.11	0.0-2.9	0.0-0.5
631172:]]	 		 		 		! !	
Fogg	0-2	86-100	0-10	I 0-9 I	1.30-1.55	' 5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
- 33	2-7	71-100	0-15		1.40-1.65			1 0.0-2.9 1	0.5-2.0
	7-13		0-10		1.40-1.65		0.06-0.08		2.0-5.0
	13-21		0-10		1.40-1.65		0.06-0.08		0.5-3.0
i	21-34		0-10		1.40-1.65		0.06-0.08		0.5-3.0
	34-43		5-45		1.45-1.70			1 0.0-2.9 1	0.0-0.5
i	43-48		5-45		1.45-1.70		0.09-0.19		0.0-0.5
	48-55	23-90	5-45 I		1.45-1.70		0.12-0.19		0.0-0.5
İ	55-80		0-15		1.40-1.65		0.06-0.11		0.0-0.5
Benzonia	l I 0-5	 86-100	0-10 I	 0-9	 1.25-1.45		0 07-0 09	0.0-2.9	2.0-5.0
Delizonia	5-11		0-10		1.35-1.45			1 0.0-2.9 1	0.5-2.0
	11-15		0-10		1.35-1.45			0.0-2.9	2.0-5.0
	15-20		0-10		1.35-1.45		0.06-0.08		2.0-5.0
	20-27		0-10		1.35-1.45		0.06-0.08		0.5-3.0
	27-35		0-10		1.35-1.45		0.06-0.08		0.5-3.0
	35-80	71-100	0-10		1.35-1.45	5.9-20.0	0.06-0.11		0.0-0.5
631173:] I		!					!!!	
Fogg	0-2	 86-100	0-10 i	. 0-9 i	1.30-1.55	5.9-20.0	0.07-0.12	1 0.0-2.9 1	2.0-5.0
1099		71-100	0-15		1.40-1.65		0.06-0.11		0.5-2.0
	7-13		0-10		1.40-1.65			1 0.0-2.9 1	2.0-5.0
		86-100	0-10		1.40-1.65			1 0.0-2.9 1	0.5-3.0
	21-34		0-10		1.40-1.65			1 0.0-2.9 1	0.5-3.0
	34-43	23-90	5-45		1.45-1.70		0.09-0.19		0.0-0.5
	43-48		5-45 I		1.45-1.70		0.09-0.19		0.0-0.5
	48-55	23-90	5-45		1.45-1.70	0.2-5.9	0.12-0.19		0.0-0.5
İ	55-80		0-15		1.40-1.65			0.0-2.9	0.0-0.5
Benzonia	l I 0-5	 86-100	0-10 I	l I I 0-9 I	 1.25-1.45		0.07-0.09	1 0.0-2.9 1	2.0-5.0
	5-11		0-10		1.35-1.45		0.05-0.08		0.5-2.0
	11-15		0-10		1.35-1.45		0.05 0.08		2.0-5.0
	15-20		0-10		1.35-1.45			1 0.0-2.9	2.0-5.0
	20-27		0-10		1.35-1.45		0.06-0.08		0.5-3.0
	27-35		0-10		1.35-1.45		0.06-0.08		0.5-3.0
	35-80		0-10		1.35-1.45		0.06-0.11		0.0-0.5
	33 33	12 2001	0 10 1			3.5 20.0	3.00 0.11	1.0 2.3	0.0 0.0

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name					bulk	(Ksat)	water	swell	matter
i		i i	i	i	density	i i i	capacity	 potential	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
1		. — .				, — ,		. — .	
631174:		1 1		l I		l l		1 1	
Fogg	0-2	86-100	0-10	0-9	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
I	2-7	71-100	0-15	0-14	1.40-1.65	5.9-20.0	0.06-0.11	0.0-2.9	0.5-2.0
1	7-13	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
1	13-21	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
1	21-34	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
1	34-43	23-90	5-45	3-26	1.45-1.70	0.2-20.0	0.09-0.19	0.0-2.9	0.0-0.5
I	43-48	23-90	5-45	3-26	1.45-1.70	0.2-20.0	0.09-0.19	0.0-2.9	0.0-0.5
I	48-55	23-90	5-45	7-26	1.45-1.70	0.2-5.9	0.12-0.19	0.0-2.9	0.0-0.5
!	55-80	76-100	0-15	0-14	1.40-1.65	2.0-20.0	0.06-0.11	0.0-2.9	0.0-0.5
Benzonia	0-5	 86-100	0-10	0-9	1.25-1.45		0.07-0.09	 0.0-2.9	2.0-5.0
ĺ	5-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.05-0.08	0.0-2.9	0.5-2.0
1	11-15	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
1	15-20	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
1	20-27	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
1	27-35	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
!	35-80	71-100	0-10	0-14	1.35-1.45	5.9-20.0	0.06-0.11	0.0-2.9	0.0-0.5
680939: I		 						 	
Fern	0-9	71-100	0-15	0-14	1.30-1.55	I 5.9-20.0 I	0.07-0.12	0.0-2.9	2.0-5.0
i	9-10	71-100			1.30-1.60			0.0-2.9	0.5-2.0
i	10-24	86-100	0-15	0-14	1.30-1.60	5.9-20.0	0.06-0.11	0.0-2.9	0.5-1.0
i	24-29	20-100	5-45		1.50-1.70		0.06-0.19	0.0-5.9	0.0-0.5
i		20-50			1.50-1.70			3.0-5.9	0.0-0.5
i		20-50			1.50-1.70	0.2-2.0		3.0-5.9	0.0-0.5
i		20-50			1.50-1.70			3.0-5.9	0.0-0.5
Spinks	 0-5	 86-100	0-10	 0-9	1.40-1.70	 5.9-20.0	0 07-0 09	 0.0-2.9	2.0-5.0
opimo		86-100			1.40-1.70	5.9-20.0 I		1 0.0-2.9 1	0.5-2.0
		86-100			1.40-1.70			0.0-2.9	0.5-2.0
		71-100			1.40-1.70	5.9-20.0 I		0.0-2.9	0.0-0.5
		71-100		•	1.40-1.70	5.9-20.0 I		0.0-2.9	0.0-0.5
	72-80				1.40-1.70			0.0-2.9	0.0-0.5
680943:] 	 		 		 		 '	
Milnichol	0-2	86-100	0-10	0-9 1	1.30-1.50	 5.9-20.0	0.07-0.09	' ' ' 0.0-2.9	2.0-5.0
11111101101	2-12				1.30-1.65			1 0.0-2.9 1	0.5-2.0
· ·		86-100			1.30-1.65			0.0-2.9	2.0-5.0
· ·		86-100			1.40-1.65			0.0-2.9	
		86-100			1.40-1.65			0.0-2.9	0.5-3.0
		86-100			1.40-1.65			0.0-2.9	0.0-0.5
	47-50				1.50-1.70			1 0.0-2.9 1	0.0-0.5
	50-68				1.50-1.70	1 0.2-0.6 1		3.0-6.0	0.0-0.5
i	68-80		15-80		1.50-1.70			0.0-6.0	0.0-0.5
i				== 50		i i		i i	,

Table 15.-Physical Soil Properties-Continued

<u>In</u>	 Pct			bulk	(Ksat)	water	swell	matter
In	 Pct							
In	Pct		<u>' </u>	density	<u> </u>	capacity	potential	
		Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
							!!	
0-9		0.15		1 20 1 55	I	0 07 0 10		205
	71-100			1.30-1.55			0.0-2.9	2.0-5.0
9-10	71-100			1.30-1.60			0.0-2.9	0.5-2.0
- '								0.5-1.
								0.0-0.
-								0.0-0.
								0.0-0.
50-80	20-50	20-45	7-35	1.50-1.70	0.2-2.0	0.14-0.19	3.0-5.9	0.0-0.
	! !							
								2.0-5.0
								0.5-2.0
								0.5-1.
								0.0-0.
								0.0-0.
								0.0-0.
50-80	20-50 	20-45	7-35	1.50-1.70	0.2-2.0	0.14-0.19	3.0-5.9	0.0-0.
	I I		 		I I			
0-4	86-100	0-10	I 0-9 I	1.25-1.45	5.9-20.0	0.07-0.09	1 0.0-2.9 1	2.0-5.0
4-11								0.0-2.0
								2.0-5.0
								0.5-2.0
								0.5-2.0
								0.0-0.
								0.0-0.
0.0		0.10		1 05 1 45		0 07 0 00		0.0.5
								2.0-5.
								0.5-2.0
								2.0-5.0
								0.5-3.0
								0.5-3.
								0.0-0.
70-80	86-100 	0-10	0-9 	1.35-1.50	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.
	. ' 		' ' 		i :		i i	
0-4	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.
4-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.0-2.
11-15	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.
15-24	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.
24-39	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.
39-44	71-100	0-15	0-14	1.30-1.50	2.0-20.0	0.03-0.11	0.0-2.9	0.0-0.
44-80	86-100	0-10				0.02-0.07	1 0.0-2.9 1	0.0-0.
	29-42 42-50 50-80 0-9 9-10 10-24 24-29 29-42 42-50 50-80 0-4 4-11 11-15 15-24 24-39 39-44 44-80 0-3 3-9 9-11 11-16 16-21 21-70 70-80 0-4 4-11 11-15 15-24 24-39 39-44	24-29 20-100 29-42 20-50 42-50 20-50 50-80 20-50 0-9 71-100 9-10 71-100 10-24 86-100 24-29 20-50 42-50 20-50 42-50 20-50 42-50 20-50 42-11 86-100 44-11 86-100 24-39 86-100 39-44 71-100 44-80 86-100 3-9 86-100 3-9 86-100 11-16 86-100 11-16 86-100 11-16 86-100 11-170 86-100 11-170 86-100 11-180 86-100 11-15 86-100	24-29 20-100 5-45 29-42 20-50 20-45 42-50 20-50 20-45 50-80 20-50 20-45 	24-29 20-100 5-45 5-35 29-42 20-50 20-45 7-35 42-50 20-50 20-45 7-35 50-80 20-50 20-45 7-35 50-80 20-50 20-45 7-35 60-80 20-50 20-45 7-35 60-80 70-50 20-45 7-35 60-80 70-50 20-45 7-35 60-14 60-10 60-15 60-14 60-10 60-15 60-14 60-10 60-15 60-14 60-10 60-15 60-14 60-10 60-15 60-14 60-10 60-15 60-14 60-10 60-15 60-14 60-10	24-29 20-100 5-45 5-35 1.50-1.70 29-42 20-50 20-45 7-35 1.50-1.70 42-50 20-50 20-45 7-35 1.50-1.70 50-80 20-50 20-45 7-35 1.50-1.70 50-80 20-50 20-45 7-35 1.50-1.70	24-29 20-100 5-45 5-35 1.50-1.70 0.2-2.0 29-42 20-50 20-45 7-35 1.50-1.70 0.2-2.0 42-50 20-50 20-45 7-35 1.50-1.70 0.2-2.0 50-80 20-50 20-45 7-35 1.50-1.70 0.2-2.0 50-80 20-50 20-45 7-35 1.50-1.70 0.2-2.0 50-80 20-50 20-45 7-35 1.50-1.70 0.2-2.0 50-80 20-50 20-45 7-35 1.50-1.70 0.2-2.0 50-80 20-50 20-45 7-35 1.50-1.70 0.2-2.0 50-90 71-100 0-15 0-14 1.30-1.55 5.9-20.0 50-90	24-29 20-100 5-45 5-35 1.50-1.70 0.2-2.0 0.06-0.19	24-29 20-100 5-45 5-35 1.50-1.70 0.2-2.0 0.06-0.19 0.0-5.9 29-42 20-50 20-45 7-35 1.50-1.70 0.2-2.0 0.17-0.19 3.0-5.9 3.0-

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available		Organic
and soil name		I .			bulk	(Ksat)	water	swell	matter
	<u> </u>	1 1		J	density		capacity	potential	
	In	Pct	Pct	Pct	l g/cc	In/hr	In/in	Pct	Pct
500000		!!				!!!		!!!	
680972:		1 06 1001	0 10		1 05 1 45		0 07 0 00		0 0 5 0
Kaleva	0-3 3-9	86-100	0-10		1.25-1.45			0.0-2.9	2.0-5.0
		86-100	0-10		1.35-1.45			0.0-2.9	0.5-2.0
		86-100 86-100	0-10		1.35-1.45			0.0-2.9	2.0-5.0
			0-10		1.35-1.45				0.5-3.0
		86-100 86-100	0-10 0-10		1.35-1.45 1.35-1.50			0.0-2.9	0.5-3.0
		86-100 86-100			•			0.0-2.9	0.0-0.5
	/0-80	1 86-1001	0-10	0-9	1.35-1.50	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
680973:		 			! 			; ;	
Nessen	0-4	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	1 0.0-2.9	2.0-5.0
		86-100	0-10		1.35-1.45			1 0.0-2.9 1	0.0-2.0
i		86-100	0-10		1.35-1.45			1 0.0-2.9 1	2.0-5.0
i		86-100	0-10		1.35-1.45			1 0.0-2.9 1	0.5-2.0
i		86-100	0-10		1.35-1.45			1 0.0-2.9 1	0.5-2.0
	39-44	71-100	0-15	0-14	1.30-1.50	2.0-20.0	0.03-0.11	1 0.0-2.9 1	0.0-0.5
i	44-80	86-100	0-10		1.25-1.50		0.02-0.07	0.0-2.9	0.0-0.5
		1 1			l	l I		1 1	
Kaleva	0-3	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
ĺ	3-9	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
ĺ	9-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
1	11-16	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
1	16-21	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
I	21-70	86-100	0-10	0-9	1.35-1.50	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
1	70-80	86-100	0-10	0-9	1.35-1.50	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
]	! !		!!!	
680974:	0.4	1 06 1001	0 10		1 05 1 45		0.07-0.09		2050
Nessen		86-100 86-100	0-10		1.25-1.45 1.35-1.45			1 0.0-2.9	2.0-5.0 0.0-2.0
			0-10		•				
		86-100	0-10		1.35-1.45			0.0-2.9	2.0-5.0
		86-100	0-10		1.35-1.45			0.0-2.9	0.5-2.0
		86-100 71-100	0-10		1.35-1.45			1 0.0-2.9 1	0.5-2.0
	44-80		0-15 0-10		1.30-1.50 1.25-1.50				0.0-0.5
	44-80		0-10	U-9 	1.25-1.50 	5.9-20.0 	0.02-0.07	0.0-2.9	0.0-0.5
Kaleva	0-3	86-100	0-10	0-9	 1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
i	3-9	86-100	0-10		1.35-1.45		0.06-0.08		0.5-2.0
i	9-11	86-100	0-10		1.35-1.45			0.0-2.9	2.0-5.0
i	11-16	86-100	0-10		1.35-1.45		0.06-0.08	0.0-2.9	0.5-3.0
ì		86-100	0-10		1.35-1.45			0.0-2.9	0.5-3.0
ì		86-100	0-10		1.35-1.50			0.0-2.9	0.0-0.5
ì		86-100	0-10		1.35-1.50			0.0-2.9	0.0-0.5
i		i i	i			i i		i i	

Table 15.-Physical Soil Properties-Continued

893251: Boyer		I	1						
893251: Boyer	- 1		'	ı	bulk	(Ksat)	water	swell	matter
893251: Boyer			<u> </u>	<u> </u>	density	<u> </u>	capacity	potential	
Boyer	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
Boyer	I	I	I	I	l	I		1 1	
Shavenaugh Shavenaugh Shavenaugh			!						
Shavenaugh Shavenaugh		45-85	5-45		1.35-1.60	•	0.16-0.18		2.0-5.0
1	3-4	45-85	5-45		1.30-1.60	•	0.15-0.18		0.5-2.0
3		45-85	5-45		1.35-1.60	•	0.15-0.18		0.0-0.5
4		45-85	5-45		1.35-1.60	•		0.0-5.9	0.0-0.5
Shavenaugh Shavenaugh		71-100	0-14		1.40-1.55	•	0.02-0.10		0.0-0.5
894062: Remus 1 2 3 6	45-80	71-100	0-14	0-14	1.40-1.55	5.9-20.0	0.02-0.10	0.0-2.9	0.0-0.5
894062: Remus 1 2 3 6	0-5 I	86-1001	0-10 I	0-9 1	1.30-1.55		0 07-0 09	1 0.0-2.9 1	2.0-5.0
894062: Remus		86-1001	0-10		1.30 1.33	•		1 0.0-2.9	0.5-3.0
1		86-100	0-10 0-10		1.30-1.70	•		1 0.0-2.9 1	0.5-1.0
2		86-1001	0-10		1.30-1.70	•		1 0.0-2.9 1	0.5-1.0
3		86-1001	0-10		1.30-1.70		0.03-0.11		0.5-1.0
894062: 894062:		71-90	3-15		1.30-1.70			1 0.0-2.9	0.0-0.5
894062: Remus 1 2 3 6		71-100	0-10		1.30-1.70		0.02-0.06		0.0-0.5
Remus	1 00 1	71 1001	0 10 1	0 9 1	1.30 1.70	3.9 20.0	0.02 0.00	1 0.0 2.9 1	0.0 0.5
Remus	i	i	i	i				i i	
 1 2 3 6	0-9 i	45-85 I	10-45 I	7-191	1.50-1.65	0.2-2.0	0.16-0.18	0.0-2.9	2.0-5.0
2 3 6	9-15 i		3-45		1.50-1.75		0.10-0.19		0.5-1.0
2 3 6	15-24 i		3-45 I		1.50-1.75	•	0.10-0.19		0.5-1.0
; 3 ; 6	24-35 I		3-45		1.50-1.75	•		0.0-5.9	0.5-1.0
i 6	35-66 j		10-45 I		1.50-1.75	•	0.16-0.19		0.0-0.5
 	66-80 j		5-45		1.50-1.75		0.15-0.19	0.0-5.9	0.0-0.5
Spinks	i	i	i	i	ĺ	į į		i i	
	0-5 I	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
1	5-10	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
1	10-17	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
1	17-62	71-100	0-15	3-14	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
6	62-72	71-100	0-15	3-14	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
7	72-80	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
I	I	- 1	I	- 1		l I		1 1	
894063: I	!			!				! !	
· · · ·	0-9	45-85	10-45		1.50-1.65		0.16-0.18		2.0-5.0
•	9-15	23-90	3-45		1.50-1.75		0.10-0.19		0.5-1.0
·	15-24		3-45		1.50-1.75			0.0-5.9	0.5-1.0
•	24-35		3-45		1.50-1.75		0.10-0.19		0.5-1.0
•	35-66		10-45		1.50-1.75		0.16-0.19		0.0-0.5
6	66-80 I	23-85	5-45	7-34	1.50-1.75	0.2-0.6	0.15-0.19	0.0-5.9	0.0-0.5
Spinks	0-5 I	86-100 I	0-10 I	0 0 1	1.40-1.70		0 07 0 00	1 0.0-2.9 1	2.0-5.0
-		86-100	0-10 0-10		1.40-1.70	•	0.07-0.09		0.5-2.0
•		86-100			1.40-1.70	•		0.0-2.9	
•		71-100	0-10 0-15		1.40-1.70			0.0-2.9	0.5-2.0 0.0-0.5
•		71-100	0-15 0-15		1.40-1.70	•	0.06-0.08		0.0-0.5
·		86-100	0-15 0-10		1.40-1.70	•		0.0-2.9	0.0-0.5
'	12-00 I	20-1001	0-10	0-9	1.40-1.70	3.9-20.0	0.05-0.07	1 0.0-2.9	0.0-0.5

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available		Organic
and soil name		l I	I	l I	bulk	(Ksat)	water	swell	matter
	l	<u> </u>		<u> </u>	density	lI	capacity	potential	
	In	Pct	Pct	Pct	g/cc	In/hr	<u>In/in</u>	Pct	Pct
		l I	1	l I		l l		1 1	
894064:		I I						1 1	
Fern	0-9	71-100			1.30-1.55		0.07-0.12		2.0-5.0
	9-10	71-100	0-15		1.30-1.60		0.06-0.11		0.5-2.0
I	10-24				1.30-1.60		0.06-0.11		0.5-1.0
	24-29				1.50-1.70	0.2-2.0	0.06-0.19	0.0-5.9	0.0-0.5
1	29-42	20-50	20-45	7-35	1.50-1.70	0.2-2.0	0.17-0.19	3.0-5.9	0.0-0.5
I	42-50	20-50	20-45	7-35	1.50-1.70	0.2-2.0	0.17-0.19	3.0-5.9	0.0-0.5
	50-80	20-50	20-45	7-35	1.50-1.70	0.2-2.0	0.14-0.19	3.0-5.9	0.0-0.5
Remus	0-9	l 45-85 l	10-45	 7-19	1.50-1.65		0.16-0.18	I	2.0-5.0
	9-15	23-90	3-45		1.50-1.75			1 0.0-2.9 1	0.5-1.0
	15-24	45-90	3-45		1.50-1.75			1 0.0-5.9 1	0.5-1.0
	24-35		3-45		1.50-1.75			0.0-5.9	0.5-1.0
	35-66		10-45		1.50-1.75		0.16-0.19		0.0-0.5
	66-80	23-85	5-45		1.50-1.75		0.15-0.19		0.0-0.5
1		l I	I	l I		l l		I I	
894065:		l		l				1	
Fern	0-9	71-100			1.30-1.55			0.0-2.9	2.0-5.0
	9-10	71-100			1.30-1.60			0.0-2.9	0.5-2.0
	10-24	86-100	0-15	0-14	1.30-1.60	5.9-20.0	0.06-0.11	0.0-2.9	0.5-1.0
	24-29	20-100	5-45	5-35	1.50-1.70	0.2-2.0	0.06-0.19	0.0-5.9	0.0-0.5
1	29-42	20-50	20-45	7-35	1.50-1.70	0.2-2.0	0.17-0.19	3.0-5.9	0.0-0.5
1	42-50	20-50	20-45	7-35	1.50-1.70	0.2-2.0	0.17-0.19	3.0-5.9	0.0-0.5
	50-80	20-50	20-45	7-35	1.50-1.70	0.2-2.0	0.14-0.19	3.0-5.9	0.0-0.5
Remus	0-9	I 45-85 I	10-45	I 7-19I	1.50-1.65		0.16-0.18	I	2.0-5.0
	9-15		3-45		1.50-1.75			0.0-2.9	0.5-1.0
	15-24				1.50-1.75			0.0-5.9	0.5-1.0
		45-90	3-45		1.50-1.75			0.0-5.9	0.5-1.0
	35-66		10-45		1.50-1.75		0.16-0.19		0.0-0.5
	66-80		5-45		1.50-1.75		0.15-0.19		0.0-0.5
		!!!	!			! !		!!!	
894104:			0 1 -		4 00 4 74		0.40.0.1.		0 0 - 1
Mollineaux	0-6	71-100			1.30-1.50			0.0-2.9	2.0-5.0
	6-9	71-100			1.30-1.70			0.0-2.9	0.0-1.0
l		71-100			1.40-1.70			0.0-2.9	0.5-2.0
I	15-27				1.40-1.70			0.0-2.9	0.5-2.0
	27-38				1.55-1.65			0.0-2.9	0.0-0.5
	38-64		15-50	10-35	1.50-1.70			0.0-2.9	0.0-0.5
	64-80	71-100	0-15	0-14	1.55-1.65	5.9-20.0	0.06-0.11	0.0-2.9	0.0-0.5
Remus	0-9	 45-85	10-45	ı l 7-19	1.50-1.65		0.16-0.18	 0.0-2.9	2.0-5.0
i	9-15		3-45		1.50-1.75		0.10-0.19		0.5-1.0
	15-24				1.50-1.75		0.10-0.19		0.5-1.0
i	24-35		3-45		1.50-1.75		0.10-0.19		0.5-1.0
i	35-66		10-45		1.50-1.75	0.2-0.6		0.0-5.9	0.0-0.5
		23-85			1.50-1.75		0.15-0.19		0.0-0.5
		, 00 	2.0	, , <u>, , , , , , , , , , , , , , , , , </u>		<u>.</u>	0.20 0.20	, , 	0.0 0.0

Table 15.-Physical Soil Properties-Continued

					-r				
Map unit symbol	Depth	Sand	Silt	Clay		Permeability	Available	Shrink-	Organic
and soil name		!!			bulk	(Ksat)	water	swell	matter
		<u>! </u>		<u> </u>	density	<u> </u>		potential	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
		!!!				! !		!!!	
894105:		_				! !		! !	
Mollineaux	0-6	71-100	0-15		1.30-1.50		0.10-0.12		2.0-5.0
	6-9	71-100	0-15		1.30-1.70	5.9-20.0	0.06-0.11		0.0-1.0
		71-100	0-15		1.40-1.70		0.06-0.11		0.5-2.0
		71-100	0-15		1.40-1.70		0.06-0.11		0.5-2.0
	27-38		0-15		1.55-1.65		0.06-0.11		0.0-0.5
	38-64		15-50		1.50-1.70		0.15-0.19		0.0-0.5
	64-80	71-100	0-15	0-14	1.55-1.65	5.9-20.0	0.06-0.11	0.0-2.9	0.0-0.5
Domino	0-9	ı 1 45-85	10-45	l 7101	1.50-1.65		0.16-0.18	1 0 0 2 0 1	2.0-5.0
Remus	9-15						0.16-0.18		
	15-24		3-45		1.50-1.75				0.5-1.0
	_	45-90 45-90	3-45 3-45		1.50-1.75			0.0-5.9 0.0-5.9	0.5-1.0 0.5-1.0
		43-90 23-80			1.50-1.75 1.50-1.75				
		23-80 23-85	10-45 5-45		1.50-1.75		0.16-0.19 0.15-0.19		0.0-0.5 0.0-0.5
	00-00	23-65	5-45	/-3 4	1.50-1.75	0.2-0.6	0.15-0.19	1 0.0-5.9 1	0.0-0.5
894165:				: :		! ! ! !			
Spinks	0-5	 86-100	0-10	! ∩_Q !	1.40-1.70	5.9-20.0	0.07-0.09	1	2.0-5.0
Spinks		86-100 86-100	0-10		1.40-1.70			0.0 2.9 0.0-2.9	0.5-2.0
	10-17		0-10		1.40-1.70	5.9-20.0		1 0.0-2.9 1	0.5-2.0
		71-100	0-15		1.40-1.70		0.06-0.08		0.0-0.5
		71 100 71-100	0-15		1.40-1.70			1 0.0-2.9 1	0.0-0.5
	72-80		0-10		1.40-1.70	5.9-20.0	0.05-0.07		0.0-0.5
	, , , ,	1 00 1001	0 10	, , , , , , ,	1.10 1.70	1 0.5 20.0 1	0.00 0.07	1 0.0 2.5 1	0.0 0.5
Tekenink, sandy		i i		i		i i		i i	
substratum		71-90	5-25	0-14	1.30-1.60	2.0-5.9	0.10-0.12	0.0-2.9	2.0-5.0
	8-16		5-25		1.45-1.60		0.09-0.11		0.5-2.0
i		45-85	5-45		1.45-1.60		0.12-0.14		0.5-1.0
i		45-90	5-45		1.45-1.60		0.09-0.14		0.5-1.0
i		45-85	5-45		1.45-1.60		0.12-0.14		0.5-1.0
	62-72	71-100	0-15		1.45-1.60	5.9-20.0	0.05-0.10	0.0-2.9	0.0-0.5
	72-80	71-100	0-15		1.55-1.70	5.9-20.0 j	0.05-0.10	0.0-2.9	0.0-0.5
i		i i		ı i		İ		i i	
899682:		1 1		l I		I I		1 1	
Kaleva	0-3	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
I	3-9	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
I	9-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
I	11-16	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
I	16-21	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
I	21-70	86-100	0-10	0-9	1.35-1.50	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
1	70-80	86-100	0-10	0-9	1.35-1.50	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
I		I I				l l		1 1	
899722:		1 1				I I		1 1	
Goodharbor	0-1	86-100	0-10		1.30-1.55		0.07-0.09		2.0-5.0
1	_	86-100	0-10		1.40-1.65	5.9-20.0		0.0-2.9	0.5-2.0
1	3-23		0-10					0.0-2.9	0.5-1.0
		86-100	0-10		1.40-1.65			0.0-2.9	0.5-1.0
I	40-80	86-100	0-10	I 0-9 I	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
I		1 1				I I		1 1	

Table 15.-Physical Soil Properties-Continued

Map unit symbol	Depth	Sand	Silt	Clay	Moist	Permeability	Available	Shrink-	Organic
and soil name	- I	1 1		I - I	bulk	(Ksat)	water	swell	matter
I		I I		I I	density	I I	capacity	potential	
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
1	_	. — .		. —		ı ı		ı — ı	
899731:					l	I I		1 1	
Covert	0-1	86-100	0-10	0-9	1.30-1.55		0.06-0.09	0.0-2.9	2.0-5.0
1	1-8	86-100			1.30-1.60		0.06-0.08	0.0-2.9	0.5-2.0
1	8-18	86-100	0-10	0-9	1.30-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	18-25	86-100	0-10	0-9	1.30-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	25-29	86-100	0-10	0-9	1.50-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.0-0.5
	29-38	86-100		0-9	•		0.05-0.07		0.0-0.5
1	38-47	86-100	0-10	0-9	1.50-1.60	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
ļ	47-80	86-100	0-10	0-9	1.50-1.60	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
Pipestone	 0-2	 86-100	0-10	 0-9	 1.30-1.50		0.07-0.09	0.0-2.9	2.0-5.0
	2-9	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	9-12	86-100	0-10	0-9	1.30-1.70	5.9-20.0	0.06-0.08	0.0-2.9	2.0-5.0
	12-24	86-100	0-10	0-9	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-3.0
	24-32	86-100	0-10	0-9	1.40-1.65	5.9-20.0 I	0.06-0.08	0.0-2.9	0.0-0.5
į	32-80	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
899733:		 		 	1] 			
Covert	0-1	86-100	0-10	I 0-9	1.30-1.55	5.9-20.0	0.06-0.09	0.0-2.9	2.0-5.0
	1-8	. 86-100 i			1.30-1.60		0.06-0.08	1 0.0-2.9 1	0.5-2.0
i	8-18	86-100					0.06-0.08	0.0-2.9	0.5-3.0
i	18-25	86-100			•		0.06-0.08	0.0-2.9	0.5-3.0
i	25-29	86-100			•		0.06-0.08		0.0-0.5
i	29-38	86-100			•		0.05-0.07		0.0-0.5
i	38-47				•		0.05-0.07		0.0-0.5
İ	47-80	86-100			•		0.05-0.07		0.0-0.5
 Dair	 0-4	 10	 50	 40	 0.30-0.50	 0.2-5.9	0.35-0.45		60-100
	4-7	 23-85			1.35-1.50		0.13-0.15	0.0-2.9	10-20
	7-11				•	5.9-20.0 I	0.06-0.08	0.0-2.9	0.5-1.0
	11-21				1.40-1.60			0.0-2.9	0.0-0.5
	21-50	86-100			•	5.9-20.0 I	0.05-0.07		0.0-0.5
	50-80						0.05-0.07		0.0-0.5
899734:] 	 				
Benzonia	0-5	86-100	0-10	l 0-9	 1.25-1.45	' 5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	5-11						0.05-0.08	0.0-2.9	0.5-2.0
	11-15	86-100 86-100			•		0.05 0.08	0.0-2.9	2.0-5.0
	15-20				•		0.06-0.08	0.0-2.9	2.0-5.0
	20-27				•		0.06-0.08		0.5-3.0
	27-35	86-100			•			0.0-2.9	0.5-3.0
	35-80	71-100			1.35-1.45		0.06-0.11		0.0-0.5
	55 66	, , <u>, 1</u> 001	0 10	0 14	1.55 1.45 	3.3 20.0	0.00 0.11	0.0 2.9	3.0 0.3

Table 16.-Erosion Properties

(Entries under "Erosion factors" apply to the entire profile. Entries under "Wind erodibility group" and "Wind erodibility index" apply only to the surface layer)

		Erosion factors			Wind	Wind
Map unit symbol and soil name	Depth (inches)	Kw	 Kf 	 T 		erodi- bility index
i	i		l	<u>'</u> I	9200F	<u> </u>
190775:	0.0		1	1	l	124
Adrian	0-8 8-24			4] 2 !	134
i	24-60	.15	.15	! 	i I	i
i i	i		Ī	İ	l	ĺ
Houghton	0-10		ļ	5	. 2	134
	10-60			 	 	
190777:	i		i	i I	i I	i I
Alcona	0-8	.24	.24	5	3	86
I	8-12	.17	•	l	l	I
I	12-18	.17	•	I	l	I
!	18-24	.24	.24	1		
	24-60	.24	.24	 	 	
Richter	0-8 I	.24	1 .24	ı I 5	ı I 3	I 86
i	8-27	.17	.17	İ	İ	İ
1	27-60 l	.20	.20	I	I	I
100770	ļ		1	l	<u> </u>	!
190778: Alcona	0-8 I	.24	1 .24	I I 5	I I 3	ı I 86
11200114	8-12		:	1	, J	1
i	12-18	.17	•	i I	i i	I
i	18-24	.24	•	i i	i	i
İ	24-60	.24	.24	ĺ	l	ĺ
 Richter	0-8 I	.24	 .24	l I 5	l I 3	l I 86
Richter	8-27	.17	1 .24	1 2	1 3	1 00
i	27-60 I	.20	1 .20	! 	i I	İ
1	I		1	l	I	I
190779: Alpena	0-4 I	.15	 .17	l I 2	l I 8	l I 0
Arpena	4-60 I	.10	1 .17	<u> </u>	1 °	I 0
i	i		i	i i	i	i
190780:	!		!	<u> </u>	!	!
Au Gres	0-12	.10	1 .15	J 5	1	220
!	12-24	.10	1 .15	!	!	!
	24-60	.10	.15 	 	l I	! !
Kalkaska	0-7 i	.15	.15	5	1	220
1	7-15	.15	.15	I	l	I
1	15-32	.15	.15	I	l	I
!	32-60	.15	.15	l	<u> </u>	!
190781:	<u>'</u>		1	! !	! 	! !
Bach	0-8 i	.28	.28	5	5	56
i	8-19	.28	.28	İ	İ	İ
İ	19-60	.43	.43	ĺ	l	ĺ
190782:	!		1	l	l	<u> </u>
Deer Park	0-1 I	.15	 .15	I I 5	 1	I 220
1	1-4	.15	1 .15	I	 I	 I
i	4-60	.15	1 .15	I	İ	I
100700	ļ		!	ļ	!	! :
190783: Deer Park	0-1	.15	 .15	l I 5	 1	l 220
Jeer rain	1-4	.15	1 .15	, J	, <u>+</u> I	, 220 I
;	4-60 I	.15	1 .15	I	i	i
i	I		i	I	i	i i

Table 16.-Erosion Properties-Continued

		Ero	sion factor	rs	Wind Wind		
Map unit symbol			I	ı		erodi-	
and soil name	(inches)	Kw 	Kf 	T 	bility group	bility index	
190784:] 	 	
Deer Park	0-1	.15	.15	, I 5	1	, J 220	
i	1-4	•	.15	i	ĺ	İ	
į	4-60	.15	.15	İ		İ	
Roscommon	0-6	l I .15	l .15	l I 5	1	l I 220	
į	6-60	.17	.17	İ		İ	
190786. Dune land		 	 	 		 	
190787:		 	 	 		 	
East Lake	0-8	.17	.17	4	2	134	
i	8-26	.15	.15	l]	İ	
!	26-60	.10	.15	<u> </u>		ļ	
190788:		 	! 	 	<u> </u>	! 	
East Lake	0-8	.17	.17	4	2	134	
1	8-26	.15	.15	I I		I	
-	26-60	.10 	.15 	 		 	
190789:	İ	İ	i İ	i		i İ	
East Lake	0-8		.17	4	2	134	
!	8-26		.15			!	
;	26-60	.10 	.15 	 		 	
190790:	0.0	1.7				124	
East Lake	0-8 8-26	.17 .15	.17 .15	4	2	134	
i	26-60	1 .10	.15	 	 	! 	
190791:] 	 	
Eastport	0-3	.15	.15	, I 5	1	, J 220	
	3-26	•	.15	i	. – i	 I	
į	26-60	.15	.15	İ		İ	
190792:		 	 	 		 	
Edwards	0-30			5	2	134	
!	30-60	.32	.32	<u> </u>		!	
Marl beds	0-7	 	 	 	2	 134	
!	7-60	.32	.32	<u> </u>		!	
190794:		 	! 	 	<u> </u>	! 	
Emmet	0-8	.24	.24	5] 3	l 86	
1	8-26	.24	.24	I I	l	I	
Į.	26-32	.32	.32			1	
	32-60	.28 	.28 	 		 	
Leelanau	0-8	.17	.17	5	2	134	
!	8-28	.17	.17	I		l	
	28-36 36-60	.24 .17	.24 .17] 	! 	
100705		l	ļ	l j		ļ	
190795: Emmet	0-8	l .24	l .24	l 5	 3	I 86	
i	8-26	.24	. 24	ı	Ì	I	
i	26-32	.32	.32	I i	l	I	
1	32-60	.28	.28	I	l	I	
I		l	1	I		I	

Table 16.—Erosion Properties—Continued

		Ero	sion factor		Wind	
Map unit symbol and soil name 	Depth (inches) 	Kw		 T 	erodi- bility group	erodi- bility index
190795:	I		•	 	 	
Leelanau	0-8 8-28 28-36 36-60	.17 .17 .24	.17 .17 .24	 5 	 2 	 134
100706	İ		!	İ]	İ
190796: Emmet	0-8 8-26 26-32 32-60	. 24 . 24 . 32	.24	 5 	 3 	 86
Leelanau	0-8 8-28 28-36 36-60	.17	.17 .24	 5 	 2 	 134
190797:	l I		 	 	 	
Emmet 	0-8 8-26 26-32 32-60	. 24	.24	5 	3 	86
Leelanau 	0-8 8-28 28-36 36-60	.17 .17 .24	.17 .17 .24	 5 	 2 	 134
190799:	į		 	İ	 	İ
Emmet	0-8 8-26 26-32 32-60	. 24 . 24 . 32	. 24 . 24 . 32	 5 	 3 	 86
 Leelanau 	0-8 8-28 28-36 36-60	.17	.17 .24	 5 	 2 	 134
190801:	I		 	 	 	
Emmet 	0-8 8-26 26-32 32-60	.24	.24	5 	3 	86
Mancelona	0-8 8-25 25-30 30-60	.17 .17	 .24 .24 .24 .15	 4 	 3 	 86
100003	į			į	İ	İ
190803: Emmet	0-8 8-26 26-32 32-60	.17 .24 .32 .28	.24 .24 .32 .28	 5 	 3 	 86
Mancelona	0-8 8-25 25-30 30-60	.17 .17 .17	.24 .24 .24	 4] 3 	 86

Table 16.—Erosion Properties—Continued

		Ero	sion factor	•	Wind	
Map unit symbol and soil name	Depth (inches)	77	75	l I T	erodi-	erodi- bility
and soil name	(inches)	Kw	Kf	:	bility group	bility index
100005				<u>.</u>		<u>I</u>
190805: Emmet	0-8 I	.24	l .24	•	I I 3	ı I 86
India C	8-26		.24		1	1
i i		.32	1 .32	•	! 	
i i	32-60		.28	•	İ	İ
 Omena	0-8 I	.24	l .24	l I 3	l I 3	l I 86
	8-14		.28		i	1
i	14-60		.32	i	İ	İ
190806:	 		 	 	 	
Emmet	0-8 i	.24	.24	I 5	i 3	I 86
i	8-26 I		.24	i	i -	i
i		.32	.32	•	I	i
į	32-60		.28	•	ĺ	į
 Omena	0-8 I	.24	l .24	l I 3	l I 3	I I 86
i	8-14 i	.28	.28	i	İ	i
į	14-60	.24	.32	ĺ	İ	į
190807:			 	 	 	
Emmet	0-8 i	.24	.24	I 5	I 3	I 86
i	8-26 j	.24	.24	İ	İ	İ
i	26-32 j	.32	.32	İ	İ	İ
!	32-60	.28	.28	İ		İ
 Omena	0-8 I	.24	.24	l 3	l 3	I I 86
i	8-14 I	.28	.28	İ	İ	İ
!	14-60	.24	.32	İ		İ
190808:	ľ		 	 	 	
Emmet	0-8 I	.24	.24	J 5] 3	l 86
I	8-26	.24	.24	I	I	I
I	26-32	.32	.32	I	l	I
!	32-60	.28	.28	ļ		I
 Omena	0-8 I	.24	.24	l 3	l 3	l 86
I	8-14	.28	.28	I	l	I
!	14-60	.24	.32	ļ		I
190809:	i			! 	! 	!
Emmet	0-8	.24	.24	5] 3	l 86
I	8-26			l	l	I
I	26-32	. 32	.32	l	l	I
!	32-60	.28	.28	 	 	
Omena	0-8		.24	l J 3) 3	86
I	8-14		.28	l	l	I
!	14-60	.24	.32	l		1
190811:	i			 	! 	!
Hettinger	0-8	.32	.32] 3	6	48
I	8-23		.43	l	l	I
	23-60	.43	.43] I	
Muck	0-11			l 5	l 2	 134
	11-23			1	ı	1
ı	23-60	l		1	•	1

Table 16.—Erosion Properties—Continued

	ī	Erosion factors				Wind
Map unit symbol and soil name	Depth (inches)	Kw	 Kf	l I T	erodi- bility	erodi- bility
	(Inches)		KI		group	index
190812:]	
Hettinger	0-8	. 32	.32	3	6	48
1	8-23		.43		l	I
	23-60	. 43	.43] 	
Tonkey	0-8		.32	•	5	56
1	8-20		.24	l I	1	I
	20-60	. 24	.24] 	
190814:	i					İ
Kalkaska	0-7		.15	5	1	220
1	7-15		.15	l I	1	I
I	15-32		.15	l I	l	I
1	32-60	.15	.15 			
190815:	i		i i	i	İ	i İ
Kalkaska	0-7		.15		1	220
!	7-15		.15			
	15-32		.15	•		
	32-60 	.15	.15 			
190816:	i		i i	i	i .	İ
Kalkaska	0-7		.15		1	220
!	7-15		.15			!
	15-32		.15	•		!
<u> </u>	32-60 	.15	.15 	•		I
190817:	<u>. </u>		i	_		İ
Kalkaska	0-7		.15		1	220
!	7-15		.15			!
<u> </u>	15-32 32-60		.15 .15	•		!
100010	!		<u> </u>	!		ļ
190818: Kalkaska	0-7 I	.15	l I .15	l I 5	1	I I 220
	7-15 i		.15		, – i	 i
i	15-32		.15	i	ĺ	i
į	32-60	.15	.15			İ
190819:	l I		 	 		!
Kalkaska	0-7 I		.17	5	1	220
1	7-15		.15		l	I
I	15-32		.15	•		I
1	32-60	.15	.15 			
East Lake	0-8	.17	.17		1	220
1	8-26	.15	.15			I
!	26-60	.10	.15			<u> </u>
190820:	I I] 	!
Kiva	0-6 j	.24	.32	3	5	86
İ	6-20	.20	.28	l i	l	I
!	20-60	.10	.15]	ļ.
Mancelona	0-8	.17	l .24	 4	l 3	I I 86
i	8-25		. 24		Ì	I
1					ı	
1	25-30	.17	.24			I

Table 16.—Erosion Properties—Continued

Section Sect			Erosion factors			Wind	Wind
190821:		_	 Kw 	 Kf 	 T 	 bility	erodi- bility index
Name	1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1		<u> </u>	<u> </u>	ļ	<u> </u>	İ.
6-20		0-6	l I.24	1 .32	I I 3	l I 3	I I 86
Mancelona			•	•	•	i	İ
8-25 1.7 2.4	<u>!</u>	20-60	.10	.15	ļ.	! :	!
8-25	Mancelona	0-8	 17	1 24	Ι ι 4	 3	 86
30-60 .10 .15	Manice Iona			•	•	, J	l 00
190823:	İ	25-30	.17	.24	ĺ	l	İ
Name	!	30-60	.10	.15	!	!	I .
Riva	190823:		I I	I I	! !	I I	! !
Mancelona		0-6	.24	.32	3	3	86
Mancelona	1			•	I	I	I
8-25 1.17 24	!	20-60	.10	1 .15			1
8-25 1.17 24	Mancelona	0-8	ı I .17	1 .24	I I 4	I I 3	ı I 86
190824.	i		•	•	İ	İ	İ
190824.	1			•	•	I	I
Lake beaches 190825. Lake bluffs 190826: Leelanau	!	30-60	.10	1 .15			1
Lake bluffs	•		 	 	 	 	
190826: Leelanau	190825.		 	 	l I	 	
Leelanau	Lake bluffs		<u> </u>	!	!	!	I .
Leelanau	190826:		 	1	 	l I	
East Lake	•	0-8	.17	.17	5	2	134
East Lake	1		•	•	I	ļ	I
East Lake					•		1
8-26 .15 .15	i	30-00	1 .±/	1 .1/	! 	! 	i i
190827: Leelanau	East Lake	0-8	.17	.17	4	2	134
190827: Leelanau	!				•	!	I .
Leelanau		26-60	l .10	1 .15	 	l I	
8-28 .17 .17	190827:		' 	i	i	i I	i
28-36 .24 .24	Leelanau			•	5	2	134
East Lake	!		•	•		l	1
East Lake	<u> </u>				! !	! 	! !
8-26 .15 .15	i		İ	i	İ	İ	İ
26-60 .10 .15	East Lake			•	4	. 2	134
190828: Leelanau					 	l I	! !
Leelanau	i			i	i	i	i
8-28 .17 .17	•		<u> </u>	!	ļ	!	1
28-36 .24 .24	Leelanau				5	2	134
East Lake	;			•	! 	! 	! !
8-26 .15 .15	i				İ	İ	i
8-26 .15 .15	!	0.0	l	1	!	I	104
26-60 .10 .15	East Lake				1 4 1	1 2 1	1 134 I
190829:	i				İ	' 	i I
Leelanau	i		l	!	l	l	Į.
8-28 .17 .17		0-9	 17	17		2	124
	neeranau				, s	ı 4 I	1 134
20-30 .24 .24	i	28-36	.24	.24	İ	İ	i
36-60 .17 .17	1	36-60	.17	.17	l	l	I

Table 16.—Erosion Properties—Continued

1	I.	Ero	sion factor		Wind	
Map unit symbol and soil name	Depth (inches)	v	 Kf	l I T	erodi- bility	erodi- bility
and soil name	(Inches)	Kw		l T	group	billty index
190829:	 		•]]	
East Lake	0-8	.17	.17	4	2	134
1	8-26	.15	.15	l	l	I
1	26-60	.10	•] i	
190830:	i		i	i	İ	İ
Leelanau	0-8		•	5	2	134
!	8-28		•			!
	28-36 36-60		•	 	 	
 East Lake	0-8 I	.17	•	l I 4	l I 2	 134
East Lake	8-26 I		•	4 	<u>4</u> 	1 134
i	26-60 I		•	i I	! 	!
190831:	ļ]] 	
Lupton	0-10			' 5	, 2	134
<u> </u>	10-60		•	l]	İ
Markey	0-20		•	 4	 2	 134
!	20-60	.10	.15	 	 	l
190832:	i		 	! 	! 	i I
Mancelona	0-8	.24		4] 3	J 86
!	8-25		•			1
	25-30 30-60	.17 .10	•]]	
190833:			 	 	 	
Mancelona	0-8	.24	24	I 4	ı I 3	I 86
i	8-25		•	' - 	İ	i
i	25-30		•	İ	İ	i
1	30-60	.10	.15	l		I
190834:	i		 	! 	 	!
Mancelona	0-8	.17		4	2	134
!	8-25		•			I
	25-30 30-60		•	 	 	1
i	30-60 T	.10	l .13	! 	! 	İ
East Lake	0-8		•	4	2	134
!	8-26		•			!
	26-60 	.10	.15 	 	 	
190835:	0-8	17		 4	l I 2	124
Mancelona	0-8 8-25	.17 .17		4 	ı 4 I	134
i	25-30	.17	.24	! 	! 	
į	30-60	.10	.15			
East Lake	0-8 I	.17	 .17	 4	 2	 134
İ	8-26	.15	.15	l	l	I
	26-60	.10	.15	 	 	l I
190836:	İ		 	! 	! 	!
Mancelona	0-8	.17	.17	4	2	134
I	8-25	.17	•	l	<u> </u>	!
!	25-30	.17	. 24		 -	Į.
	30-60 l	.10	.15	I	I	I

Table 16.—Erosion Properties—Continued

		Eros	sion factor	•	Wind	
Map unit symbol and soil name	Depth (inches)	Kw	 Kf	l I T	erodi- bility	erodi- bility
and soli name	(Inches)	I.W		I	group	bility index
190836:			l	ļ		Į .
East Lake	0-8	.17	ı I .17	I I 4	I I 2	I 134
I I	8-26		•	, <u>-</u>	 I	1
i	26-60			i	İ	i
190837:			 	 -	 	
Mancelona	0-8	.17	1 .17	4	' I 2	134
i	8-25		•	i	i I	i -
i	25-30	.17	.24	İ	l	İ
į.	30-60	.10	•	ļ	<u> </u>	Į.
 	0-8	.17	•	 4	l I 2	l I 134
1	8-26		•	' - I	. – i	1
i	26-60		•	i	İ	i
190838:	l		 	 	 	
Mancelona	0-8	.17	ı .17	 4	ı 2	 134
i	8-25	.17	.24	İ	l	İ
1	25-30	.17	.24	I	I	I
!	30-60	.10	•	!		ļ
 East Lake	0-8	.17	•	 4	l 2	 134
i	8-26	.15	.15	İ	l	İ
!	26-60	.10		! :	l	Į.
190839:			 	 	 	
Mancelona	0-8	.17	. 24	4	3	86
İ	8-25	.17	.24	İ	l	İ
1	25-30	.17	.24	I	l	I
!	30-60	.10	•	ļ		Į.
Richter	0-8	. 24	•	l I 5	l 3	I 86
i	8-27	.17	.17	İ	l	İ
į.	27-60	.20	•	ļ	<u> </u>	Į.
190840:			 	 	 	
Nester	0-6	. 32	.32	3	5	56
1	6-8	. 32	.32	I	I	I
1	8-28	. 32	. 32	l	l	I
!	28-60	. 32	.32	 -] i	
190841:			 	! 	 	!
Nester	0-6	. 32	.32	3	5	56
1	6-8	. 32	. 32	I	l	I
1	8-28	. 32	. 32	l	l	I
!	28-60	. 32	.32	 -] i	
190842:			 	' 	! 	!
Nester	0-6	. 32	.32] 3	5	J 56
1	6-8	. 32	.32	l	l	I
1	8-28	. 32	.32	<u> </u>	l	I
	28-60	. 32	.32] 	
190843:			I	I	İ	i
190045.						
Nester	0-6	. 32	. 32] 3	5	56
	6-8	. 32	. 32	İ	5 	56
			.32 .32	3 	5 	56

Table 16.—Erosion Properties—Continued

		Erosion factors			Wind	Wind
Map unit symbol and soil name 		 Kw	 Kf 	l I T	erodi- bility group	erodi- bility index
190844:	0-6 6-8 8-28 28-60	. 32 . 32	.32 .32 .32 .32	 3 1	 5 	 56
190846. Pits, gravel		 	 	 	 	
190847:	0-8 8-27 27-60		 	 5 	 3 	
Alcona 		.24 .17 .17 .24	24 .24 .17 .17 .24	5 	3 3 	86
190848:	0-8 8-27 27-60	•	 	 5 	 	
Alcona 	0-8 8-12 12-18 18-24 24-60	.17 .17 .24	.24 .17 .17 .24 .24	 5 	 3 	 86
190849: Roscommon	0-6 6-60		 .15 .17	 5 	 	
 Markey 	0-20 20-60	 .10	 .15	4	 2 	 134
190850: Sanilac 	0-6 6-16 16-24 24-60	37	 .32 .32 .37 .43	 5 	 5 	 56
190851: Tonkey	0-8 8-20 20-60	.24	 .24 .24 .24	 4 	 	
 Munuscong 	0-10 10-24 24-60	 .20 .24 .28	 .20 .24 .28	 4 	 3 	 86
 Iosco 	0-8 8-27 27-34 34-60	 .17 .17 .37		 5 	 2 	 134
190852: Tonkey 	0-8 8-20 20-60	.24	.24	 4 	 3 	 86

Table 16.—Erosion Properties—Continued

T	Erosion factors				Wind Wind		
Map unit symbol and soil name 	Depth (inches)	Kw	 Kf 	 T 	erodi- bility group	erodi- bility index	
190852:	I		 	l I] 	 	
Munuscong	0-10 10-24 24-60		.20 .24 .28	i	 3 	' 86 	
 Iosco 	0-8 8-27 27-34 34-60	.37	 .17 .17 .37 .37	 	 2 	 134 	
190853. Water	 		 	 	 	 	
190854: Wallace	0-8 8-24 24-60	.15 .15 .15	 .15 .15 .15		1 1 	 220 	
Kalkaska 	0-7 7-15 15-32 32-60	.15	 .15 .15 .15 .15	i I	 1 	 220 	
190855: Wind eroded land	0-60	.10	 .15	 5	 	 	
190856: Wind eroded land	0-60	.10	 .15	 5		 220	
193236. Beaches	 		 	 	 	 	
193237: Thompsonville 	0-5 5-15 15-29 29-37 37-55 55-72 72-80	.15 .15 .15 .43		 	 1 	 250 	
Milnichol	0-2 2-12 12-15 15-25 25-33 33-47 47-50 50-68 68-80		•	 5 	 1 	250 250 	
193255: Spinks	0-5 5-10 10-17 17-62 62-72 72-80	.15 .15 .15 .15 .15	.15 .15 .15 .15 .15 .15	 	 1 	220 1 1 1 1	

Table 16.—Erosion Properties—Continued

		Erosion factors				Wind
Map unit symbol	- <u>-</u> -		I			erodi-
and soil name	(inches)	Kw	Kf	Т 	bility group	bility index
·····	i		i	<u>' </u>	l =====	l
193255:	l I		1	l	l	I
Coloma	0-3 [.15	.15	•	1	220
	3-4		.15	l	l	I
	4-8		.15	l	l	I
I	8-15		.15	l	l	I
	15-25		.15	l	l	I
	25-40	.15	.15	l	l	I
1	40-80 I	.15	.15	l	l	I
.93256:				 -	 	l
Spinks		.15	.15	ı I 5	' 1	ı I 220
	5-10 I		.15	•	· -	v
	10-17		.15		' 	<u>'</u>
	17-62		1 .15		! !	! !
	62-72		.15		! 	I
	72-80		1 .15		! 	! !
	7 <u>2</u> 00	.10	I .13	! 	! 	i
Coloma	0-3	.15	15	5	1	220
	3-4	.15	.15	l	l	I
i	4-8	.15	.15	l	l	İ
i	8-15 I	.15	.15	l	l	İ
i	15-25 I	.15	.15	İ	İ	İ
	25-40 I	.15	.15	İ	İ	i
i	40-80 I	.15	.15		l	Ī
1	l I		I I	l	l	I
.93257:				_	!	
Spinks	0-5 I		.15	•	1	220
	5-10 I		.15		l	I
	10-17		.15		l	I
1	17-62		.15	•	l	I
	62-72		.15			
	72-80	.10	.15		<u> </u>	!
Coloma		.15	 .15	I I 5	 1	I I 220
	3-4		.15	•	. – i	 I
	4-8		.15		i i	i
	8-15 I		.15		i i	i
i	15-25		.15		i i	i
	25-40 I		.15	•	i i	i
i	40-80		.15	' I		i i
i	i		İ	İ	İ	İ
.93258:	l		I	l	l .	l
Spinks	0-5 I	.15	.15	5	1	220
	5-10		.15	l	l	I
	10-17	.15	.15	l	l	I
	17-62	.15	.15	l	l	I
	62-72	.15	.15	l	l	I
	72-80 I	.10	.15	l	<u> </u>	!
Coloma	 0-3	.15	 .15	l 5	 1	l 220
	0-3 3-4	.15	.15	ı 5	, <u>+</u> ,	, 220 I
	3-4 4-8	.15		 	 	
				•] 	1
	8-15	.15	.15	l i	 -	!
	15-25	.15	.15	l	l ·	!
I						
!	25-40 40-80	.15 .15	.15 .15	l	 -	!

Table 16.—Erosion Properties—Continued

May unit symbol and soil name (inches) Kw Kf T bility bility 193260:		·····	Ero	sion factor	rs	•	Wind
193260: Copemish					!		
193260: Copemish	and soil name	(inches)	KW	K±	T 		_
Copemish		· · · · · · · · · · · · · · · · · · ·	<u></u>	i	<u> </u>	, <u>9</u> _0 <u>_p</u>	1
2-7	•	i		İ	ĺ	l	Ī
7-11	Copemish			•	2	1	220
11-28	!			•			!
28-36 .15 .15				•		l I	1
193262: Kaleva				•		l I	
Kaleva	i			•		! 	i I
Kaleva	1	- 1		1		I	I
3-9		0-3 I	15	1 15	5	 1	220
9-11	Italieva			•		, ± 	1 220
11-16	i			•		! 	I
193263:	i			•		İ	i
193263:	i	16-21	.15	.15		l	Ī
193263: Kaleva	1	21-70	.15	.15		l	I
Name	!	70-80 I	.15	.15		l	I .
3-9	193263:			1		l 	! !
9-11	Kaleva	0-3 i	.15	.15	5	1	220
11-16 .15 .15	1			•		l	I
16-21	I			•		l	I
21-70	!			•		<u> </u>	!
193265: Grattan	!			•			!
193265: Grattan				•	 	l I	
Grattan	i	70 00	.13	1		! 	İ
4-13 .15 .15	•	ı		1		l	I
13-18	Grattan			•	5	1	220
18-25 .15 .15	!			•			!
25-53 .15 .15				•		l i	! !
193266: Grattan	;			•		! 	! !
Grattan	i			•		İ	i
Grattan	1			1		l	ļ.
4-13	•	0-4	15	1 15	5	 1	220
13-18 .15 .15	Gractan			•	, J	, ± 	220
18-25 .15 .15	i			•			I
53-80 .15 .15	i	18-25 I		.15	İ	i	i İ
193267: Grattan	1	25-53	.15			l	I
Grattan	!	53-80 I	.15	.15		1	l
Grattan	193267:			1		l 	! !
13-18 .15 .15	•	0-4 i	.15	.15	5	1	220
18-25 .15 .15	1					l	I
25-53 .15 .15	I					l	I
53-80 .15 .15	!					<u> </u>	!
193269:	ļ					 	1
Grattan	;	33-80 I	.15	1 .15		! 	i i
4-13 .15 .15		į		İ	İ		İ
13-18 .15 .15	Grattan				5	1	220
18-25 .15 .15	!					 -	I
25-53 .15 .15						 	I I
					 	! 	I
i i i i i i	i				· 	i I	i
	i	i		1	ı İ	l	I

Table 16.—Erosion Properties—Continued

		Ero	sion factor	rs	Wind	Wind
Map unit symbol and soil name 	Depth (inches)	 Kw 	 Kf 	 T 	erodi- bility group	erodi- bility index
193270:		l 	I I	 		
Covert 	8-18 18-25 25-29 29-38 38-47	.15 .15 .15 .15 .15	15 .15 .15 .15 .15 .15	5 		220
193271: Pipestone	9-12 12-24 24-32	.15 .15 .15 .15 .15 .15	.15 .15 .15 .15	5 5 	1 1 	220 220
193272: Dair	7-11 11-21 21-50	 .20 .17 .17 .17	.17 .17 .17	5 1 1 1 1 1 1 1 1 1	 8 -	 0
193277: Benona	6-9 9-17 17-28	.15	.15 .15 .15 .15	5 5 	1	 220
193278: Benona	9-17 17-28 28-46	.15 .15 .15	15 .15 .15 .15 .15	5 5 	1	 220
193279: Benona 	0-2 2-6 6-9 9-17 17-28 28-46 46-80	 .15 .15 .15 .15 .15 .15	.15 .15 .15	 5 	1	 220
193284: Udorthents	0-80	 .24	 .24	 5	5	 56
 	0-80	 .17 	 .17 	 5 	1	 220

Table 16.—Erosion Properties—Continued

	!	Erosion factors				Wind
Map unit symbol and soil name	Depth (inches)	Kw	 Kf	l I T	erodi- bility	erodi- bility
	(Inches)	I.W		1	group	index
 193285:	ļ		 	 	 	
Lumley	0-3 i			5	, 8	i 0
i	3-6 i			i	i	i
i	6-8 i			i	i I	i i
i	8-20 j		i i	ĺ	İ	i İ
i	20-45 I		i i	ĺ	İ	İ
i	45-53 I		i i	ĺ	İ	i İ
į	53-80		i i			İ
 Makinen	0-4 I		 	l I 5	l I 8	I I 0
	4-14		i i	-	i	i
i	14-22		i i	i	i i	i i
i	22-31		i i	i	i i	i i
i	31-80		.15	İ	İ	İ
193286:			[
Histosols	0-45 I		i i	5	, 8	i 0
į	45-80	.15	.15		l	ĺ
Aquents	0-80	.15	 .15	5	l 8	I I 0
193287: Dune land.	 		 	 	 	
Quartzipsamments	0-80 I	.15	 .15	5	 1	 220
 193288:]	 	
Udipsamments	0-80	.17	.17	5	1	220
 193342:	ľ] 	
Gorvan	0-4	.28	.28	5	8	j 0
1	4-11	.28	.28	l	I	I
1	11-27	. 43	.43	l	I	I
!	27-80	.15	.15	l	<u> </u>	ļ
Houghton	0-12		 	l I 5	l 8	I I 0
i	12-26 i		i i	i	İ	i İ
į	26-80		i i	ĺ	ĺ	İ
Glendora	0-6 I	.17	 .17	l I 5	l I 8	I I 0
	6-9 i		.17	-	i	i
i	9-30		.15	i	i i	i i
i	30-80		.15	İ	İ	i
 193349:	l I] 	l İ	
Spinks	0-5 I		.15		1	220
i	5-10 j		.15		i I	İ
i	10-17		.15		i I	i i
i	17-62 i		.15	•	i I	i i
i	62-72	.15	.15			İ
į	72-80	.10	.15		l	!
 Coloma	0-3 I	.15	 .15	l I 5	 1	 220
i	3-4	.15	.15		I	I
l I	4-8	.15	.15		I	i
i	8-15	.15	.15	•	I	i
i	15-25	.15	.15		I	I
	25-40	.15	.15	I	I	I
1	23 30 1					1

Table 16.—Erosion Properties—Continued

		Erosion factors			•	Wind
Map unit symbol	Depth				erodi-	erodi-
and soil name	(inches)	Kw 	Kf 		bility group	bility index
Ī		l	Ī	l	i	Ī
193351:		!	!	_	!	
Benona	0-2	.15	.15		1	220
!		.15 .15	.15 .15		 	!
;		.15 .15	.15 .15		l I	! !
i		.15	1 .15		! 	i
i		.15	.15		i	i
i		.15	.15	•	İ	i İ
193354:		 	 	 	 	
Dune land.				l		ļ
Quartzipsamments	0-80	. 15	.15	l 5	 1	 220
193357:		 	 	 	 	
Shavenaugh	0-5	.15	.15	5	1	220
1	5-8	.15	.15	l	l	l
1		.15	.15		l	I
!		.15	.15		 -	!
!		.15	.15	•		!
!		.15 .05	.15 .15	•	 	!
;	44-00	.05 	.15 	•	! 	! !
193359:		İ	i	i	İ	i
Shavenaugh		.15	.15	5	1	220
Į.		.15	.15			
!		.15	.15		<u> </u>	!
!		.15	.15	•		!
!		.15 .15	.15 .15	•	 	!
i		.15 .05	.15 .15		! 	! !
i		İ	İ	i	i I	İ
193360:		!		_	!	
Shavenaugh	0-5	.15	.15		1	220
!		.15 .15	.15 .15		 -	!
;		.15 .15	.15 .15		l I	! !
i		1 .15	1 .15		! 	! !
i		.15	.15		' 	i
i		.05	.15		İ	i İ
193362:		 	 	l I	 	
Benzonia	0-5	.15	.15	5	1	220
1	5-11	.15	.15	l	l	I
1		.15	.15	l	l	I
1	15-20	.15	.15	l	l	I
!		.15	.15		 -	!
<u> </u>	27-35 35-80	.15 .15	.15 .15	l I	l i	
i	33 00	l .13	.13	i i	' 	İ
193363:	0.5			l <u>-</u>		
Benzonia	0-5	1 .15	1 .15	5	1	220
l i	5-11 11-15	.15 .15	1 .15] 	I I
1	11-15 15-20	.15 .15	.15 .15	•	 	! !
-	20-27	.15	.15	! 	1 	!
i	27-35	.15	.15	i İ	i i	i
i	35-80	.15	.15			i İ
İ		I	İ		I	I

Table 16.-Erosion Properties-Continued

		Erosion factors			•	Wind
Map unit symbol and soil name	Depth (inches)	Kw	 Kf	 T 	erodi- bility group	erodi- bility index
<u>_</u>				<u>'</u> 	<u> </u>	11106x
193364:			!	l _	ļ .	1
Benzonia	0-5 5-11	.15 .15	.15 .15		1	220
1		.15	.15 .15		! !	! !
i		.15	.15	•	i I	i i
i		.15	.15	I	İ	İ
1		.15	.15	l	l	I
!	35-80	.15	.15		! :	!
193365:			l I] 	l I	! !
Benzonia	0-5	.15	.15	5	1	220
1	5-11	.15	.15	l	l	I
1	11-15		.15	•	I	I
!		.15	.15	•	!	!
!		.15 .15	.15 .15	•	<u> </u>	1
<u> </u>	35-80		1 .15	'	! !	! !
i	33 00	. 13	1	i	i I	i
193371:			!	l <u>-</u>	l	I
Dair	0-4 4-7	.20		5	8	0
;		.17	1 .20		l I	! !
i		.17	1 .17	•	! 	! !
i		.17	.17	•	i I	i i
i	50-80	.17	.17	İ	ĺ	İ
 Pipestone	0-2	.15	 .15	l I 5	 1	l I 220
I pes cone		.15	1 .15		, <u>-</u>	1
i		.15	.15	•	i i	i
İ	12-24	.15	.15	l	ĺ	İ
1	24-32	.15	.15	l	l	I
!	32-80	.15	.15		<u> </u>	!
193372.			i	l I	! 	i I
Access Denied	i		i	i	İ	İ
193423:			1	 	l	1
Benona	0-2	.15	.15	, J 5	, 1	220
İ	2-6	.15	.15	l	ĺ	İ
1	6-9	.15	.15	l	l	I
!	9-17		.15	•	l	1
!	17-28	.15	.15	•	! :	!
	28-46 46-80	.15 .15	.15 .15] 	l I	! !
i	10 00	. 13	1	i	i I	i
193484.	I		1	l	I	I
Pits, sand and gravel	ļ		1		!	I .
193494:			i i	l I	l I	! !
Nordhouse	0-3	.15	.15	5	1	220
1	3-11		.15	l	I	I
1		.15	1 .15	l	!	!
		.15	1 .15	 -	l I	I I
	60-80 	.15	.15 	' 	! 	!
193496:	i		İ	l	l	İ
Nordhouse	0-3	.15	.15	5	1	220
ļ	3-11 11-40	.15	1 .15] 	I 1	I I
	11-40 40-60	.15 .15	.15 .15	l I	 	I I
i		.15	1 .15	I	i	i
i		- 	i	•	i	i

Table 16.-Erosion Properties-Continued

		Ero	sion factor	rs	•	Wind
Map unit symbol and soil name	Depth (inches)	Kw	 Kf	l I T	erodi- bility	erodi- bility
and soil name	(Inches)	I.W	 	l +	group	index
193497:		 	 	 	 	
Nordhouse	0-3 i	.15	.15	5	1	220
1	3-11	.15	.15	l	I	I
1	11-40		•	l	l	I
I	40-60		•	l	l	I
!	60-80 I	.15	.15	'	!	!
193498:			 	l I	l I	
Nordhouse	0-3 i	.15	.15	I 5	i 1	220
i	3-11		.15	•	i	i
i	11-40 i		.15	İ	İ	İ
i	40-60 I	.15	.15		İ	İ
1	60-80 J	.15	.15	l	l	I
 Platteriver	0-1 I		 	l I 5	 1	l I 220
l laccelivei	1-3	1		, J I	, <u>-</u>	1 220
i	3-14		•	' I	i i	i
i	14-20		•	i I	i i	i
i	20-29		•	i İ	i	i i
i	29-80 I	.15	.15	i	İ	İ
 Dair	0-4 I		 	l I 5	l I 8	I I 0
Dair	4-7	1		3) °	1 0
i	7-11		•	! 	<u>'</u>	
i	11-21		•	' 	I	i I
i	21-50		.17		i i	i
i	50-80		•	i i	i	i
193503:	ļ		 	 	 	
Spinks	0-5 I	.15	.15	ı I 5	, i 1	l 220
	5-10		•	İ	i	i
i	10-17 i	.15	.15	İ	İ	İ
1	17-62	.15	.15	I	I	I
1	62-72	.15	.15	l	I	I
!	72-80	.10	.15	l	!	!
 Shavenaugh	0-5 I	.15	l .15	l I 5	 1	l I 220
	5-8		•	İ	i	i
i	8-16 i		•	i İ	i i	i i
i	16-28 j	.15			İ	İ
1	28-34	.15	.15	l	I	I
1	34-44	.15	.15	l	l	I
!	44-80	.05	.15	l	!	!
193504:			 	 	l I	
Spinks	0-5 i	.15		' 5	, 1	, 220
I	5-10	.15	.15	I	I	I
1	10-17	.15	.15		l	I
1	17-62	.15	.15	l	l	I
I	62-72	.15	.15	l	I	I
!	72-80	.10	.15	 	 	
Shavenaugh	0-5 I	.15	I .15	l 5	 1	 220
i	5-8 I	.15	.15		I	I
İ	8-16	.15		ĺ	I	I
1	16-28	.15	.15	l	l	I
	00 04 1	.15	.15	l	1	1
İ	28-34			1	•	1
İ	28-34 34-44 44-80	.15	.15 .15 .15	İ	İ	İ

Table 16.—Erosion Properties—Continued

		Erosion factors			Wind	Wind
Map unit symbol and soil name 	Depth (inches)	 Kw 	 Kf 	T	erodi- bility group	erodi- bility index
193505: Spinks		.15	 		1	
	17-62 62-72	.15 .15	.15 .15 .15 .15			
Shavenaugh 	5-8 8-16 16-28 28-34 34-44	.15 .15 .15 .15 .15	.15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15		1	220 220
193506: Spinks 	10-17 17-62 62-72	.15 .15 .15 .15			1	 220
Shavenaugh 	5-8 8-16 16-28 28-34 34-44	.15 .15 .15 .15 .15	.15 .15		1	 220
193507: Spinks 	10-17 17-62 62-72	.15 .15 .15 .15	.15		1	 220
Shavenaugh 	5-8 8-16 16-28	.15 .15 .15	.15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15	i	1	 220
193508: Madaus 	0-12 12-34 34-38 38-62 62-80	 .43 .43 .15 .32	 .43 .43 .15	5 5 	8	 0 1 1 1
193509: Boyer 	0-3 3-4 4-14 14-30 30-45 45-80	.17 .15 .10 .15 .05 .10	.24	4 	3	 86

Table 16.—Erosion Properties—Continued

		Erosion factors				Wind
Map unit symbol and soil name	Depth (inches)	Kw	 Kf	 T 	erodi- bility group	erodi- bility index
			ī	i I	 	l
193509: Shavenaugh		.15	 .15	l I 5	 1	l 220
Snavenaugn		.15	1 .15		l	220
i	8-16		.15		i i	i i
i	16-28	.15	.15	İ	l	ĺ
I		.15	.15	l	l	I
!	34-44		.15		 -	!
	44-80	.05	.15	l I	l I	
193510:	i		i	i	İ	i
Boyer	0-3	.17	.24	4] 3	l 86
<u> </u>		.15	.24	•		1
	4-14		.24			!
		.15 .05	.24			!
		.05 .10	.15 .15		l I	! !
i	45 00		1	•	! 	İ
Shavenaugh	0-5	.15	.15		1	220
<u> </u>		.15	1 .15			1
		.15	.15			!
	16-28		.15		 -	!
	28-34 34-44	.15 .15	.15 .15		l I	! !
i		.05	.15		! 	i
i	İ		i i	İ	İ	İ
193511:		4.5	1		l	l
Boyer	0-3 3-4	.17 .15	.24 .24] 3	86
	3-4 4-14		.24		l I	! !
		.15	.24		! 	! !
i	30-45		.15			i i
i		.10	.15		İ	İ
Charrage	 0-5	1 5	 .15	•	 1	l I 220
Shavenaugh	0-5 5-8	.15 .15	.15		±	220
		.15	.15		! 	! !
i	16-28		1 .15		i	i
i		.15	.15		i İ	i
i	34-44	.15	.15	l	l	Ī
<u> </u>	44-80	.05	.15	l	l	ļ.
193513:			I .	l I	l i	
Dair	0-4			l 5	ı 8	I 0
i	4-7	.20	.20			İ
I	7-11	.17	.17	l	l	I
I	11-21	.17	.17	l	l	I
	21-50	.17	.17		<u> </u>	!
	50-80	.17	.17	l I	l i	
	0-7			, J 5	, 8	, I 0
i	7-20		i i	I	I	I
I	20-35				l	I
<u>!</u>	35-80	.15	.15	l		<u> </u>
193514:	 	 	I 	l I	 	I I
Platteriver	0-1		i	' 5	1	, 220
i	1-3	.15	.15	l	l	I
I	3-14	.15	.15	l	l	I
I	14-20	.15	.15	l	I	I
	20-29	.15	.15	l	l	1
·	29-80	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name (inches)			Ero	sion facto	rs	Wind	Wind
193514: Pipestone	Map unit symbol	Depth	1	ī	ī	erodi-	erodi-
193514: Pipestone	and soil name		Kw	Kf	T	bility	bility
Pipestone	<u></u>		<u> </u>	<u> </u>	<u> </u>	group	index
Pipestone	193514:		 	 	 	 	
2-9		0-2	.15	i .15	i 5	1	I 220
9-12 .15 .15	1		•	•		. – i	 i
24-32	i		•	•	•	i I	i
202010:	i	12-24	.15	1 .15	İ	l	İ
202010: Houghton	i	24-32	.15	1 .15	İ	l	İ
Houghton	i	32-80	.15	.15	İ	l	İ
Houghton	202010:		 	 	 	l i	
12-26		0-12		i	I 5	' I 8	i 0
Adrian				i	i	i	i
7-20	i			i	i	İ	i
7-20		0.7		1	! _	I	I
20-35	Adrian		•	1] 5	8	1 0
202016: Spinks			•	•	!	l	!
202016: Spinks			•	•	!	 	!
Spinks	<u> </u>	33-80	l .13	l .15	! !	! 	! !
5-10 .15 .15	•		İ	İ	i	İ	İ
10-17	Spinks		•	•	5	1	220
17-62 .15 .15	I		•	•	I	l	I
Tekenink, sandy	I		•	•	I	l	I
Tekenink, sandy substratum	I		•	•	I	l	I
Tekenink, sandy substratum	I		•	•	I	l	I
Substratum	ļ	72-80	.10	1 .15		 	1
8-16 .17 .17	Tekenink, sandy		! 		! 	! 	i
16-21 .24 .24	substratum	0-8	.17	.17	5	2	134
21-49 .17 .17	1	8-16	.17	.17	I	I	I
49-62 .24 .24	1	16-21	.24	.24	I	l	I
62-72 .17 .17	1	21-49	.17	.17	I	l	I
631170: 72-80	1	49-62	.24	.24	I	l	I
631170: Fogg	1	62-72	.17	.17	I	l	I
Fogg	!	72-80	.15	1 .15	!	<u> </u>	!
2-7	631170:]]]]	
7-13	Fogg	0-2	.15	1 .15	5	1	220
13-21 .15 .15	1	2-7	.15	.15	I	l	I
21-34 .15 .15	1	7-13	.15	.15	I	l	I
34-43 .17 .17	1	13-21	.15	.15	I	l	I
43-48 .24 .24	1	21-34	.15	.15	I	l	I
48-55 .32 .32	1	34-43	.17	.17	I	l	I
55-80 .15 .15	1		•	.24	I	l	I
	1	48-55	.32	.32	I	l	I
5-11 .15 .15	!	55-80	.15	1 .15	!	<u> </u>	I .
5-11 .15 .15	 Benzonia	0-5	ı .15	1 .15	ı 5	 1	ı 220
11-15 .15 .15	i						i
15-20 .15 .15	i				İ		İ
20-27 .15 .15	i				I	I	I
27-35 .15 .15	i				I	I	I
35-80 .15 .15	i				I	I	I
	İ				I	l	I
	1		l	I	I	l	I

Table 16.—Erosion Properties—Continued

		Ero	sion factor	rs	Wind	Wind
Map unit symbol	-	•	I	ı		erodi-
and soil name	(inches)	Kw	Kf	T	bility	bility
		<u> </u>	<u> </u>	<u> </u>	group	index
631171:		! 	! !	 		!
Fogg	0-2	.15	.15	5	1	220
I	2-7	.15	.15	l I		l
I		.15	.15	l I		I
I	13-21	.15	.15	•		I
<u> </u>	21-34	.15	1 .15	•		
!	34-43	.17	.17	!		!
ļ		.24	.24			!
ļ	48-55 55-80	.32 .15	.32 .15			!
<u> </u>	55-60	l .13	1 .15	 		! !
Benzonia	0-5	.15	.15	5	1	, 220
i	5-11	.15	.15	İ		İ
I	11-15	.15	.15	l I		I
I	15-20	.15	.15	l I		I
I	20-27	.15	.15	l I		I
I	27-35	.15	.15	l I		I
Į.	35-80	.15	1 .15			Į.
631172: I			1			!
Fogg	0-2	I I .15	I .15	I 5	1	ı I 220
F0gg	2-7	1 .15	1 .15	•	<u> </u>	220
į		.15	•			<u> </u>
i	13-21	.15	1 .15	•		i i
i	21-34	.15	1 .15	•		i
i	34-43	.17	.17	ĺ		İ
I	43-48	.24	.24	l I		I
I	48-55	.32	.32	l I		I
I	55-80	.15	.15			I
Pan-ania I	0-5	l I .15	 .15	l I 5	1	l I 220
Benzonia	5-11	1 .15	1 .15	•	_ <u>_</u>	220
<u> </u>	11-15	1 .15	•	 	 	! !
į	15-20	.15	1 .15	•		<u> </u>
i	20-27	.15	1 .15	•		I
i	27-35	.15	.15	i		i
İ	35-80	.15	1 .15	ĺ		İ
I		l	I			I
631173:	0.0	1	1			1
Fogg	0-2 2-7	.15 .15	.15 .15	5	1	220
ļ	7-13	.15	.15 .15			!
<u> </u>	13-21		.15			! !
<u>'</u>		:	1 .15			<u>.</u>
į	34-43	.17	1 .17			<u> </u>
i	43-48	.24	.24	i		I
i	48-55	. 32	.32	i		i
i	55-80	.15	.15	i i		İ
	_	l	I .			
Benzonia	0-5	.15	1 .15	5	1	220
!	5-11	.15	.15	!		!
l	11-15	.15	.15		1	1
l I	15-20 20-27	.15 .15	.15 .15	 	 	I I
 	20-27 27-35	.15	.15] 	! !
' I	35-80	.15	.15		1 	i
i	22 00	<u></u>	<u></u>	i	, 	i
·		•	•		•	•

Table 16.—Erosion Properties—Continued

		Erosion factors			Wind	Wind
Map unit symbol and soil name 	Depth (inches)	Kw	 Kf 	T	erodi- bility group	erodi- bility index
631174:	1	 	I	 	 	
Fogg	0-2 2-7	.15 .15	.15 .15	5	1	220
I I	7-13 13-21		.15 .15	 		
į	21-34		.15	İ		į
l I	34-43 43-48		.17 .24			
į	48-55		.32	İ		İ
l I	55-80	.15	.15 			
Benzonia	0-5		.15	5	1	220
ļ	5-11 11-15		.15 .15			!
i	15-20	.15	.15	i i		İ
I	20-27 27-35		.15 .15			1
i	35-80	.15	.15			!
680939: I		 	I		 	
Fern	0-9	.15	.15	5	1	220
l I	9-10 10-24		.15 .15			1
ļ	24-29		.37	, 		!
Į.	29-42		.37			ļ.
 	42-50 50-80		.37 .37	 		
 Spinks	0-5	.15	 .15	l 5	1	l I 220
i	5-10	.15	.15			İ
I	10-17 17-62	.15 .15	.15 .15			1
ļ	62-72	.15	.15			!
!	72-80	.10	.15			<u> </u>
680943:			! !			!
Milnichol	0-2 2-12	.15 .15	.15 .15	5	1	250
	12-15		.15			i I
ı	15-25		.15			I
l	25-33 33-47	.15 .15	.15 .15			
i	47-50		1 .17			I
I	50-68 68-80	.43 .43	.43 .43			
	100 00	.43	.43			İ
680945: Fern	0-9	.15	 .15	 5	1	l 220
i	9-10	.15	.15	i i		İ
l	10-24 24-29	.15 .37	.15 .37			<u> </u>
ļ	29-42	.37	.37	, 		!
!	42-50	.37	.37	! !		ļ
l I	50-80	.37	.37 			
680946: Fern	0-9	.15	 .15	 5	1	l I 220
 	9-10	.15	.15	, J	· <u>+</u>	, 220
Į.	10-24	.15	.15			!
l I	24-29 29-42	.37 .37	.37 .37	 	 	I I
i	42-50	.37	.37	i i		i
I	50-80	.37	.37			
1		ı	1	' '	ı	1

Table 16.-Erosion Properties-Continued

		Erosion factors				Wind
Map unit symbol and soil name	Depth (inches)	Kw	 Kf	l I T	erodi- bility	erodi- bility
	(Inches)	Κw		l	group	index
680971:			1	 	 	1
Nessen	0-4	.15	.15	l I 5	, 1	220
i	4-11		.15		İ	İ
İ	11-15	.15	.15	l	l	İ
1	15-24	.15	.15		l	I
1	24-39	.15	.15	l	l	I
I	39-44		.15	l	l	I
l	44-80	.10	.15	 -	 	1
Kaleva	0-3	.15	.15	l 5	1	220
1	3-9	.15	.15	l	l	I
I	9-11	.15	.15	l	l	I
I	11-16		.15		l	I
I	16-21		.15	•	l	I
!	21-70		.15	•		1
	70-80	.15	.15	 	 	1
680972:	i		! 	! 	' 	!
Nessen	0-4	.15	.15	5	1	220
1	4-11	.15	.15	l	l	I
I	11-15		.15	l	l	I
	15-24		.15	•		1
!	24-39		.15	•		!
!	39-44		.15	•	l	!
	44-80	.10	.15 	l I	l I	! !
Kaleva	0-3 i	.15	.15	5	1	220
I	3-9		.15	•	l	I
	9-11		.15	•		1
!	11-16		.15	•	l	!
	16-21		.15 .15	•	 -	!
	21-70 70-80		.15 .15	'	! 	! !
i	i		İ	i	i I	İ
680973:	0-4 I	15	l I .15	l I 5	 1	
Nessen	4-11	.15 .15	.15 .15		l ±	220
	11-15		.15	•	! 	! !
i	15-24		.15	•	' 	i
i	24-39		.15		i İ	i
İ	39-44	.10	.15		l	İ
!	44-80	.10	.15	l	<u> </u>	Į.
 	0-3 I	.15	 .15	l I 5	 1	l I 220
1.0.2010	3-9		.15		 I	i
i	9-11	.15	.15		i İ	i
İ	11-16	.15	.15		l	İ
1	16-21	.15	.15	l	l	I
I	21-70	.15	.15	l	l	I
ļ	70-80 I	.15	.15			
680974:			! 	! 	 	!
Nessen	0-4	.15	.15	5	1	220
I	4-11	.15	.15	l	l	I
I	11-15	.15	.15	l	l	I
I	15-24	.15	.15	l	<u> </u>	1
<u> </u>	24-39	.15	.15		 -	!
į	39-44	.10	.15	l	l	I
:	44-80	.10	.15	ı	ı	1

Table 16.—Erosion Properties—Continued

<u> </u>		Erosion factors			Wind	Wind
Map unit symbol and soil name 	Depth (inches)	Kw	 Kf 	 T 	erodi- bility group	erodi- bility index
680974:	0-3 3-9 9-11 11-16 16-21 21-70 70-80	.15		 5 	1	 220
893251: Boyer 	0-3 3-4 4-14 14-30 30-45 45-80	.15	.24 .24 .24 .24 .24 .15 .15	4 4 	3	 86
Shavenaugh 	0-5 5-8 8-16 16-28 28-34 34-44 44-80	.15 .15	.15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15 .15	5 1 1	1	220 220
894062: Remus 	0-9 9-15 15-24 24-35 35-66 66-80	.37	 .24 .28 .17 .37 .37	 5 	3	 86
 Spinks 	0-5 5-10 10-17 17-62 62-72 72-80	.15 .15 .15 .15 .15	.15	5 5 	1	 220
894063: Remus	0-9 9-15 15-24 24-35 35-66 66-80	.24 .28 .17 .37 .37	.24	 5 	3	 86
 Spinks 	0-5 5-10 10-17 17-62 62-72 72-80	.15 .15 .15 .15 .15	.15	 5 	1	 220
894064:	0-9 9-10 10-24 24-29 29-42 42-50 50-80	.15 .15 .15 .37 .37 .37	.15	5	1	 220

Table 16.—Erosion Properties—Continued

	!	Ero	sion factor	rs		Wind
Map unit symbol and soil name	Depth (inches)	Kw	l I K£	l I T	erodi- bility	erodi- bility
	(21101105)			<u> </u>	group	index
 B94064:	I		 	 	 	
Remus	0-9 i	.24	.24	5	3	86
1	9-15	.28	.28	l	l	I
1	15-24	.17	.17	l	l	I
1	24-35		.37	l	l	I
1	35-66		.37		l	I
!	66-80	.37	. 37		<u> </u>	!
894065:	l I		 	l 	 	!
Fern	0-9	.15	.15	5	1	220
1	9-10	.15	.15	l	l	I
1	10-24	.15	.15	l	l	I
1	24-29	. 37	.37	l	l	I
1	29-42	. 37	.37	l	l	I
I	42-50		.37	•	l	I
	50-80	. 37	.37 	 	 	
Remus	0-9		.24	5	, 3	, 86
1	9-15		.28	l	l	I
I	15-24		.17	l	l	I
!	24-35		. 37	•		1
!	35-66		. 37	•		!
	66-80	. 37	.37	l I	l i	
894104:	i		' 	i i	' 	İ
Mollineaux	0-6 I	.17	.17	5	2	134
1	6-9 I	.17	.17	l	l	I
1	9-15		.17	l	l	I
I	15-27		.17	l	l	I
I	27-38		.17	•	l	I
!	38-64		. 32	•		!
	64-80	.15	.15 	l I	l I	
Remus	0-9	.24	.24	5	, 3	86
1	9-15		.28		l	I
I	15-24		.17	l	l	I
I	24-35		.37	•	l	I
!	35-66 66-80		.37 .37	•	<u> </u>	!
i	66-80 	.37	.37 	 	! 	!
894105:	į		1	_		İ
Mollineaux	0-6 6-9	.17 .17	.17	5] 2	134
	6-9 9-15		.17 .17	l I	 	!
	15-27	.17	1 .17	l I	l I	! !
;	27-38	.17	1 .17	! 	! 	! !
;	38-64	.32	.32	! 	! 	! !
i	64-80	.15	.15	i	İ	İ
Pomus	1	2.4		 F	3	
Remus	0-9 9-15	. 24 . 28	.24 .28	J 5	J 3	86
	15-24	.17	.17	 	! !	! !
<u> </u>	24-35	.37		 	! 	! !
<u> </u>	35-66	.37	.37	! 	! !	! !
i	66-80	.37	.37	i	! 	İ
994165.	!		l	 	 	l
894165: Spinks	0-5	.15	l .15	l 5	 1	I 220
i	5-10	.15	.15			İ
i	10-17 I	.15	.15	l	I	I
i	17-62	.15	.15	l	I	I
İ	62-72	.15	.15	l	l	I
		.10				

Table 16.—Erosion Properties—Continued

	ı	Ero	sion factor	rs	Wind	Wind
Map unit symbol				ļ	•	erodi-
and soil name	(inches)	Kw	Kf	Т 	bility group	bility index
i	<u>i</u>		i	<u>' </u>	l =====	<u> </u>
894165:	!		!!!	l	!	!
Tekenink, sandy substratum	0-8 I	.17	 .17	l I 5	l I 2	 134
substratum	8-16 I	.17	1 .17	•	1 2 1	l 134
j	16-21		.24	•	i I	İ
i	21-49		.17	•	i	i
I	49-62	.24	.24	l	I	I
I	62-72		.17	l	l	I
	72-80	.15	.15		<u> </u>	1
899682: I	l I		 	l I	 	
Kaleva	0-3	.15	.15	, 5	, 1	220
i	3-9 j	.15	.15	I	İ	İ
I	9-11	.15	.15	l	I	I
I	11-16	.15	.15	l	l	I
I	16-21	.15	.15	l	l	I
<u> </u>	21-70		.15			1
l	70-80	.15	.15	 	l	1
899722: I				! 	! 	! !
Goodharbor	0-1 İ	.15	.15	5	1	250
I	1-3	.15	.15	l	l	I
I	3-23		.15	l	l	I
I	23-40		.15	•	l	I
I	40-80	.15	.15	 	l	1
899731:	, I			! 	! 	i I
Covert	0-1	.15	.15	5	1	220
I	1-8	.15	.15		l	I
I	8-18		.15		l	I
!	18-25		.15	•	!	!
l	25-29		1.15	•		!
<u> </u>	29-38 38-47		.15 .15	•	 	
'	47-80 I	.15	1 .15	•	! 	i I
i	i		i i	İ	İ	İ
Pipestone	0-2	0	.15	•	1	220
l	2-9	.15 .15	1.15	•		!
<u> </u>	9-12 12-24		.15 .15		! !	
<u> </u>	24-32		1 .15	•	! 	! !
i	32-80	.15	.15	İ	i	i
!	!		!	l	! :	!
899733: Covert	0-1	.15	 .15	l 5	 1	 220
Covert	1-8	.15	.15) 	 	1 220
į	8-18	.15	1 .15	! 	' 	!
i	18-25	.15	.15	i I	i i	i
i	25-29	.15	.15		İ	İ
I	29-38	.15	.15	l	l	I
I	38-47	.15	.15	l	I	I
!	47-80	.15	.15	 -	l	1
899733: I			 	' 	i I	i
Dair	0-4		i i	5	8	i o
I	4-7	.20	.20	l	I	I
I	7-11	. 17	.17	l	!	!
I	11-21	.17	.17		!	!
!	21-50 50-80	.17 .17	.17 .17	! !	!	1

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Table 16.—Erosion Properties—Continued

	T		Τ	E	rosi	on fact	ors		T	Wind	Τ	Wind
Map unit symbol	- 1	Depth	1		Т		ı		_ I	erodi-	1	erodi-
and soil name	- 1	(inches)	1	Kw	- 1	Kf	- 1	T	1	bility	1	bility
	ı		1		- 1		- 1		1	group	1	index
	T		T		T		ı		ī		T	
899734:	- 1		1				- 1		-		-	
Benzonia		0-5	1	.15	- 1	.15	- 1	5	-	1		220
	- 1	5-11	1	.15	- 1	.15	- 1		1		1	
	- 1	11-15	1	.15		.15	- 1		-		-	
	- 1	15-20	1	.15	- 1	.15	- 1		1		1	
	- 1	20-27	1	.15	- 1	.15	- 1		1		1	
	- 1	27-35	1	.15	- 1	.15	- 1		1		1	
	- 1	35-80	1	.15	- 1	.15	- 1		1		1	
	1				- 1		- 1		1		1	

Table 17.-Total Soil Carbon

(This table displays soil organic carbon (SOC) and soil inorganic carbon (SIC) in kilograms per square meter to a depth of 2 meters or to the representative top depth of any kind of bedrock or any cemented soil horizon. SOC and SIC are reported on a volumetric whole soil basis, corrected for representative rock fragments indicated in the database. SOC is converted from horizon soil organic matter of the fraction of the soil less than 2 mm in diameter. If soil organic matter indicated in the database is NULL, SOC is assumed to be zero. SIC is converted from horizon calcium carbonate content fraction of the soil less than 2 mm in diameter. If horizon calcium carbonate indicated in the database is NULL, SIC is assumed to be zero. A weighted average of all horizons is used in the calculations. Only major components of a map unit are displayed in this table)

Map unit symbol, component name, and component percent	 soc 	 SIC
	 kg/m ²	 kg/m ²
190775: Adrian (55%)	1 132	
Houghton (45%)	 176	l 0
190777: Alcona (55%)	 - 6	 0
Richter (30%)	 - 8	 16
190778: Alcona (65%)	 6	 0
Richter (25%)	1	 16
190779: Alpena (90%)	 - 4	 32
190780: Au Gres (45%)	 	
Kalkaska (35%)	 12	I I 0
190781: Bach (90%)	 - 9	 29
190782: Deer Park (100%)	 - 3	
190783: Deer Park (100%)	 - 3	
190784: Deer Park (70%)	 - 3	
Roscommon (25%)	1 13	1 12
190786: Dune land (100%)	 	
190787: East Lake (90%)	 - 4	 19
190788: East Lake (90%)	 - 4	 19

Table 17.-Total Soil Carbon-Continued

	 soc 	 SIC
	 kg/m ²	 kg/m ²
190789: East Lake (90%)	, 4	 19
190790: East Lake (90%)	 4	 19
190791: Eastport (93%)	 4	
190792: Edwards (70%)	 92	 9
Marl beds (20%)	 34	 16
190794: Emmet (60%)	 6	 26
Leelanau (30%)	 5	 21
190795: Emmet (60%)	 6	 26
Leelanau (30%)	l 5	 21
190796: Emmet (50%)	 6	 26
Leelanau (30%)	 5	 21
190797: Emmet (50%)	 6	 26
Leelanau (30%)	 5	 21
190799: Emmet (45%)	 6	 26
Leelanau (30%)	 5	 21
190801: Emmet (70%)	 5	 26
Mancelona (25%)	 6	 17
190803: Emmet (60%)	 5	 26
Mancelona (30%)	 6	 17
190805: Emmet (50%)	 6	 26
Omena (45%)	 5	 42
190806: Emmet (50%)	 6	 26
Omena (45%)	 5 	 42

Table 17.—Total Soil Carbon—Continued

	soc	sic
	 kg/m ²	kg/m ²
190807: Emmet (50%)	 	26
Omena (45%)	 5	42
190808: Emmet (50%)	 	 26
Omena (45%)	 5 	 42
190809: Emmet (50%)	 6	26
Omena (45%)		 42
190811: Hettinger (45%)	1 13	46
Muck (30%)	86 86	 24
190812: Hettinger (45%)	1 13	46
Tonkey (30%)	11 11	10
190814: Kalkaska (85%)	1 12	0
190815: Kalkaska (85%)	 	0
190816: Kalkaska (90%)		
190817: Kalkaska (90%)	 12	
190818: Kalkaska (90%)	 	
190819: Kalkaska (55%)	 	
East Lake (35%)		19
190820: Kiva (65%)	 	 21
Mancelona (30%)	 6	17
190821: Kiva (50%)	 	21
Mancelona (30%)	 6	 17
190823: Kiva (50%)	 	 21
Mancelona (30%)	 6 	 17

Table 17.-Total Soil Carbon-Continued

Map unit symbol, component name, and component percent	 soc 	SIC
	 kg/m ²	kg/m ²
190824. Lake beaches (100%)	 	
190825. Lake bluffs (100%)	 	
190826: Leelanau (60%)	 5	21
East Lake (30%)	 4	19
190827: Leelanau (65%)	 5	21
East Lake (25%)	 4	19
190828: Leelanau (65%)	 5	21
East Lake (25%)	 4	19
190829: Leelanau (50%)	 5	21
East Lake (35%)	4	19
190830: Leelanau (50%)	 5	21
East Lake (35%)	 4	19
190831: Lupton (60%)	 176	0
Markey (30%)	 51	6
190832: Mancelona (90%)	 6	17
190833: Mancelona (90%)	 6	17
190834: Mancelona (60%)	 6	17
East Lake (30%)	 4	19
190835: Mancelona (55%)	 6	17
East Lake (35%)	 4	19
190836: Mancelona (50%)	 6	17
East Lake (30%)	4	19
190837: Mancelona (45%)	 6	17
East Lake (30%)	 4 	19

Table 17.—Total Soil Carbon—Continued

Map unit symbol, component name, and component percent	soc soc 	sic
	 kg/m ²	kg/m ²
190838: Mancelona (50%)	 6	17
East Lake (30%)	4	19
190839: Mancelona (70%)	 	17
Richter (25%)		16
190840: Nester (90%)		47
190841: Nester (90%)	 5	47
190842: Nester (90%)		47
190843: Nester (90%)	 	47
190844: Nester (90%)	 	47
190846. Pits, gravel (100%)		
190847: Richter (45%)	8	16
Alcona (40%)	 6 	0
190848: Richter (45%)	8	16
Alcona (40%)	6	0
190849: Roscommon (50%)	1 13	12
Markey (30%)	51	6
190850: Sanilac (90%)	6	17
190851: Tonkey (40%)	1 12	10
Munuscong (25%)		33
Iosco (25%)	, , 7 , 1	29
190852: Tonkey (35%)	1 12	10
Munuscong (30%)	8 8	33
Iosco (20%)	, 7 	29
190853. Water (100%)		

Table 17.-Total Soil Carbon-Continued

Map unit symbol, component name, and component percent	 SOC 	 SIC
	 kg/m ²	 kg/m ²
190854: Wallace (50%)	, 9	, 0
Kalkaska (45%)	 12	I 0
190855: Wind eroded land (100%)	 9	 0
190856: Wind eroded land (100%)	, 9) 0
193236. Beaches (100%)	' 	
193237: Thompsonville (50%)	 26) 0
Milnichol (40%)	 16	 28
193255: Spinks (50%)	 9	, 0
Coloma (40%)	 8	l I 0
193256: Spinks (50%)	 9	
Coloma (40%)	I 8	I 0
193257: Spinks (55%)	 9	 0
Coloma (35%)	I 8	I I 0
193258: Spinks (50%)	 9	 0
Coloma (40%)	 8 	I I 0 I
193260: Copemish (95%)	 19	, 0
193262: Kaleva (95%)	, 11	, 0
193263: Kaleva (95%)	 11	, 0
193265: Grattan (95%)	 12	, 0
193266: Grattan (95%)	 12	
193267: Grattan (95%)	 12 	 0
193269: Grattan (95%)	 12 	 0
193270: Covert (90%)	 12 	 0

Table 17.—Total Soil Carbon—Continued

Map unit symbol, component name, and component percent	 SOC 	 SIC
	 kg/m ²	kg/m ²
193271: Pipestone (90%)	 13	 0
193272: Dair (90%)	 30	0
193277: Benona (90%)	 13	
193278: Benona (90%)	 13	 0
193279: Benona (90%)	 13	 0
193284: Udorthents (55%)	 49	 0
Udipsamments (35%)	 13	l I 0
193285: Lumley (55%)	 336	 0
Makinen (40%)	 164	0
193286: Histosols (55%)	 269	
Aquents (45%)	4	0
193287: Dune land (55%)	 	
Quartzipsamments (40%)	1 1	0
193288: Udipsamments (100%)	 13	 0
193342: Gorvan (35%)	 12	1 17
Houghton (30%)	 499	0
Glendora (20%)	 19	0
193349: Spinks (50%)	 9	
Coloma (40%)	 8	0
193351: Benona (95%)	 13	
193354: Dune land (50%)	 	
Quartzipsamments (40%)	1	0
193357: Shavenaugh (85%)	 	 16

Table 17.-Total Soil Carbon-Continued

Map unit symbol, component name, and component percent	 soc 	 SIC
	 kg/m ²	 <u>kg/m²</u>
193359: Shavenaugh (85%)	, 9	 16
193360: Shavenaugh (85%)	 9	 16
193362: Benzonia (90%)	 18	I I I 0
193363: Benzonia (90%)	 18	
193364: Benzonia (90%)	 18	
193365: Benzonia (90%)	 18	 0
193371: Dair (50%)	 30	 0
Pipestone (40%)	 13	l I 0
193372. Access Denied (100%)	 	
193423: Benona (95%)	 13	
193484. Pits, sand and gravel (100%)	 	
193494: Nordhouse (100%)	 11	
193496: Nordhouse (95%)	 11	
193497: Nordhouse (95%)	 11	
193498: Nordhouse (40%)	 11	 0
Platteriver (35%)	17	l I 0
Dair (25%)	I I 30	l I 0
193503: Spinks (50%)	 9	 0
Shavenaugh (40%)	 9	 16
193504: Spinks (50%)	 9	 0
Shavenaugh (40%)	 9	 16
193505: Spinks (50%)	 9	 0
Shavenaugh (40%)	 9 	 16

Table 17.—Total Soil Carbon—Continued

Map unit symbol, component name, and component percent	I SOC 	 SIC
	 <u>kg/m²</u>	kg/m ²
193506: Spinks (50%)	 9	 0
Shavenaugh (40%)	 9	16
193507: Spinks (50%)	 9	 0
Shavenaugh (40%)	 9	 16
193508: Madaus (90%)	 78	 50
193509: Boyer (50%)	 5	26
Shavenaugh (40%)	 9 	 16
193510: Boyer (50%)	 5	26
Shavenaugh (40%)	 9	16
193511: Boyer (50%)	 5	26
Shavenaugh (40%)	 9	16
193513: Dair (50%)	 30	0
Adrian (45%)	 224 	0
193514: Platteriver (55%)	 17	0
Pipestone (40%)	 13 	0
202010: Houghton (55%)	 499	0
Adrian (40%)	 224) 0
202016: Spinks (50%)	 9	0
Tekenink, sandy substratum (40%)	 16	12
631170: Fogg (50%)	 17	0
Benzonia (40%)	 18	0
631171: Fogg (50%)	 17	0
Benzonia (40%)	 18 	 0
631172: Fogg (50%)	 17	 0
Benzonia (40%)	 18 	l 0

Table 17.-Total Soil Carbon-Continued

	 soc 	 SIC
	 kg/m ²	 kg/m ²
631173: Fogg (50%)	, 17	, 0
Benzonia (40%)	 18	l 0
631174: Fogg (50%)	 17	
Benzonia (40%)	 18	l 0
680939: Fern (50%)	 11	 20
Spinks (40%)	 9	l 0
680943: Milnichol (90%)	 16	 28
680945: Fern (90%)	 11	 20
680946: Fern (90%)	 11	 20
680971: Nessen (50%)	 12	 17
Kaleva (40%)	1 11) 0
680972: Nessen (50%)	 12	 17
Kaleva (40%)	1 11	l 0
680973: Nessen (50%)	 12	 17
Kaleva (40%)	1 11	I I 0
680974: Nessen (50%)	 12	 17
Kaleva (40%)	1 11	I I 0
893251: Boyer (50%)	 5	 26
Shavenaugh (40%)	 9	 16
894062: Remus (50%)	 13	 6
Spinks (40%)	 9	l 0
894063: Remus (50%)	 13	 6
Spinks (40%)	 9 	 0

Table 17.—Total Soil Carbon—Continued

Map unit symbol, component name, and component percent	 soc 	 SIC
	 kg/m ²	 kg/m ²
894064: Fern (50%)	 11	 20
Remus (40%)	 13	l I 6
894065: Fern (50%)	 11	
Remus (40%)	 13	l 6
894104: Mollineaux (50%)	 	
Remus (40%)	 13	I 6
894105: Mollineaux (50%)	 11	 0
Remus (40%)	13 	, 6
894165: Spinks (50%)	 9	 0
Tekenink, sandy substratum (40%)	 16 	 12
899682: Kaleva (90%)	' 11	, 0
899722: Goodharbor (90%)	, 9	' 53
899731: Covert (50%)	 12	 0
Pipestone (40%)	 13) 0
899733: Covert (50%)	 12	 0
Dair (45%)	I 30 	I 0
899734: Benzonia (90%)	 18 	

Table 18.—Chemical Soil Properties

(Absence of an entry indicates that data were not estimated)

Map unit symbol and soil name	Depth	Cation- exchange capacity		reaction	 Calcium carbon- ate
i	In	meq/100 g	meq/100 g	рН	Pct
1		ı ı		ı —	
190775:	0.0				l ,
Adrian		80.0-120.0 80.0-120.0		4.5-7.8 4.5-7.8	0 0
		1.0-3.0			0
i		i i		l	İ
Houghton		140.0-180.0		5.6-7.8	
	10-60	140.0-180.0		5.6-7.8	0
190777:		: :			
Alcona	0-8	3.0-15.0		6.1-7.3	0
1	8-12	1.0-6.0		6.1-7.3	0
I		1.0-8.0		6.1-7.8	•
		2.0-8.0			0
	24-60	1.0-8.0		7.4-8.4	0
Richter	0-8			ı I 5.6-7.3	I I 0
1		5.0-15.0		5.6-7.8	0
i	27-60	1.0-10.0		7.4-8.4	0-20
!		! !		l	l
190778:	0.0				l
Alcona	0-8 8-12	3.0-15.0 1.0-6.0		6.1-7.3 6.1-7.3	0 0
		1.0-6.0 1.0-8.0		6.1-7.8	
		1 2.0-8.0			1 0
i	24-60	1.0-8.0		7.4-8.4	
I		1 1		l	l .
Richter	0-8	5.0-15.0		5.6-7.3	
	8-27 27-60	5.0-15.0 1.0-10.0		5.6-7.8 7.4-8.4	0 0-20
	27 00	1.0 10.0 		7.4 0.4 	0 20
190779:		i i		l	İ
Alpena	0-4	5.0-15.0		6.6-7.8	0
	4-60	0.0-2.0		7.4-8.4	10-25
190780:		 			l İ
Au Gres	0-12	' 5.0-10.0		3.6-7.3	' 0
		2.0-5.0			0
I	24-60	1.0-2.0		5.1-7.3	0
77.111	0.7				1
Kalkaska	0-7 7-15	1.0-15.0 4.0-15.0		5.1-6.0	0 0
		4.0-15.0 2.0-5.0		5.1-6.0 5.1-6.0	•
		1.0-2.0		5.1-6.5	
i		i i		i	İ
190781:		! !			
Bach	0-8	5.0-25.0		7.4-7.8	•
	8-19 19-60	2.0-10.0 2.0-15.0		7.4-7.8 7.4-8.4	
	19-60	2.0-15.0 		7.4-0.4 	5-25
190782:		i i		i	İ
Deer Park	0-1	1.0-5.0		5.1-6.0	0
<u> </u>		1.0-3.0		5.1-6.5	
	4-60	0.0-2.0		5.1-6.5	0
190783:		, , , ,] 	
Deer Park	0-1	 1.0-5.0		 5.1-6.0	0
i	1-4	1.0-3.0		5.1-6.5	
		0.0-2.0		5.1-6.5	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	 Depth 	Cation- Cation- exchange capacity		reaction	 Calcium carbon- ate
	l In	meq/100 g		pH	Pct
		ı —— ı		ı 	ı —
190784:	l	1 1		l	l .
Deer Park	0-1	1.0-5.0		5.1-6.0	0
	1-4 4-60	1.0-3.0 0.0-2.0		5.1-6.5 5.1-6.5) 0 I 0
	- 00	1 0.0 2.0 1		1	ı v I
Roscommon	0-6	5.0-35.0		6.1-7.8	0
	6-60	1.0-4.0		6.1-7.8	0-10
100707		! !			
190787: East Lake	I I 0-8			 5.6-7.3	I I 0
Last Lake	8-26	1 1.0-5.0		5.6-7.3	1 0
	26-60	1.0-2.0	i	7.4-8.4	10-25
	l	l I			l
190788:				!	
East Lake	0-8	2.0-5.0 1.0-5.0		5.6-7.3	Ι 0 Ι 0
	8-26 26-60	1.0-5.0 1.0-2.0		5.6-7.3 7.4-8.4	∪ 10-25
	, 20 00 I	1 1.0 2.0 1		7.1 0.1	1
190789:	I	i i		İ	İ
East Lake	l 0-8	2.0-5.0		5.6-7.3	0
	8-26	1.0-5.0		5.6-7.3	0
	26-60	1.0-2.0		7.4-8.4	10-25
190790:	l I	! ! ! !			l I
East Lake	0-8	2.0-5.0		5.6-7.3	0
	8-26	1.0-5.0		5.6-7.3	0
	26-60	1.0-2.0		7.4-8.4	10-25
100701	<u> </u>	!!!			l
190791: Eastport	I I 0-3			 6.1-7.3	I I 0
Eastport	I 3-26	1.0-4.0		5.1-7.8	•
	26-60	1.0-2.0		7.4-8.4	•
	l	I I			l
190792:	l	! !			
Edwards		140.0-180.0		5.1-7.8	0
	30-60 	1.0-4.0		7.4-8.4	50-90
190794:	! 	i i			!
Emmet	0-8	10.0-20.0		5.6-6.5	0
	8-26	2.0-6.0		5.6-7.3	0
	26-32	3.0-9.0		6.6-7.8	1-8
	32-60	1.0-3.0		7.4-8.4	10-30
Leelanau	ı I 0-8	3.0-10.0		 5.6-7.3	I I 0
Decranda	8-28	1.0-4.0		5.6-7.3	•
	28-36	2.0-10.0		6.1-7.3	0
	36-60	1.0-5.0		7.4-8.4	10-30
100705.	 	! !			 -
190795: Emmet	l I 0-8			 5.6-6.5	l I 0
Thinkie C	0-6 8-26	1 2.0-6.0 I		5.6-7.3	
	26-32	3.0-9.0		6.6-7.8	
	32-60	1.0-3.0		7.4-8.4	10-30
Leelanau	0-8	3.0-10.0		5.6-7.3	•
	8-28 28-36	1.0-4.0 2.0-10.0		5.6-7.3 6.1-7.3	
	36-60	1.0-5.0		7.4-8.4	
			i		

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	 Depth 	 Cation- exchange capacity	exchange capacity	reaction	ate
	In In	meq/100 g	meq/100 g	pH —	Pct
190796: Emmet	 0-8 8-26 26-32 32-60	2.0-6.0	 	 5.6-6.5 5.6-7.3 6.6-7.8 7.4-8.4	0 1-8
Leelanau	0-8 8-28 28-36 36-60	•	 	5.6-7.3 5.6-7.3 6.1-7.3 7.4-8.4	, 0 0
190797: Emmet	 0-8 8-26 26-32 32-60	 10.0-20.0 2.0-6.0 3.0-9.0 1.0-3.0		5.6-6.5 5.6-7.3 6.6-7.8 7.4-8.4	•
Leelanau	0-8 8-28 28-36 36-60	3.0-10.0 1.0-4.0 2.0-10.0 1.0-5.0		5.6-7.3 5.6-7.3 6.1-7.3 7.4-8.4	, 0 0
190799:		İ			İ
Emmet	0-8 8-26 26-32 32-60	10.0-20.0 2.0-6.0 3.0-9.0 1.0-3.0	 	5.6-6.5 5.6-7.3 6.6-7.8 7.4-8.4	0 1-8
Leelanau	0-8 8-28 28-36 36-60	3.0-10.0 1.0-4.0 2.0-10.0 1.0-5.0	 	5.6-7.3 5.6-7.3 6.1-7.3 7.4-8.4	, 0 0
190801: Emmet	 0-8 8-26 26-32 32-60	 10.0-20.0 2.0-6.0 3.0-9.0 1.0-3.0		 5.6-6.5 5.6-7.3 6.6-7.8 7.4-8.4	0 1-8
Mancelona	 0-8 8-25 25-30 30-60	2.0-10.0 1.0-10.0 4.0-15.0 1.0-4.0		 5.6-7.3 5.6-7.8 6.1-7.8 7.4-8.4	0 0
190803: Emmet	0-8 8-26 26-32 32-60	10.0-20.0 2.0-6.0 3.0-9.0 1.0-3.0	i	5.6-6.5 5.6-7.3 6.6-7.8 7.4-8.4	0 1-8
Mancelona	 0-8 8-25 25-30 30-60	2.0-10.0 1.0-10.0 4.0-15.0 1.0-4.0	i	5.6-7.3 5.6-7.8 6.1-7.8 7.4-8.4	0 0
190805: Emmet	0-8 8-26 26-32 32-60	10.0-20.0 2.0-6.0 3.0-9.0 1.0-3.0		5.6-6.5 5.6-7.3 6.6-7.8 7.4-8.4	0 1-8

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation- exchange capacity	exchange capacity	reaction	 Calcium carbon- ate
	In	meq/100 g	meq/100 g	pН	Pct
190805:		 	 		
Omena	0-8	5.0-20.0	' 	6.1-7.8	0
	8-14		l	6.1-7.8	1-8
	14-60	5.0-25.0		7.4-8.4	10-30
190806:		I 	I I		l I
Emmet	0-8	10.0-20.0		5.6-6.5	0
	8-26	2.0-6.0		5.6-7.3	
	26-32	3.0-9.0	!	6.6-7.8	
	32-60	1.0-3.0 	 	7.4-8.4	10-30
Omena	0-8	 5.0-20.0	' 	6.1-7.8	0
	8-14	5.0-20.0		6.1-7.8	1-8
	14-60	5.0-25.0	!	7.4-8.4	10-30
190807:] 	 		l I
Emmet	0-8	 10.0-20.0		5.6-6.5	0
	8-26	2.0-6.0		5.6-7.3	0
	26-32	3.0-9.0	l	6.6-7.8	1-8
	32-60	1.0-3.0	ļ	7.4-8.4	10-30
Omena	0-8	I I 5.0-20.0	l I	 6.1-7.8	I I 0
	8-14			6.1-7.8	1-8
	14-60	5.0-25.0		7.4-8.4	10-30
		! :	!		l
190808: Emmet	0-8	 10.0-20.0	l I	 5.6-6.5	l I 0
Enale C	8-26	1 2.0-6.0	' 	5.6-7.3	
	26-32	3.0-9.0		6.6-7.8	•
	32-60	1.0-3.0	l	7.4-8.4	10-30
0	0 0	 5.0-20.0		6170	l 0
Omena	0-8 8-14	5.0-20.0 5.0-20.0	 	6.1-7.8 6.1-7.8	
	14-60	5.0-25.0		7.4-8.4	10-30
		l	I		l
190809:	0 0		<u> </u>		1
Emmet	0-8 8-26	10.0-20.0 2.0-6.0		5.6-6.5 5.6-7.3	l 0 l 0
	26-32	1 3.0-9.0	' 	6.6-7.8	
	32-60	1.0-3.0		7.4-8.4	10-30
	0.0		!		l
Omena	0-8 8-14	5.0-20.0 5.0-20.0		6.1-7.8 6.1-7.8	
	14-60	5.0-25.0		7.4-8.4	•
		l	l	İ	İ
190811:	0.0		!		l ^
Hettinger	0-8 8-23	15.0-40.0 10.0-20.0		6.1-7.3 6.1-7.3	
	23-60	10.0-20.0		7.9-8.4	
		l	İ		
190812:			! :		
Hettinger	0-8	15.0-40.0		6.1-7.3	
	8-23 23-60	10.0-20.0 10.0-30.0		6.1-7.3 7.9-8.4	
	23 00	, <u>10.0 50.0</u> 	i	,	, 20 30
Tonkey	8-0	10.0-25.0	l	5.6-7.8	0
	8-20	2.0-10.0		5.6-7.8	
	20-60	1.0-10.0	 	7.4-8.4	0-10

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	 Depth 	Cation- cexchange capacity	exchange capacity	reaction	 Calcium carbon- ate
	In In	meq/100 g	meq/100 g	рн	Pct
190814: Kalkaska	 0-7 7-15 15-32 32-60			5.1-6.0 5.1-6.0	 0 0 0 0
100015		l :	l	l	l ·
190815: Kalkaska	0-7 7-15 15-32 32-60	1.0-15.0 4.0-15.0 2.0-5.0 1.0-2.0		5.1-6.0	 0 0 0 0
190816: Kalkaska	0-7 7-15 15-32 32-60	1.0-15.0 4.0-15.0 2.0-5.0 1.0-2.0		5.1-6.0	 0 0 0
190817: Kalkaska	 0-7 7-15 15-32 32-60	1		5.1-6.0 5.1-6.0	 0 0 0 0
190818: Kalkaska	 0-7 7-15 15-32 32-60	1	 	•	•
190819: Kalkaska	 0-7 7-15 15-32 32-60	2.0-5.0 4.0-15.0 2.0-5.0 1.0-2.0		•	•
East Lake	 0-8 8-26 26-60	2.0-5.0 1.0-5.0 1.0-2.0	 		 0 0 10-25
190820:	l 	l 	 	l 	
Kiva	0-6 6-20 20-60	3.0-15.0 2.0-10.0 1.0-2.0	 	6.1-7.8 6.6-7.8 7.4-8.4	0
Mancelona	0-8 8-25 25-30 30-60	2.0-10.0 1.0-10.0 4.0-15.0 1.0-4.0		5.6-7.3 5.6-7.8 6.1-7.8 7.4-8.4	0 0
190821:	 	 	 	 	I
Kiva	0-6 6-20 20-60	3.0-15.0 2.0-10.0 1.0-2.0		6.1-7.8 6.6-7.8 7.4-8.4	0
Mancelona	 0-8 8-25 25-30 30-60	2.0-10.0 1.0-10.0 4.0-15.0 1.0-4.0		 5.6-7.3 5.6-7.8 6.1-7.8 7.4-8.4	0 0

Table 18.—Chemical Soil Properties—Continued

		· · · · · · · · · · · · · · · · · · ·	1		<u> </u>
Map unit symbol and soil name	Depth	Cation- exchange capacity	exchange capacity	reaction	 Calcium carbon- ate
	In In	meq/100 g	meq/100 g	<u>pH</u>	Pct
190823:		l I	 	 	
Kiva	0-6 6-20 20-60	3.0-15.0 2.0-10.0 1.0-2.0	 	6.1-7.8 6.6-7.8 7.4-8.4	0 0 0 10-25
	0-8 8-25 25-30 30-60	2.0-10.0 1.0-10.0 4.0-15.0 1.0-4.0	i	5.6-7.3 5.6-7.8 6.1-7.8 7.4-8.4	, 0 0
	0-8 8-28 28-36 36-60	3.0-10.0 1.0-4.0 2.0-10.0 1.0-5.0	i	5.6-7.3 5.6-7.3 6.1-7.3	i I 0
East Lake	0-8 8-26 26-60	2.0-5.0 1.0-5.0 1.0-2.0	 	5.6-7.3 5.6-7.3 7.4-8.4	0
190827:		! 	! 	 	!
	0-8 8-28 28-36 36-60	3.0-10.0 1.0-4.0 2.0-10.0 1.0-5.0	i	5.6-7.3 5.6-7.3 6.1-7.3 7.4-8.4	, 0 0
East Lake	 0-8 8-26 26-60	 2.0-5.0 1.0-5.0 1.0-2.0	 	 5.6-7.3 5.6-7.3 7.4-8.4	0
190828:		! 	! 	 	!
	0-8 8-28 28-36 36-60	3.0-10.0 1.0-4.0 2.0-10.0 1.0-5.0	i	5.6-7.3 5.6-7.3 6.1-7.3 7.4-8.4	, 0 0
East Lake	0-8 8-26 26-60	2.0-5.0 1.0-5.0 1.0-2.0	 	5.6-7.3 5.6-7.3 7.4-8.4	0
		3.0-10.0 1.0-4.0 2.0-10.0 1.0-5.0		 5.6-7.3 5.6-7.3 6.1-7.3 7.4-8.4	l 0 l 0
East Lake	0-8 8-26 26-60	1.0-5.0 2.0-5.0 1.0-5.0 1.0-2.0		7.4-8.4 5.6-7.3 5.6-7.3	 0 0
190830:	[I I
Leelanau	0-8 8-28 28-36 36-60	3.0-10.0 1.0-4.0 2.0-10.0 1.0-5.0	I	5.6-7.3 5.6-7.3 6.1-7.3 7.4-8.4	I 0 I 0
East Lake	0-8 8-26 26-60	2.0-5.0 1.0-5.0 1.0-2.0		 5.6-7.3 5.6-7.3 7.4-8.4	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name 	Depth	Cation- exchange capacity		 Soil reaction 	 Calcium carbon- ate
	In	meq/100 g	meq/100 g	рн	Pct
100001		!!!		!	l
190831: Lupton	0-10	 140.0-180.0		I I 5.6-7.8	I I 0
Lup con		140.0-180.0		1 5.6-7.8	•
i		i i		İ	i I
Markey		140.0-180.0		6.6-7.8	•
!	20-60	1.0-3.0		7.4-8.4	0-5
190832:		! ! ! !		l I]
Mancelona	0-8	' 2.0-15.0		, 5.6-7.3	0
i	8-25	1.0-10.0		5.6-7.8	0
I	25-30	4.0-15.0		6.1-7.8	0
!	30-60	1.0-4.0		7.4-8.4	10-25
190833:				 	l I
Mancelona	0-8	2.0-15.0		ı I 5.6-7.3	I 0
i	8-25	1.0-10.0		5.6-7.8	0
I	25-30	4.0-15.0		6.1-7.8	0
!	30-60	1.0-4.0		7.4-8.4	10-25
190834:				 -] I
Mancelona	0-8			ı 5.6-7.3	I I 0
	8-25	1.0-10.0		5.6-7.8	
i	25-30	4.0-15.0		6.1-7.8	0
I	30-60	1.0-4.0		7.4-8.4	10-25
Reat Taba	0 0			 5.6-7.3	1
East Lake	0-8 8-26	2.0-5.0 1.0-5.0		5.6-7.3 5.6-7.3) 0 I 0
i	26-60	1.0-2.0		7.4-8.4	10-25
i		i i		İ	İ
190835:		1		l .	l .
Mancelona	0-8	2.0-10.0		5.6-7.3	'
	8-25 25-30	1.0-10.0 4.0-15.0		5.6-7.8 6.1-7.8	
i	30-60	1.0-4.0		7.4-8.4	•
i		i i		i	
East Lake	0-8	2.0-5.0		5.6-7.3	0
	8-26	1.0-5.0		5.6-7.3	0
	26-60	1.0-2.0		7.4-8.4	10-25
190836:		' '		! 	!
Mancelona	0-8	2.0-10.0		5.6-7.3	0
I	8-25	1.0-10.0		5.6-7.8	0
I	25-30	4.0-15.0		6.1-7.8	
!	30-60	1.0-4.0		7.4-8.4	10-25
 East Lake	0-8			I 5.6-7.3	I I 0
last lake	8-26	1.0-5.0		5.6-7.3	
i	26-60	1.0-2.0		7.4-8.4	
		1 1		I	I
190837:	0 0				1
Mancelona	0-8 8-25	2.0-10.0 1.0-10.0		5.6-7.3 5.6-7.8	
i i	25-30	1.0-10.0 4.0-15.0		6.1-7.8	
i	30-60	1.0-4.0		7.4-8.4	
i		ı i		I	I
East Lake	0-8	2.0-5.0		5.6-7.3	
	0 26				1 0
	8-26 26-60	1.0-5.0 1.0-2.0		5.6-7.3 7.4-8.4	

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation- exchange capacity 		reaction	 Calcium carbon- ate
	In In	meq/100 g	meq/100 g	рн	Pct
190838: Mancelona	 0-8 8-25 25-30 30-60	 2.0-10.0 1.0-10.0 4.0-15.0 1.0-4.0	 	 5.6-7.3 5.6-7.8 6.1-7.8 7.4-8.4	i 0 i 0
East Lake	0-8 8-26 26-60	 2.0-5.0 1.0-5.0 1.0-2.0	 	 5.6-7.3 5.6-7.3 7.4-8.4	 0 0 10-25
· ·	0-8 8-25 25-30 30-60	2.0-10.0 2.0-10.0 1.0-10.0 4.0-15.0 1.0-4.0	•	 5.6-7.3 5.6-7.8 6.1-7.8 7.4-8.4	 0 0 0 10-25
Richter	0-8 8-27 27-60	5.0-15.0 5.0-15.0 1.0-10.0	 	5.6-7.3 5.6-7.8 7.4-8.4	0 0 0-20
190840: Nester	0-6 6-8 8-28 28-60	5.0-20.0 2.0-10.0 5.0-20.0 5.0-20.0	 	 6.6-7.3 6.6-7.3 6.6-7.3 7.9-8.4	•
190841: Nester	0-6 6-8 8-28 28-60	5.0-20.0 2.0-10.0 5.0-20.0 5.0-20.0	 	 6.6-7.3 6.6-7.3 6.6-7.3 7.9-8.4	•
190842: Nester	0-6 6-8 8-28 28-60	5.0-20.0 2.0-10.0 5.0-20.0 5.0-20.0		6.6-7.3 6.6-7.3 6.6-7.3 7.9-8.4	•
190843: Nester	0-6 6-8 8-28 28-60	5.0-20.0 2.0-10.0 5.0-20.0 5.0-20.0	 	6.6-7.3 6.6-7.3 6.6-7.3 7.9-8.4	0-20
190844: Nester	0-6 6-8 8-28 28-60	5.0-20.0 2.0-10.0 5.0-20.0 5.0-20.0	 	 6.6-7.3 6.6-7.3 6.6-7.3 7.9-8.4	0 0-20
190847: Richter	0-8 8-27 27-60	 5.0-15.0 5.0-15.0 1.0-10.0	i	 5.6-7.3 5.6-7.8 7.4-8.4	0
İ	8-12	 3.0-15.0 1.0-6.0 1.0-8.0 2.0-8.0 1.0-8.0	 	 6.1-7.3 6.1-7.3 6.1-7.8 6.1-7.8 7.4-8.4	0 0 0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol	 Depth	 Cation-	 Effective	 Soil	 Calcium
and soil name	l	exchange	cation-	reaction	carbon-
	I	capacity	_	•	ate
	<u> </u>	1 (100	capacity		<u> </u>
	I In	<u>meq/100 g</u>	meq/100 g	<u>рн</u> 	Pct
190848:	! 	i		! 	!
Richter	0-8	5.0-15.0		5.6-7.3	0
	8-27	5.0-15.0		5.6-7.8	1 0
	27-60	1.0-10.0		7.4-8.4	0-20
Alcona	I I 0-8	 3.0-15.0		 6.1-7.3	I I 0
	8-12	1.0-6.0		6.1-7.3	•
	12-18	1.0-8.0		6.1-7.8	J 0
	18-24	2.0-8.0		6.1-7.8	1 0
	24-60	1.0-8.0		7.4-8.4	J 0
190849:	l I	 		 	
Roscommon	0-6	5.0-35.0		6.1-7.8	0
	6-60	1.0-4.0		6.1-7.8	0-10
Markey	l I 0-20	 140.0-180.0		l I 6.6-7.8	l I 0
Markey	0-20 20-60	1.0-3.0	 		I 0-5
	=0 00	1			
190850:		!			
Sanilac	0-6 6-16	5.0-15.0		5.6-7.8	0
	6-16 16-24	2.0-10.0 3.0-15.0		7.4-8.4 17.4-8.4	0 0
	1 24-60	2.0-10.0		•	l 0-20
	İ	i	İ	İ	İ
190851:	l I 0-8	 10.0-25.0		 5.6-7.8	l 0
Tonkey	0-6 8-20	2.0-10.0	 	5.6-7.8	l 0 I 0
	20-60	1.0-10.0		7.4-8.4	0-10
					l
Munuscong	0-10	5.0-15.0		6.1-7.8	•
	10-24 24-60	2.0-10.0 10.0-30.0	 	6.1-7.8 7.4-8.4	0 10-30
	21 00	1		7.1 0.1	1
Iosco	l 0-8	4.0-10.0		5.6-6.5	•
	8-27	2.0-10.0		5.1-7.8	0
	27-34 34-60	4.0-10.0 8.0-20.0		6.1-7.8 6.6-8.4	3-6 15-30
	34-60 	8.0-20.0 	, I	0.0-0.4 	15-30
190852:	İ	i	i	İ	İ
Tonkey	0-8	10.0-25.0		5.6-7.8	0
	•	2.0-10.0		•	0
	20-60 	1.0-10.0 		7.4-8.4 	0-10
Munuscong	0-10	5.0-15.0		6.1-7.8	0
	10-24	2.0-10.0		6.1-7.8	•
	24-60	10.0-30.0		7.4-8.4	10-30
Iosco	I 0-8	4.0-10.0		 5.6-6.5	I I 0
	8-27	2.0-10.0		5.1-7.8	
	27-34	4.0-10.0		6.1-7.8	3-6
	34-60	8.0-20.0		6.6-8.4	15-30
190854:	l 	 		l 	
Wallace	 0-8	2.0-5.0	0.4-3.0	4.5-5.5	0
				4.5-5.0	•
	24-60	1.0-2.0		5.1-6.5	0
Kalkaska	l I 0-7	 1.0-15.0	l 	 5.1-6.0	l I 0
Mainasha		4.0-15.0		5.1-6.0	•
	15-32	2.0-5.0		5.1-6.0	•
	32-60	1.0-2.0		5.1-6.5	0
	l	I I		I	l

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation- capacity		reaction	Calcium carbon- ate
	In	meq/100 g	meq/100 g		Pct
1	_	ı 			
193237:					
Thompsonville	0-5 5-15			3.5-6.0) 0 I 0
		1.0-3.0 2.0-4.0		3.5-6.0 3.5-6.0	'
		•		3.5-6.0	
i	37-55	2.0-4.0		3.5-6.0	0
	55-72	5.0-20.0	3.0-15.0	5.1-7.8	0-20
	72-80	5.0-20.0	3.0-15.0	5.1-7.8	0-20
Milnichol	0-2	l l 2.0-6.0	2.0-4.0	 3.5-6.0	l I 0
MITHIGHOI	2-12	•		3.5-6.0	
i		•		4.5-6.0	
	15-25	2.0-4.0	1.0-3.0	4.5-6.0	0
		1.0-3.0	0.8-3.0	4.5-6.0	
		•		5.6-7.3	
		5.0-15.0 5.0-20.0		6.6-8.4 6.6-8.4	
	68-80	5.0-15.0		6.6-8.4	
i		İ	i i		
193255:					
Spinks	0-5 5-10	3.0-6.0 1.0-3.0	1.0-4.0 0.8-2.0	5.1-7.3 5.1-7.3) 0 I 0
	10-17	•		5.1-7.3	
		•	0.8-2.0	5.1-7.3	
i	62-72	•		5.1-7.3	
I	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20
Coloma	0-3	 3.0-6.0	 2.0-4.0	 4.5-6.5	l I 0
COTOMA	3-4	•		4.5-6.5	
i	4-8	1.0-3.0	0.8-2.0	4.5-6.5	
I	8-15	1.0-3.0	0.8-2.0	4.5-6.5	0
	15-25	1.0-3.0	0.8-2.0	4.5-6.5	
	25-40 40-80	1.0-3.0 1.0-3.0	0.8-2.0 0.8-2.0	4.5-6.5 4.5-7.3	
	1 40 00	l 1.0 3.0	0.0 2.0 	4.5 7.5	0
193256:		l I			l
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10 10-17	1.0-3.0 1.0-3.0	0.8-2.0 0.8-2.0	5.1-7.3 5.1-7.3) 0 I 0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	
i	62-72	1.0-3.0		5.1-7.3	
1	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20
Coloma	0-3	 3.0-6.0	 2.0-4.0	 4.5-6.5	l I 0
COTOMA	3-4	1.0-3.0		4.5-6.5	
i	4-8	1.0-3.0		4.5-6.5	
i	8-15	1.0-3.0	0.8-2.0	4.5-6.5	0
1		1.0-3.0		4.5-6.5	
	25-40	1.0-3.0		4.5-6.5	
	40-80	1.0-3.0 	0.8-2.0 	4.5-7.3) 0 I
193257:		i			i
Spinks	0-5	3.0-6.0		5.1-7.3	
1	5-10	1.0-3.0		5.1-7.3	
	10-17	1.0-3.0		5.1-7.3	
	17-62 62-72	1.0-3.0 1.0-3.0		5.1-7.3 5.1-7.3	
1	72-80	1.0-3.0	0.8-2.0	5.1-7.3	
	/ /2 80	1.0-3.0 	0.0-2.0 	J.1 -0.4	U-20

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	 Depth 	Cation- exchange capacity		reaction	 Calcium carbon- ate
	l <u>In</u>	meq/100 g	meq/100 g	рн	Pct
100057		!			l
193257: Coloma	I I 0-3	I I 3.0-6.0	 2.0-4.0	l 4.5-6.5	I I 0
COTOMA	0 3 3-4	•	•	4.5-6.5	•
	•	•		4.5-6.5	0
				4.5-6.5	
		•		4.5-6.5	•
	25-40 40-80	•	0.8-2.0 0.8-2.0	4.5-6.5 4.5-7.3	•
	İ	İ			İ
193258: Spinks	l I 0-5	l l 3.0-6.0	 1.0-4.0	 5.1-7.3	l I 0
opinio -	5-10	•		5.1-7.3	'
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
		•		5.1-7.3	
	62-72			5.1-7.3	•
	72-80 	1.0-3.0 	0.8-2.0 	5.1-8.4 	0-20
Coloma	0-3	•		4.5-6.5	
		•		4.5-6.5	
	•	•		4.5-6.5 4.5-6.5	'
	•	•	•	1 4.5-6.5	•
	25-40	1.0-3.0		4.5-6.5	•
	40-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193260:	 	I I] 	l I
Copemish	0-2		2.0-5.0	3.5-5.0	0
	2-7			3.5-5.0	•
	7-11	!	•	3.5-5.0	
	11-28 28-36	 	0.8-3.0 0.8-3.0	3.5-5.0 3.5-5.0	'
	36-80		0.8-2.0	3.5-5.0	•
102262		!			
193262: Kaleva	I I 0-3	I I 3.0-6.0	 2.0-4.0	 4.5-6.0	I I 0
	3-9	1.0-3.0		4.5-6.0	'
	•	2.0-6.0	•	4.5-6.0	0
		•		5.1-6.5	
	16-21 21-70	2.0-4.0 1.0-3.0		5.1-6.5 5.1-6.5	•
	70-80	1.0-3.0		5.1-6.5	•
102062	l	!	!		l
193263: Kaleva	l I 0-3	l I 3.0-6.0	 2.0-4.0	 4.5-6.0	l I 0
	3-9	•		4.5-6.0	
	9-11	2.0-6.0	1.0-4.0	4.5-6.0	0
	11-16	2.0-4.0		5.1-6.5	
	16-21 21-70	2.0-4.0 1.0-3.0		5.1-6.5 5.1-6.5	
	70-80	1.0-3.0	0.8-2.0	5.1-6.5	
10005	l	!		l	l
193265: Grattan	 0-4	 3.0-6.0	 2.0-4.0	 4.5-6.5	l I 0
	4-13	1.0-3.0	•	4.5-6.5	•
	13-18	2.0-4.0		4.5-6.5	
	18-25	2.0-4.0		4.5-6.5	
	25-53	1.0-3.0		4.5-6.5	
	53-80	1.0-3.0	0.8-2.0	5.1-7.3) 0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation- exchange capacity	exchange capacity	reaction	 Calcium carbon- ate
	In	meq/100 g	meq/100 g	pH	Pct
193266:] i	 -
Grattan	0-4	ı	2.0-4.0	I I 4.5-6.5	I I 0
	4-13	1.0-3.0		4.5-6.5	•
1	13-18	2.0-4.0	1.0-3.0	4.5-6.5	0
		2.0-4.0		4.5-6.5	•
	25-53 53-80	1.0-3.0 1.0-3.0	0.8-2.0 0.8-2.0	4.5-6.5 5.1-7.3	
i		, _,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,, ,	0.0 2.0	i	İ
193267:		l I		l	l
Grattan	0-4	3.0-6.0		4.5-6.5	
	4-13 13-18	1.0-3.0 2.0-4.0		4.5-6.5 4.5-6.5	•
i		2.0-4.0		4.5-6.5	
I	25-53	1.0-3.0	0.8-2.0	4.5-6.5	
!	53-80	1.0-3.0	0.8-2.0	5.1-7.3	. 0
193269:		 		l	
Grattan	0-4	' 3.0-6.0	2.0-4.0	4.5-6.5	, 0
i	4-13	1.0-3.0	0.8-2.0	4.5-6.5	0
		2.0-4.0		4.5-6.5	
	18-25 25-53	2.0-4.0 1.0-3.0		4.5-6.5 4.5-6.5	•
	53-80	1.0-3.0	0.8-2.0	5.1-7.3	
i		i i	i	İ	İ
193270:	0 1		1040		l .
Covert	0-1 1-8	3.0-6.0 1.0-3.0		4.5-7.3 4.5-7.3	
i	8-18	2.0-4.0		4.5-6.0	•
I	18-25	2.0-4.0	1.0-3.0	4.5-7.3	0
		2.0-3.0		4.5-7.3	
	29-38 38-47	1.0-3.0 1.0-3.0		5.1-8.4 5.1-8.4	•
	47-80	1.0-3.0	0.8-2.0	5.1-8.4	•
i		İ	i	l	ĺ
193271:	0.0		1040		l .
Pipestone	0-2 2-9	2.0-6.0 1.0-3.0	1.0-4.0 0.8-2.0	3.5-7.3 3.5-7.3	•
	9-12	1 2.0-6.0		3.5-6.0	
i	12-24	2.0-4.0	1.0-3.0	4.5-6.0	0
		1.0-3.0		4.5-7.3	
	32-80	1.0-3.0	0.8-2.0	4.5-7.3 	0
193272:		i			'
Dair	0-4	125.0-140.0		5.6-7.3	0
		20.0-45.0		6.1-7.3	
		1.0-3.0 1.0-3.0		6.6-7.8 6.6-7.8	
		1.0-3.0		6.6-7.8	
i		1.0-3.0		6.6-7.8	•
100077		! !			<u> </u>
193277: Benona	0-2	 3.0-6.0	2.0-4.0	 3.5-6.0	l I 0
	2-6	3.0-8.0 1.0-3.0		3.5-6.0 4.5-6.0	
i	6-9	2.0-6.0		4.5-6.0	
		2.0-5.0		4.5-5.5	
		1.0-3.0		4.5-7.3	
		1.0-3.0 1.0-3.0		4.5-7.3 4.5-7.3	
		1.0 3.0 			l

Table 18.—Chemical Soil Properties—Continued

		<u> </u>			<u> </u>
Map unit symbol and soil name	Depth	Cation- cachange capacity		reaction	 Calcium carbon- ate
	In	meq/100 g	meq/100 g	pН	Pct
		1	ı ı		ı —
193278:	 0-2	1 2060		2 5 6 0	l 0
Benona	0-2 2-6	3.0-6.0 1.0-3.0	2.0-4.0 0.8-2.0	3.5-6.0 4.5-6.0	I 0 I 0
	6-9	2.0-6.0		4.5-6.0	•
	9-17	2.0-5.0	1.0-3.0	4.5-5.5	0
	17-28	1.0-3.0		4.5-7.3	•
	28-46 46-80	1.0-3.0 1.0-3.0		4.5-7.3	
	46-80	1.0-3.0	0.8-2.0 	4.5-7.3) 0 I
193279:	! 	İ	i		'
Benona	0-2	3.0-6.0	2.0-4.0	3.5-6.0	
	2-6	1.0-3.0		4.5-6.0	•
	6-9	1 2.0-6.0		4.5-6.0	•
	9-17	2.0-5.0 1.0-3.0		4.5-5.5	•
	17-28 28-46	1.0-3.0		4.5-7.3 4.5-7.3	•
	46-80	1.0-3.0	1 0.8-2.0 1	4.5-7.3	•
		İ	i i		İ
193284:		I	l l		l
Udorthents	0-80	5.0-15.0	! !	5.6-7.3	. 0
Udipsamments	0-80	 0.0-2.0	 0.0-1.0	5.1-6.5	I I 0
193285:		1			
Lumley	l I 0−3	l I	 140.0-180.0	3 5-4 4	I I 0
namine,	3-6	•	140.0-180.0		•
	6-8	125.0-200.0		5.1-7.3	I 0
	8-20	125.0-200.0	i i	5.1-7.3	0
		125.0-200.0			•
	45-53	•	140.0-180.0		
	53-80		140.0-180.0	3.5-4.4	0
Makinen	0-4	1125.0-200.0		5.1-7.3	I I 0
		1125.0-200.0		5.1-7.3	•
		125.0-200.0		5.1-7.3	•
	22-31		140.0-180.0	3.5-4.4	0
	31-80	1.0-3.0		6.1-8.4	0-25
193286:		1			 -
Histosols	0-45	1125.0-200.0	! !	5.1-7.3	I 0
	45-80	1.0-3.0		4.5-7.8	•
		İ	i i		I
Aquents	0-80	1.0-3.0		4.5-7.8	0
102007		!	!!!		<u> </u>
193287: Quartzipsamments	 0-80	I I 0 0-1 0	 	5.1-6.5	I I 0
Quartzipsamments) U-80 	0.0-1.0	 	3.1-0.5	U
193288:		i	i i		I
Udipsamments	0-80	0.0-2.0	0.0-1.0	5.1-6.5	0
		I			l
193342:	0.4		 	6 1 7 0	0 1-
Gorvan	0-4 4-11	2.5-15.0 2.5-15.0		6.1-7.8 6.1-7.8	
	11-27	2.5-15.0		6.6-7.8	
	27-80		' 	6.6-8.4	•
		I	ı i		l
Houghton		125.0-200.0		4.5-7.3	
		125.0-200.0		4.5-7.3	
	26-80	125.0-200.0		4.5-7.3	J 0
	l	I			I

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth 	exchange capacity 	exchange capacity	reaction	ate
	In In	meq/100 g	meq/100 g	pH —	Pct
193342: Glendora	 0-6 6-9 9-30 30-80	 25.0-100.0 1.0-3.0 1.0-3.0	 	5.6-7.3 5.6-7.3 5.6-7.3 5.6-7.3	0 0
193349:]	
Spinks	10-17 17-62 62-72	3.0-6.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0	0.8-2.0 0.8-2.0 0.8-2.0	5.1-7.3 5.1-7.3 5.1-7.3 5.1-7.3 5.1-7.3 5.1-8.4	0 0 0
Coloma	3-4 4-8	3.0-6.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0	0.8-2.0 0.8-2.0 0.8-2.0 0.8-2.0	4.5-6.5 4.5-6.5 4.5-6.5 4.5-6.5 4.5-6.5 4.5-6.5 4.5-7.3	0 0 0 0
193351:		İ	İ		İ
Benona	6-9	3.0-6.0 1.0-3.0 2.0-6.0 2.0-5.0 1.0-3.0 1.0-3.0	1.0-4.0 1.0-3.0	3.5-6.0 4.5-6.0 4.5-6.0 4.5-5.5 4.5-7.3 4.5-7.3	0 0 0 0
193354: Quartzipsamments	0-80	 0.0-1.0		 5.1-6.5	 0
193357: Shavenaugh		3.0-6.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0	0.8-2.0	5.6-7.3 5.1-7.3 6.6-7.8 6.6-7.8 6.6-7.8 6.6-7.8 7.4-8.4	0 0 0 0
193359: Shavenaugh	0-5 5-8 8-16 16-28 28-34 34-44 44-80	3.0-6.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0	0.8-2.0	5.6-7.3 5.1-7.3 6.6-7.8 6.6-7.8 6.6-7.8 6.6-7.8 7.4-8.4	0 0 0 0
193360: Shavenaugh	0-5 5-8 8-16 16-28 28-34 34-44 44-80	3.0-6.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0 1.0-3.0	0.8-2.0 	5.6-7.3 5.1-7.3 6.6-7.8 6.6-7.8 6.6-7.8 6.6-7.8 7.4-8.4	0 0 0 0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation- exchange capacity		reaction	Calcium carbon- ate
	In	meq/100 g	meq/100 g	pН	Pct
193362: Benzonia	 0-5	 	 	 4.5-5.5	 0
	5-11 11-15	 	0.8-2.0	4.5-5.5 5.1-5.5	
	15-20 20-27	 2.0-4.0		5.1-5.5 5.1-6.0	
	27-35 35-80	2.0-4.0 1.0-3.0	1.0-3.0	5.1-6.0 5.6-6.0	0
193363:	 	 			
Benzonia	0-5 5-11	 		4.5-5.5 4.5-5.5	'
	11-15 15-20	 		5.1-5.5 5.1-5.5	
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35 35-80	2.0-4.0 1.0-3.0	1.0-3.0	5.1-6.0 5.6-6.0	
193364: Benzonia	I I 0-5	 	 2.0-4.0	 4.5-5.5	 0
	5-11	i i	0.8-2.0	4.5-5.5	0
	11-15 15-20	 		5.1-5.5 5.1-5.5	
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35 35-80	2.0-4.0 1.0-3.0	1.0-3.0	5.1-6.0 5.6-6.0	
193365: Benzonia	I I 0-5	 	 2.0-4.0	 4.5-5.5	 0
Delizonia	5-11	i i	0.8-2.0	4.5-5.5	0
	11-15 15-20	 	2.0-4.0 2.0-4.0	5.1-5.5 5.1-5.5	
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35 35-80	2.0-4.0 1.0-3.0	1.0-3.0	5.1-6.0 5.6-6.0	
193371:	 0-4	 		 5.6-7.3	 0
Dair	0-4	20.0-45.0		6.1-7.3	-
	7-11 11-21	1.0-3.0 1.0-3.0		6.6-7.8 6.6-7.8	'
	21-50	1.0-3.0		6.6-7.8	0
	l	1.0-3.0 		6.6-7.8 	
Pipestone	0-2 2-9	2.0-6.0 1.0-3.0		3.5-7.3 3.5-7.3	
	9-12 12-24	2.0-6.0 2.0-4.0		3.5-6.0 4.5-6.0	
	24-32	1.0-3.0	0.8-2.0	4.5-7.3	
	32-80 	1.0-3.0 	0.8-2.0	4.5-7.3	0
193423: Benona	 0-2	 3.0-6.0		 3.5-6.0	
	2-6 6-9	1.0-3.0 2.0-6.0		4.5-6.0 4.5-6.0	
	6-9 9-17	2.0-6.0		4.5-5.5	
	17-28 28-46	1.0-3.0 1.0-3.0		4.5-7.3 4.5-7.3	
		1.0-3.0		4.5-7.3	

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name 	Depth	exchange capacity 	exchange capacity	reaction	Calcium carbon- ate
!	<u>In</u>	meq/100 g	meq/100 g	pН	Pct
 193494:		 			
Nordhouse	0-3	' 3.0-6.0	2.0-4.0	3.5-7.3	0
I	3-11	1.0-3.0		3.5-7.3	
!		2.0-4.0		3.5-7.3	
 	40-60 60-80	1.0-3.0 1.0-3.0	0.8-2.0 0.8-2.0	3.5-7.3 3.5-7.3	0 0
 193496:					
Nordhouse	0-3	' 3.0-6.0	2.0-4.0	3.5-7.3	0
I	3-11	1.0-3.0		3.5-7.3	
!	11-40	2.0-4.0		3.5-7.3	
 	40-60 60-80	1.0-3.0 1.0-3.0	0.8-2.0 0.8-2.0	3.5-7.3 3.5-7.3	
 193497:		!!!!]
Nordhouse	0-3	3.0-6.0	2.0-4.0	3.5-7.3	I 0
i	3-11	1.0-3.0	0.8-2.0	3.5-7.3	0
!		2.0-4.0		3.5-7.3	
 	40-60 60-80	1.0-3.0 1.0-3.0	0.8-2.0 0.8-2.0	3.5-7.3 3.5-7.3	0 0
j		į į			
193498: Nordhouse	0-3		2.0-4.0	3.5-7.3	l I 0
Northiouse	3-11	1 1.0-3.0		3.5-7.3	
i	11-40	2.0-4.0	1.0-3.0	3.5-7.3	0
ļ.	40-60	1.0-3.0		3.5-7.3	
 	60-80	1.0-3.0 	0.8-2.0	3.5-7.3) 0 I
Platteriver	0-1	2.0-6.0		3.5-6.5	
!		2.0-6.0 1.0-3.0		3.5-6.5	0
<u>'</u>	3-14 14-20	1.0-3.0 1.0-3.0		3.5-6.5 3.5-6.5	0 0
i	20-29	1.0-3.0		3.5-6.5	
!	29-80	1.0-3.0	0.8-2.0	3.5-6.5	0
 Dair	0-4	 125.0-140.0	 	5.6-7.3) 0
ļ.	4-7	20.0-45.0		6.1-7.3	
	7-11 11-21	1.0-3.0 1.0-3.0		6.6-7.8 6.6-7.8	
i i	21-50	1.0-3.0 1.0-3.0		6.6-7.8	
į	50-80	1.0-3.0		6.6-7.8	0
 193503:]
Spinks	0-5	3.0-6.0		5.1-7.3	0
!	5-10	1.0-3.0		5.1-7.3	
	10-17 17-62	1.0-3.0 1.0-3.0		5.1-7.3 5.1-7.3	
i	62-72	1.0-3.0		5.1-7.3	
į	72-80	1.0-3.0		5.1-8.4	
 Shavenaugh	0-5	 3.0-6.0	 	5.6-7.3	l 0
i	5-8	1.0-3.0		5.1-7.3	
!	8-16	1.0-3.0		6.6-7.8	
!	16-28 28-34	1.0-3.0 1.0-3.0		6.6-7.8 6.6-7.8	
	~ U J4			0.0-7.0	
i I	34-44	1.0-3.0	i	6.6-7.8	

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation- exchange capacity	exchange	reaction	 Calcium carbon- ate
	In	meq/100 g		рн	Pct
	ı —	Ι	I	ı —	ı —
193504:					
Spinks	0-5 5-10	3.0-6.0 1.0-3.0		5.1-7.3 5.1-7.3	
				5.1-7.3	
			•	5.1-7.3	
		1.0-3.0	0.8-2.0	5.1-7.3	0
	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20
Shavenaugh	l l 0-5	I I 3.0-6.0	l I	I I 5.6-7.3	I I 0
		•		5.1-7.3	
	8-16	1.0-3.0		6.6-7.8	0
		•	•	6.6-7.8	
		•	•	6.6-7.8	
	34-44 44-80	1.0-3.0 1.0-3.0	 	6.6-7.8 7.4-8.4	
	11 00	1	İ	l , , , , , , , , , , , , , , , , , , ,	1
193505:	1	l	l	l	١ .
Spinks	0-5	3.0-6.0		5.1-7.3	
		•		5.1-7.3 5.1-7.3	•
				5.1-7.3	
		•		5.1-7.3	
	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20
Shavenaugh	l l 0-5	I I 3.0-6.0	l I	l 5.6-7.3	l I 0
biia v ciiaagii		•		5.1-7.3	
	8-16	1.0-3.0		6.6-7.8	0
		•		6.6-7.8	
		•	 	6.6-7.8 6.6-7.8	_
	44-80	1.0-3.0 1.0-3.0	 	6.6-7.8 7.4-8.4	•
	İ	İ	i I	i	İ
193506:		1			1
Spinks	0-5 5-10	3.0-6.0 1.0-3.0		5.1-7.3 5.1-7.3	
				5.1-7.3	
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	
		•		5.1-7.3	
	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20
Shavenaugh	I 0-5	I 3.0-6.0	 	ı I 5.6-7.3	I 0
3	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
				6.6-7.8	
		1.0-3.0	•	6.6-7.8	
	28-34 34-44	1.0-3.0 1.0-3.0	 	6.6-7.8 6.6-7.8	
	44-80	1.0-3.0	' 	7.4-8.4	
]	l	l	l	l
193507:	 0_5	30.60	1 0 4 0		l
Spinks	0-5 5-10	3.0-6.0 1.0-3.0		5.1-7.3 5.1-7.3	
	10-17			5.1-7.3	
	17-62		•	5.1-7.3	
	62-72	•	•	5.1-7.3	•
	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20

Table 18.—Chemical Soil Properties—Continued

	 I	<u> </u>	<u> </u>		<u> </u>
Map unit symbol and soil name	Depth 	Cation- exchange capacity		reaction	Calcium carbon- ate
	' 	capacity	capacity		400
	In	meq/100 g	meq/100 g	рН	Pct
100505	l	!			!
193507: Shavenaugh	I I 0-5	I I 3.0-6.0	 	 5.6-7.3	I I 0
ona venaugn	•	1.0-3.0	0.8-2.0	5.1-7.3	1 0
		1.0-3.0		6.6-7.8	0
		1.0-3.0	 	6.6-7.8	•
		1.0-3.0 1.0-3.0	 	6.6-7.8 6.6-7.8	I 0 I 0
	44-80	1.0-3.0	 	7.4-8.4	10-25
	l				l
193508: Madaus	 0-12	 125.0-200.0		 6.1-8.4	l I 0
madaus		2.0-10.0		7.4-8.4	•
	34-38	2.0-10.0			50-90
	38-62	1.0-3.0		7.4-8.4	
	62-80 	1.0-3.0		7.4-8.4	10-30
193509:	! 	i			!
Boyer	0-3	3.0-8.0		5.6-8.4	0
		1.0-6.0		5.6-8.4	•
	•	4.0-20.0 4.0-20.0		5.6-8.4 5.6-8.4	•
	30-45	1.0-3.0		7.9-8.4	•
	45-80	1.0-3.0		7.9-8.4	10-25
Shavenaugh	l I 0-5	l l 3.0-6.0	 	 5.6-7.3	l I 0
ona v chaagh	:	1.0-3.0	0.8-2.0	5.1-7.3	•
		1.0-3.0		6.6-7.8	•
	•	1.0-3.0 1.0-3.0	 	6.6-7.8 6.6-7.8	•
	20-34 34-44	1.0-3.0		6.6-7.8	•
	44-80	1.0-3.0	i	7.4-8.4	•
102510.					ļ
193510: Boyer	I I 0-3	I 3.0-8.0		 5.6-8.4	I I 0
1	•	1.0-6.0	i i	5.6-8.4	•
	4-14	4.0-20.0		5.6-8.4	•
	14-30 30-45	4.0-20.0 1.0-3.0	 	5.6-8.4 7.9-8.4	•
	30-45 45-80	1.0-3.0		7.9-8.4	•
	I	İ	İ	i	İ
Shavenaugh	0-5	3.0-6.0		5.6-7.3	•
	5-8 8-16	1.0-3.0 1.0-3.0	0.8-2.0	5.1-7.3 6.6-7.8	0 0
	16-28	1.0-3.0		6.6-7.8	
	28-34	1.0-3.0		6.6-7.8	
	34-44	1.0-3.0 1.0-3.0		6.6-7.8	
	44-80 	1.0-3.0 		7.4-8.4 	10-25
193511:	i İ	i		j	i
Boyer	0-3	3.0-8.0		5.6-8.4	
	3-4 4-14	1.0-6.0 4.0-20.0		5.6-8.4 5.6-8.4	
	4-14	4.0-20.0		5.6-8.4	
	30-45	1.0-3.0		7.9-8.4	10-25
	45-80	1.0-3.0		7.9-8.4	10-25
	I	I			I

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation- exchange capacity		reaction	Calcium carbon- ate
	In	meg/100 g	meg/100 g	рН	Pct
1		ı —— ı		=	
193511:		l			Ι .
Shavenaugh	0-5	3.0-6.0		5.6-7.3	0
		1.0-3.0 1.0-3.0	0.8-2.0	5.1-7.3 6.6-7.8	•
		1.0-3.0	'	6.6-7.8	•
İ		1.0-3.0		6.6-7.8	
	34-44	1.0-3.0		6.6-7.8	0
1	44-80	1.0-3.0		7.4-8.4	10-25
193513:					l i
Dair	0-4	 125.0-140.0		l 5.6-7.3	I I 0
		20.0-45.0		6.1-7.3	•
i	7-11	1.0-3.0	i	6.6-7.8	0
I		1.0-3.0		6.6-7.8	•
		1.0-3.0		6.6-7.8	
	50-80	1.0-3.0		6.6-7.8	0
Adrian	0-7	 125.0-200.0		 5.1-7.3	I I 0
		125.0-200.0		5.1-7.3	•
i	20-35	125.0-200.0		5.1-7.3	0
I	35-80	1.0-3.0		6.1-8.4	0-25
193514:					l
Platteriver	0-1	I I 2.0-6.0	1.0-4.0	3.5-6.5	I I 0
Tiacceriver		1 2.0-6.0		3.5-6.5	•
i	3-14	1.0-3.0		3.5-6.5	0
I		1.0-3.0		3.5-6.5	0
		1.0-3.0		3.5-6.5	
	29-80	1.0-3.0	0.8-2.0	3.5-6.5	0
Pipestone	0-2	I 2.0-6.0	1.0-4.0	3.5-7.3	I I 0
		1.0-3.0		3.5-7.3	•
i	9-12	2.0-6.0	1.0-4.0	3.5-6.0	0
1	12-24	2.0-4.0		4.5-6.0	•
		1.0-3.0		4.5-7.3	•
	32-80	1.0-3.0	0.8-2.0	4.5-7.3	0
202010:					'
Houghton	0-12	125.0-200.0	i	5.1-7.3	0
I		125.0-200.0	'	5.1-7.3	0
	26-80	125.0-200.0		5.1-7.3	0
Adrian	 0-7	 125.0-200.0		 5.1-7.3	I I 0
Adlian		125.0 200.0 125.0-200.0		5.1-7.3	
i		125.0-200.0		5.1-7.3	
ĺ	35-80	1.0-3.0		6.1-8.4	0-25
000016		! :			l
202016:	0 5	3060	1 0 4 0		l ^
Spinks	0-5 5-10	3.0-6.0 1.0-3.0	1.0-4.0 0.8-2.0	5.1-7.3 5.1-7.3	
		1.0-3.0		5.1-7.3	
i	17-62	1.0-3.0		5.1-7.3	
i	62-72	1.0-3.0	0.8-2.0	5.1-7.3	
I	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20
					l

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	exchange capacity 	exchange capacity	reaction	Calcium carbon- ate
	<u>In</u>	meq/100 g	meq/100 g	рн	Pct
202016: Tekenink, sandy	 	 	 	 	
substratum	0-8	5.0-15.0	•	5.1-7.3	0
	8-16	5.0-10.0			0
· ·	16-21 21-49	5.0-10.0 3.0-10.0		5.1-7.3 5.1-7.3	
İ		5.0-15.0		5.1-7.8	•
		1.0-3.0		7.4-8.4	
	72-80 	1.0-3.0	 	7.4-8.4 	10-25
631170: Fogg	 0-2	 3.0-6.0	 2.0-4.0	' 4.5-6.0	, 0
- 33	2-7	1.0-3.0	•	4.5-6.0	•
				4.5-6.0	
		2.0-4.0 2.0-4.0		4.5-6.0 4.5-6.0	
i		•	•	5.6-7.3	
		3.0-10.0	•	5.6-7.3	
		5.0-15.0 1.0-3.0	•	5.6-7.3 5.6-7.3	
Benzonia	l I 0-5	 	 2.0-4.0	İ	 0
Benzonia	5-11		•	4.5-5.5	•
	11-15			5.1-5.5	
	15-20 20-27	 2.0-4.0	•	5.1-5.5 5.1-6.0	
İ	27-35	2.0-4.0	•	5.1-6.0	
	35-80	1.0-3.0		5.6-6.0	. 0
631171:				 	
Fogg	0-2 2-7	3.0-6.0 1.0-3.0	•	4.5-6.0 4.5-6.0	0 0
		2.0-6.0		4.5-6.0	•
	_	2.0-4.0		4.5-6.0	
		•		4.5-6.0 5.6-7.3	
İ	43-48	3.0-10.0	•	5.6-7.3	
		5.0-15.0	•	5.6-7.3	•
	55-80 	1.0-3.0 	 	5.6-7.3 	0
Benzonia	0-5		2.0-4.0		0
	5-11 11-15	 	0.8-2.0 2.0-4.0	4.5-5.5 5.1-5.5	0 0
	15-20			5.1-5.5	
	20-27	2.0-4.0		5.1-6.0	
	27-35 35-80	2.0-4.0 1.0-3.0	1.0-3.0 	5.1-6.0 5.6-6.0	0 0
	33 00	l 1.0 3.0		3.0 0.0 	l o
631172:	1	1	1		I
Fogg	0-2 2-7	3.0-6.0 1.0-3.0	•		0 0
	7-13	2.0-6.0		4.5-6.0	
· · · · · · · · · · · · · · · · · · ·	13-21	2.0-4.0		4.5-6.0	
· · · · · · · · · · · · · · · · · · ·	21-34 34-43	2.0-4.0 3.0-10.0		4.5-6.0 5.6-7.3	
	43-48	3.0-10.0		5.6-7.3	
	48-55	5.0-15.0	•	5.6-7.3	
			 	5.6-7.3 	l 0 I
		•			-

Table 18.—Chemical Soil Properties—Continued

					<u> </u>
Map unit symbol and soil name	 Depth 	Cation- exchange capacity 		reaction	 Calcium carbon- ate
	In	meq/100 g	meq/100 g	рн	Pct
		! :	ļ	<u> </u>	<u> </u>
631172: Benzonia	l I 0-5	l 	l l 2.0-4.0	 4.5-5.5	I I 0
Benzonia	0-5 5-11	l	•	4.5-5.5	•
	11-15	•	•	5.1-5.5	•
	15-20	i	2.0-4.0	5.1-5.5	0
		•	•	5.1-6.0	•
	27-35 35-80	2.0-4.0 1.0-3.0	1.0-3.0 	5.1-6.0 5.6-6.0	•
	33 00 	l 1.0 3.0	! 	3.0 0.0 	l o
631173:	İ	i	i	i	i İ
Fogg	0-2	•	•	4.5-6.0	•
		•	•	4.5-6.0	•
	•	•	•	4.5-6.0 4.5-6.0	•
		•	•	4.5-6.0	•
	•	•	•	5.6-7.3	•
		•		5.6-7.3	
		•	 	5.6-7.3 5.6-7.3	•
	33-80 	l 1.0-3.0	 	3.6-7.3 	I 0
Benzonia	0-5		2.0-4.0	4.5-5.5	0
	5-11	l		4.5-5.5	•
	11-15	•	•	5.1-5.5	•
		•	•	5.1-5.5 5.1-6.0	•
	27-35	2.0-4.0	•	5.1-6.0	•
	35-80	1.0-3.0	i	5.6-6.0	0
631174:		<u> </u>	<u> </u>	l	<u> </u>
Fogg	I I 0-2	ı I 3.0-6.0	1 2.0-4.0	I I 4.5-6.0	I I 0
		•	•	4.5-6.0	•
	7-13	2.0-6.0	2.0-4.0	4.5-6.0	0
		•	•	4.5-6.0	•
		•	•	4.5-6.0 5.6-7.3	•
		•	•	5.6-7.3	•
	48-55	5.0-15.0		5.6-7.3	•
	55-80	1.0-3.0	!	5.6-7.3	0
Benzonia	l I 0-5	I I	l l 2.0-4.0	 4.5-5.5	I I 0
	5-11		•	4.5-5.5	
	11-15		2.0-4.0	5.1-5.5	0
		•		5.1-5.5	
	20-27 27-35	2.0-4.0 2.0-4.0	1.0-3.0 1.0-3.0	5.1-6.0 5.1-6.0	
	35-80	1.0-3.0	1.0 3.0 	5.6-6.0	
	l	I	I	l	I
680939:	1	l	!		1
Fern	0-9 9-10	3.0-6.0 1.0-3.0	 	5.6-7.3 5.6-7.3	
	10-24			5.6-7.3	
	24-29		i	5.6-7.3	
	29-42			6.1-7.8	
	42-50 50-80	3.0-10.0 3.0-10.0		6.1-8.4 6.1-8.4	
	50 00	, 3.0 10.0 I	İ	, 0.1 0. 1	, 0 30 I

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation- exchange capacity		reaction	 Calcium carbon- ate
	In	meq/100 g	meg/100 g	pH	Pct
	_	, <u></u>	, <u>1,</u>	<u> </u>	
680939:		l			l
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
		•	0.8-2.0	5.1-7.3	•
		•	0.8-2.0 0.8-2.0	5.1-7.3 5.1-7.3	•
		•	0.8-2.0	5.1-7.3	•
i	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20
		l	l I		l
680943:	0.0	1		1 2 5 6 0	1
Milnichol	0-2 2-12	2.0-6.0 1.0-3.0	2.0-4.0 0.8-2.0	3.5-6.0 3.5-6.0	'
		•		4.5-6.0	
i	15-25	2.0-4.0	1.0-3.0	4.5-6.0	0
I	25-33	•	0.8-3.0	4.5-6.0	•
			<u></u>	5.6-7.3	•
			 	6.6-8.4 6.6-8.4	
	68-80	•	 	6.6-8.4 6.6-8.4	
j		l 3.0 13.0		0.0 0.1	, 0 30 I
680945:		l			İ
Fern	0-9	3.0-6.0		5.6-7.3	
		•		5.6-7.3	•
			 	5.6-7.3 5.6-7.3	•
				6.1-7.8	•
i	42-50	•		6.1-8.4	
I	50-80	3.0-10.0		6.1-8.4	0-30
500045		 -			
680946: Fern	0-9	I I 3.0-6.0	l	 5.6-7.3	I I 0
rem		•		5.6-7.3	•
i		•	i	5.6-7.3	•
I	-			5.6-7.3	•
		•	<u></u>	6.1-7.8	
	42-50 50-80	3.0-10.0 3.0-10.0		6.1-8.4 6.1-8.4	
	30 00	3.0 10.0 		0.1 0.4	l 0 30
680971:		İ	İ	İ	İ
Nessen	0-4	3.0-6.0	2.0-4.0	5.1-6.0	0
	4-11	1.0-3.0	0.8-2.0	5.1-6.0	
	11-15 15-24	2.0-6.0 2.0-4.0	1.0-4.0 1.0-3.0	5.1-6.0 5.1-6.0	Ι 0 Ι 0
		•	•	5.1-6.0	
	39-44	1.0-3.0	0.8-2.0	5.1-6.0	
İ	44-80		i	7.4-8.4	
Walana (1		1 4 5 6 6	l
Kaleva	0-3 3-9	3.0-6.0 1.0-3.0		4.5-6.0	
	9-11			4.5-6.0 4.5-6.0	
	11-16	2.0-4.0	1.0-3.0	5.1-6.5	
	16-21	2.0-4.0	1.0-3.0	5.1-6.5	
	21-70	1.0-3.0	0.8-2.0	5.1-6.5	
		1.0-3.0	0.8-2.0	5.1-6.5	0
	16-21 21-70 70-80	2.0-4.0	1.0-3.0	5.1-6.5	

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	 Depth 	 Cation- exchange capacity 		reaction	 Calcium carbon- ate
	In	meq/100 g		pH	Pct
	_	ı ———		. —	
680972:	l			!	
Nessen	0-4	3.0-6.0		5.1-6.0	
		•	0.8-2.0 1.0-4.0	5.1-6.0 5.1-6.0	
			•	5.1-6.0	•
		•		5.1-6.0	
	39-44	1.0-3.0	0.8-2.0	5.1-6.0	I 0
	44-80	1.0-3.0		7.4-8.4	10-25
W-1	0.2	1 2060		1 4 5 6 0	1
Kaleva		•		4.5-6.0 4.5-6.0	
				4.5-6.0	
				5.1-6.5	
	16-21	2.0-4.0	1.0-3.0	5.1-6.5	J 0
	21-70	•		5.1-6.5	
	70-80	1.0-3.0	0.8-2.0	5.1-6.5	. 0
680973:	l I	 		l I	
Nessen	0-4	3.0-6.0	2.0-4.0	, 5.1-6.0	, I 0
	4-11			5.1-6.0	•
	11-15	2.0-6.0	1.0-4.0	5.1-6.0	0
		•		5.1-6.0	
		•		5.1-6.0	
	39-44 44-80	•	0.8-2.0 	5.1-6.0 7.4-8.4	•
	44 00	l 1.0 3.0		7.4 0.4 	10 25
Kaleva	0-3	3.0-6.0	2.0-4.0	4.5-6.0	0
	3-9	1.0-3.0	0.8-2.0	4.5-6.0	0
		•		4.5-6.0	
		•		5.1-6.5	
	16-21 21-70	•		5.1-6.5 5.1-6.5	
	70-80	1.0-3.0	0.8-2.0	5.1-6.5	
	İ	İ	İ	İ	I
680974:	l .	l	l	l	Ι
Nessen	0-4	3.0-6.0		5.1-6.0	
		•	0.8-2.0 1.0-4.0	5.1-6.0 5.1-6.0	•
	15-24	2.0-6.0 2.0-4.0		5.1-6.0	
	24-39	2.0-4.0		5.1-6.0	
	39-44	1.0-3.0	0.8-2.0	5.1-6.0	0
	44-80	1.0-3.0		7.4-8.4	10-25
V-1	l l 0-3	1 2060	2040	 4 E 6 0	l I 0
Kaleva	0-3 3-9	3.0-6.0 1.0-3.0		4.5-6.0 4.5-6.0	
	9-11	2.0-6.0		4.5-6.0	•
	11-16	2.0-4.0		5.1-6.5	
	16-21	2.0-4.0		5.1-6.5	
	21-70	1.0-3.0	0.8-2.0	5.1-6.5	
	70-80 	1.0-3.0	0.8-2.0	5.1-6.5 	0
893251:	! 	! 	 	! 	!
Boyer	0-3	3.0-8.0		 5.6-8.4	, 0
-	3-4	1.0-6.0	l i	5.6-8.4	
	4-14			5.6-8.4	
	14-30	4.0-20.0		5.6-8.4	•
	30-45	1.0-3.0		7.9-8.4	
	45-80 	•	 	7.9-8.4 	10-25
	1	ı	1	ı	1

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	 Depth 	Cation- exchange capacity		reaction	 Calcium carbon- ate
	In	meq/100 g	meq/100 g	pH	Pct
	_	. — <u> </u>	, ;	<u>-</u>	· —
893251:	l	l	I		l
Shavenaugh	0-5	3.0-6.0		5.6-7.3	J 0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16 16-28	1.0-3.0	 	6.6-7.8 6.6-7.8	•
	10-26 28-34	1.0-3.0 1.0-3.0	 	6.6-7.8	•
	34-44	1.0-3.0		6.6-7.8	•
	44-80	1.0-3.0	i i	7.4-8.4	10-25
	l	l	l I		l
894062:				!	
Remus	0-9 9-15	5.0-15.0 5.0-15.0	•	5.1-7.3 5.1-7.3	I 0 I 0
	9-15	1.0-15.0	•	5.1-7.3	•
	24-35	1.0-15.0	•	5.1-7.3	•
	35-66	5.0-20.0	•	5.1-7.3	0
	66-80	5.0-15.0		7.4-8.4	10-30
				!	
Spinks				5.1-7.3	•
	5-10 10-17	1.0-3.0 1.0-3.0		5.1-7.3 5.1-7.3	
	17-62			5.1-7.3	•
	62-72	1.0-3.0	•	5.1-7.3	•
	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20
		l			
894063:	0 0		20100		1
Remus	0-9 9-15	5.0-15.0 5.0-15.0			I 0 I 0
	15-24	1.0-15.0	•		1 0
		1.0-15.0	•	5.1-7.3	•
	35-66	5.0-20.0	3.0-15.0	5.1-7.3	0
	66-80	5.0-15.0		7.4-8.4	10-30
On in land	. ^ -	1 2060	1040		1
Spinks	0-5 5-10	3.0-6.0 1.0-3.0	1.0-4.0 0.8-2.0	5.1-7.3 5.1-7.3	I 0 I 0
	10-17	•		5.1-7.3	•
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	•
	62-72	1.0-3.0	0.8-2.0	5.1-7.3	0
	72-80	1.0-3.0	0.8-2.0	5.1-8.4	0-20
894064:					
Fern	I I 0-9	ı I 3.0-6.0	l	 5.6-7.3	I I 0
rem	9-10	1.0-3.0		5.6-7.3	•
	10-24			5.6-7.3	•
	24-29	3.0-20.0		5.6-7.3	0
	29-42	4.0-20.0		6.1-7.8	•
	42-50	3.0-10.0		6.1-8.4	•
	50-80 	3.0-10.0	 	6.1-8.4	0-30
Remus	 0-9	ı 5.0−15.0	 3.0-10.0	 5.1-7.3	I 0
	9-15	5.0-15.0		5.1-7.3	
	15-24	1.0-15.0		5.1-7.3	0
	24-35	1.0-15.0		5.1-7.3	
	35-66	5.0-20.0		5.1-7.3	
	66-80	5.0-15.0		7.4-8.4	
	l	I		I	l

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation- exchange capacity	exchange	reaction	Calcium carbon- ate
	In	 meg/100 g	capacity meg/100 g	рН	l Pct
		l med/100 g	l med/100 g	<u> </u>	1
894065:		i İ	i i	i	İ
Fern	0-9	3.0-6.0		5.6-7.3	0
		1.0-3.0	!	5.6-7.3	
	10-24 24-29	•	 	5.6-7.3 5.6-7.3	
		•		6.1-7.8	
i	42-50	3.0-10.0	i i	6.1-8.4	
1	50-80	3.0-10.0	I I	6.1-8.4	0-30
Domina	 0-9	 5.0-15.0	20100	 5.1-7.3	l I 0
Remus		5.0-15.0 5.0-15.0	•	5.1-7.3 5.1-7.3	
		1.0-15.0	•	5.1-7.3	
i	24-35	1.0-15.0	3.0-10.0	5.1-7.3	0
	35-66	5.0-20.0		5.1-7.3	0
	66-80	5.0-15.0	ļ	7.4-8.4	10-30
894104:]]
Mollineaux	0-6	3.0-6.0		5.6-7.3	0
i	6-9	1.0-3.0		5.6-7.3	0
1				5.6-6.0	
	15-27		!	5.6-6.5	
	27-38 38-64	•	 	5.6-7.3 5.6-7.3	
	64-80	1 1.0-3.0		5.6-7.3	0
i		İ	i i	i i	
894104:		!			
Remus	0-9	5.0-15.0			0
	9-15 15-24	5.0-15.0 1.0-15.0	•	5.1-7.3 5.1-7.3) 0 I 0
	24-35	1.0-15.0	•	5.1-7.3	'
i	35-66	5.0-20.0	3.0-15.0	5.1-7.3	0
1	66-80	5.0-15.0		7.4-8.4	10-30
894105:		 			1
Mollineaux	0-6	ı I 3.0-6.0	 	 5.6-7.3) 0
	6-9	1.0-3.0		5.6-7.3	'
	9-15	2.0-4.0		5.6-6.0	0
	15-27	•		5.6-6.5	
	27-38			5.6-7.3	
	38-64 64-80	5.0-20.0 1.0-3.0	 	5.6-7.3 5.6-7.3	
i			i		
Remus		5.0-15.0		5.1-7.3	
		5.0-15.0		5.1-7.3	
· · · · · · · · · · · · · · · · · · ·	15-24 24-35	1.0-15.0 1.0-15.0		5.1-7.3	
	35-66	5.0-20.0	•	5.1-7.3	
i	66-80	5.0-15.0		7.4-8.4	
004165		l :	! :		
894165:	0_5	1 30.60	1 0.40		l
Spinks	0-5 5-10	3.0-6.0 1.0-3.0		5.1-7.3 5.1-7.3	
	10-17			5.1-7.3	
· · · · · · · · · · · · · · · · · · ·	17-62			5.1-7.3	
	62-72	1.0-3.0	0.8-2.0	5.1-7.3	0
l	72-80		0.8-2.0	5.1-7.3	

Table 18.—Chemical Soil Properties—Continued

				<u> </u>	 I
Map unit symbol and soil name	Depth	exchange capacity 	exchange capacity	reaction	ate
	I In	meq/100 g	meq/100 g	PH PH	Pct
894165:]] 	l
Tekenink, sandy	İ	j i	İ	i	I
substratum	0-8 8-16	5.0-15.0 5.0-10.0	3.0-10.0 0.8-3.0	5.1-7.3 5.1-7.3	0 0
	16-21	5.0-10.0	·	5.1-7.3	•
	21-49	3.0-10.0		5.1-7.3	0
	49-62 62-72	5.0-15.0 1.0-3.0	3.0-10.0	5.1-7.8 7.4-8.4	0-25 10-25
	72-80	1.0-3.0		7.4-8.4	•
899682:	 			1	
Kaleva	 0-3	 3.0-6.0	2.0-4.0	 4.5-6.0	I I 0
	3-9	1.0-3.0		4.5-6.0	•
	9-11 11-16	2.0-6.0 2.0-4.0	1.0-4.0 1.0-3.0	4.5-6.0 5.1-6.5	•
	16-21	2.0-4.0		5.1-6.5	•
	21-70 70-80	1.0-3.0 1.0-3.0	0.8-2.0 0.8-2.0	5.1-6.5 5.1-6.5	•
	70-80 	1.0-3.0 	0.8-2.0	5.1-6.5	0
899722:					l
Goodharbor	0-1 1-3	3.0-6.0 1.0-3.0	2.0-4.0 0.8-2.0	5.1-7.3 5.1-7.3	I 0 I 0
	3-23	1.0-3.0		7.4-8.4	10-25
	23-40 40-80	1.0-3.0 1.0-3.0		7.4-8.4 7.4-8.4	10-25 10-25
	40 00	1.0 3.0 		7.4 0.4	10 25
899731:	l . 0 1	3060	1 0 4 0		l 0
Covert	0-1 1-8	3.0-6.0 1.0-3.0	' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' ' '	4.5-7.3 4.5-7.3	0 0
	8-18	2.0-4.0	1.0-3.0	4.5-6.0	•
	18-25 25-29	2.0-4.0 2.0-3.0	1.0-3.0 0.8-3.0	4.5-7.3 4.5-7.3	•
	29-38	1.0-3.0	·	5.1-8.4	•
	38-47	1.0-3.0	0.8-2.0	5.1-8.4	0-25
	47-80 	1.0-3.0 	0.8-2.0	5.1-8.4 	0-25
Pipestone	0-2	2.0-6.0	1.0-4.0	3.5-7.3	•
	2-9 9-12	1.0-3.0 2.0-6.0	0.8-2.0 1.0-4.0	3.5-7.3 3.5-6.0	0 0
	12-24	2.0-4.0		4.5-6.0	
	24-32 32-80	1.0-3.0 1.0-3.0	' :::: : : : '	4.5-7.3 4.5-7.3	•
	32-80 	1.0-3.0 	0.8-2.0	4.5-7.5 	l O
899733:	1 0 1		1 0 4 0		l o
Covert	0-1 1-8	3.0-6.0 1.0-3.0	1.0-4.0 0.8-2.0	4.5-7.3 4.5-7.3	
	8-18	2.0-4.0		4.5-6.0	0
	18-25 25-29	2.0-4.0 2.0-3.0		4.5-7.3 4.5-7.3	
		1.0-3.0		5.1-8.4	
	38-47	1.0-3.0		5.1-8.4	
	47-80 	1.0-3.0 	0.8-2.0	5.1-8.4 	0-25
Dair		125.0-140.0		5.6-7.3	0
		20.0-45.0 1.0-3.0	 	6.1-7.3 6.6-7.8	
		1.0-3.0		6.6-7.8	
	21-50	1.0-3.0 1.0-3.0		6.6-7.8	
	50-80 	1.0-3.0 		6.6-7.8 	0

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Table 18.—Chemical Soil Properties—Continued

		ī		ī		ī		ī	
Map unit symbol	Depth	1	Cation-	1	Effective	Ι	Soil	I C	alcium
and soil name		-	exchange	1	cation-	1	reaction	l c	arbon-
		-	capacity	1	exchange	1		1	ate
		-		1	capacity	1			
	In	T	meq/100 g	T	meq/100 g	T	pН	ī	Pct
899734:		-		1		1		1	
Benzonia	0-5	-		-	2.0-4.0	1	4.5-5.5	1	0
	5-11	-		-	0.8-2.0	1	4.5-5.5	1	0
	11-15	-		1	2.0-4.0	1	5.1-5.5	1	0
	15-20	-		1	2.0-4.0	1	5.1-5.5	1	0
	20-27	-	2.0-4.0	1	1.0-3.0	1	5.1-6.0	1	0
	27-35	-	2.0-4.0	1	1.0-3.0	1	5.1-6.0	1	0
	35-80	-	1.0-3.0	1		1	5.6-6.0	1	0
		-		1		1		1	

Table 19.-Water Features

(See text for definitions of terms used in this table. Estimates of the frequency of ponding and flooding apply to the whole year rather than to individual months. Absence of an entry indicates that the feature is not a concern or that data were not estimated)

	I	1	·	table	1	Ponding	1	Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	1	limit	limit	water	I	1		1
	group	1	1		depth	I	1		1
	l	1	Ft	Ft	Ft		I		ı
	I	I				I	1		1
.90775:	I	1	1		1 1	I	1		1
Adrian	A/D	1	1		1 1	I	1		1
	l	January	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	l	February	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	l	March	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	l	April	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	I	May	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	I	November	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	I	December	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	İ	İ	İ		i i	i	- i		İ
Houghton	A/D	İ	İ		i i	i	į		İ
-	İ	January	0.0	>6.0	10.0-1.01	Very long	Frequent		None
		February	0.0			Very long	-		None
		March	0.0			Very long	_		None
	•	April	0.0			Very long	-		None
		May	0.0			Very long	-		l None
		September				Very long			None
	•	October	0.0			Very long	_		None
	•	November	0.0			Very long	-		None
	•	December	0.0			Very long	-		None
	! !	December	1 0.0	, , , , ,	10.0 1.01	very rong	rrequenc		None
90777:	! !	1	1) 	; ;	i	;		<u> </u>
Alcona	l IB	i I	i	! 	; ;	i	i		i
AICONA	•	 January	4.3	4.5	: :	I	None I		None
		February	1 4.3	4.5	' '	'	None		None
	•	March	1 4.3	4.5			None		None
	•	•	4.3	4.5					•
		April	•				None		None
	•	May	4.3	4.5	' '	'	None		None
	•	September	•	4.5		!	None		None
	•	October	4.3	4.5	' '	!	None		None
	•	November	4.3	4.5	! !	!	None		None
	!	December	4.3	4.5	! !	!	None		None
	! _	1	!		!!!	!	!		!
Richter	l B	!	1		!!!	!			
		January	1.0	>6.0	! !	!	None		None
		February	1.0	>6.0		!	None		None
	•	March	1.0	>6.0			None		None
		April	1.0	>6.0			None		None
		May	1.0	>6.0			None		None
	I	November	1.0	>6.0			None		None
			1.0	>6.0					

Table 19.-Water Features-Continued

	I	I	Water	table	1	Ponding	l	Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	1	limit	limit	water		1		1
	group	1		<u> </u>	depth		1		1
		1	Ft	Ft	Ft		I I		1
	1	1	ı —	ı —	1 — 1		1 1		1
L90778:	1	1	l	l	1 1		1 1		1
Alcona	l B	1		l	1 1		1 1		1
		January	4.3	4.5			None		None
		February	4.3	4.5			None		None
		March	4.3	4.5			None		None
		April	4.3	4.5			None		None
		May	4.3	4.5			None		None
		September	4.3	4.5			None		None
		October	4.3	4.5			None		None
		November	4.3	4.5			None		None
		December	4.3	4.5			None		None
		1		l	1 1		1 1		1
Richter	l B	1		l	1 1		1 1		1
		January	1.0	>6.0			None		None
	I	February	1.0	>6.0			None		None
	I	March	1.0	>6.0			None		None
	I	April	1.0	>6.0			None		None
	I	May	1.0	>6.0			None		None
	I	November	1.0	>6.0			None		None
	I	December	1.0	>6.0			None		None
	I	I	I	l	1 1		1 1		1
190779:	İ	İ	l	l	i i		i i		İ
Alpena	I A	i	i	i	i i		i i		i
•	i	Jan-Dec			i i		None		None
	i	i	i	i	i i		i i		i
190780:	i	i	i	i	i i		i i		i
Au Gres	В	i	i	i	i i		i i		i
	•	January	1.0	>6.0	i i		None		None
		February	1.0	>6.0	i i		l None l		l None
		March	1.0	>6.0	i i		None		None
		April	1.0	>6.0	i i		None		l None
		May	1.0	>6.0	i i		None		None
		November	1.0	>6.0	i i		None		None
	•	December	1.0	>6.0	i i		None		None
	i	1		1	i i		i i		i
Kalkaska	I A	i	i	i	i i		i i		i
	•	 Jan-Dec		. –––	i i		None		None
	i	1	i	i	i i		i i		i
190781:	i	i	İ	i I	i i		i i		i
Bach	В/D	i	İ	i I	i i		i i		i
		January	0.0	>6.0	0.0-1.0	Long	Frequent		None
		February	0.0		10.0-1.01	Long	Frequent		None
		March	0.0		0.0-1.0	Long	Frequent		None
					0.0-1.0		Frequent		None
	I .	lApril	1 0.0						
		April Mav	0.0 0.0			-	•		•
	İ	May	0.0	>6.0	0.0-1.0	Long	Frequent		None
	 	· -		>6.0 >6.0		-	•		•

Table 19.-Water Features-Continued

	ī		Water	table	Ī	Ponding		Floodi	ng
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequency
and soil name	logic	1	limit	limit	water	I	I - I		1
	group	1	I	I	depth	I	1 1		I
	Ī	Ī	Ft	Ft	Ft	l I	l I		ī
	I	I	_		_	I	1 1		I
190782:	1	1	I	l	1	I	I I		I
Deer Park	A	1	I	I	1	I	l 1		1
	1	Jan-Dec					None		None
444-44	!	!	1	ļ	!	!	!!!		!
190783:	! -		!	!	!	!	!!!		!
Deer Park		 Jan-Dec	!	 -	!	l I	None		 None
	!	Jan-Dec		ı		i	None		None
190784:	<u> </u>	i i	i	! 	i	<u>.</u>	' '		<u> </u>
Deer Park	i A	i	i	i I	i	i i	i i		i
	•	Jan-Dec	i		i		None		None
	İ	İ	i	İ	i	İ	i i		İ
Roscommon	A/D	1	I	I	1	I	1 1		I
	I	January	0.0	>6.0	10.0-1.0	Long	Frequent		None
	1	February	0.0	>6.0	10.0-1.0	Long	Frequent		None
	1	March		>6.0	10.0-1.0	Long	Frequent		None
		April			10.0-1.0	_	Frequent		None
		May	•		10.0-1.0		Frequent		None
		June	0.0		10.0-1.0		Frequent		None
		September			10.0-1.0		Frequent		None
		October	,		10.0-1.0		Frequent		None
	•	November	0.0 0.0	•	10.0-1.0		Frequent		None
	!	December	1 0.0	/0.0	10.0-1.0	Long	Frequent		None
190786.	i	! 	i	! !	1	! !	' '		<u> </u>
Dune land	i	i	i	! 	i	<u> </u>	: '		i
24	i	i	i	i I	i	i i	i i		i
190787:	İ	i	i	I	i	İ	i i		i
East Lake	A	1	I	I	1	I	1 1		I
	I	Jan-Dec					None		None
	1	I	I	l	1	l	I I		1
190788:	1	1	I	l	1	I	I I		I
East Lake	A	1	I	l	1	I	1 1		I
	!	Jan-Dec		!		!	None		None
100700	!		!	!	!	!	!!!		!
190789: East Lake	I I A		!	!	!	!	! !		!
East Lake	•	 Jan-Dec	!	!	!	l I	I None I		 None
	!	Jan-Dec		ı		i	None		None
190790:		1	1	 	1	! !	! ! ! !		1
East Lake	I A	i	i	! !	i	<u> </u>	' '		<u> </u>
	•	 Jan-Dec	· 		· 		l None l		l None
	i		i	i i	i	i	,		
190791:	i	İ	i	İ	i	i	i i		i
Eastport	A	I	I	I	1	I	ı i		I
	I	Jan-Dec					None		None
	I	I	I	I	1	I	I I		I

Table 19.-Water Features-Continued

	1	1	Water	table	<u> </u>	Ponding		Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequency
and soil name	logic	1	limit	limit	water		l l		1
	group	1		I	depth		l l		1
	ī	1	Ft	Ft	Ft		ı		1
	1	1	. — .				1		1
190792:	i	i	i i	I	i i		i i		i
Edwards	- A/D	i	i i	I	i i		i i		i
	i, -	 January	i 0.0 i	I >6.0	10.0-1.01	Long	 Frequent	Long	Frequent
	i	February	0.0	•	10.0-1.01	_	Frequent	Long	Frequent
	i	March	0.0	•	10.0-1.01	_	Frequent	Long	Frequent
	i	April	0.0	•	10.0-1.01	_	Frequent	Long	Frequent
	•	May	0.0	•	10.0-1.01	_	Frequent		None
	•	June	0.0	•	10.0-1.01	_	Frequent		l None
	•	July	0.0	•	10.0-1.01	_	Frequent		None
	•	August	0.0	•	0.0-1.0	_	Frequent		None
		September			[0.0-1.0]	_	Frequent		None
		October	0.0		[0.0-1.0]	_	Frequent		None
	•	November	0.0 1		[0.0-1.0]	_	Frequent	Long	Frequent
	;	December	0.0 1		[0.0-1.0]	Long	Frequent	Long	Frequent
	-	December	. 0.0 1	70.0	10.0-1.01	Long	Frequenc	Long	Frequenc
Marl beds	-I D	1	: :	!	: :				-
Mari beds	ם ו-	 Tops://ower	I 0.0 I	I I >6 0	1 1	War. 1 ana			 None
	!	January				Very long			None
		February	0.0			Very long			
	•	March	0.0			Very long			None
		April	0.0			Very long			None
		May	0.0			Very long			None
	•	June	0.0			Very long			None
		July	0.0	•		Very long			None
	•	August	0.0			Very long			None
	•	September		•		Very long			None
	ı	October	0.0	•		Very long			None
	ı	November	0.0			Very long			None
	I	December	0.0	>6.0	0.0-1.0	Very long			None
	I	1		I	1 1		l I		I
190794:	I	1		I	1 1		l I		I
Emmet	- B	1		l	1 1		l l		I
	I	Jan-Dec		I			None		None
	I	1		l	1 1				1
Leelanau	- A	1		l	1 1		l I		1
	1	Jan-Dec		I			None		None
	1	1		I	1 1		l l		1
190795:	1	1		l	1 1		1		1
Emmet	- B	1		l	1 1		l I		1
	1	Jan-Dec					None		None
	1	I	ı i	I	I İ		ı İ		1
					. :		. :		
Leelanau	- A	1		l			I		1
Leelanau	- A 	 Jan-Dec	 	l 			None		 None

Table 19.-Water Features-Continued

	1	l	· — — —	table	<u> </u>	Ponding		Floodi	ng
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	l	limit	limit	water		I I		1
	group	l	I	I	depth		1		I
	Ť	i	Ft	Ft	Ft		i		i i
	i	I	; ==		; == ;				i
190796:	1	! !	-	! !	: :		! !		:
Emmet	·I B	! !	!	!	: :				!
Elittle C		 Tan Dan	!	!			ı I I None I		1 27
	!	Jan-Dec			! !		None		None
Leelanau	! -	!	!	!	!!!		! !		!
Leelanau	•	 	!	 -	!!!				1 27
	!	Jan-Dec			!!		None		None
	!		1		!!!		!		!
190797:			1		!!!		!		!
Emmet	•	l	I	l	1 1				1
	1	Jan-Dec		I			None		None
	I	l	I	l	1 1		l l		I
Leelanau	- A	l	I	l	1 1		l l		1
	1	Jan-Dec					None		None
	1	l	I	l	1 1		l I		1
190799:	1	l	I	l	1 1		l I		1
Emmet	· B	l	I	l	1 1		1		I
	1	Jan-Dec			1 1		None		None
	i	İ	į.	İ	i i		i i		İ
Leelanau	·IA	i	i	i	i i		i i		i
	•	Jan-Dec	i	I	i i		None		None
	i	l	i	I	i i		i		i
190801:	i	i	i	i	i i		iii		i
Emmet	·I B	i	i	i	i i		iii		i
India C	•	 Jan-Dec			!		ı None I		l None
	1	l Dec	-	! !	: :		I NOILE I		i wome
Mancelona	 A	! !	!	!	: :				!
mancerona	•	 Tan Dan	!	!					1 27
	!	Jan-Dec			! !		None		None
10000	!	!	!	!	!!!		! !		!
190803:	! _	!	!	!	!!!		! !		!
Emmet	•	!	!	!	!!		! !		!
		Jan-Dec					None		None
	I	l	I	l	1 1		1		I
Mancelona	•	l	I	l	1 1				1
	1	Jan-Dec		I			None		None
	1	l	I	l	1 1		I I		I
L90805:	1	l	I	l	1 1		l I		1
Emmet	· B	l	I	l	1 1		I I		I
	1	Jan-Dec					None		None
	1	l	I	l	1 1		I I		I
Omena	B	I	I	l	1 1		1		I
	1	Jan-Dec	i	I	i i		None		None
	i		i				: :		i

Table 19.-Water Features-Continued

	I	I	Water	table	<u> </u>	Ponding	<u> </u>	Floodi	ng
	Hydro- logic		Upper limit	Lower limit	Surface water	Duration	Frequency 	Duration	Frequency
	group	l	1	l	depth		l l		1
	I		Ft	Ft -	Ft				1
190806:	! 	! 	1	! 					<u> </u>
Emmet	В	İ	i	i	i i		i i		i
	İ	Jan-Dec			i i		None		None
Omena	I I B	 	1	 					-
omena	•	 Jan-Dec	ļ		i i		None		None
190807:	 	 		 					
Emmet	' В	i I	i	İ	i i		i		i
	I	Jan-Dec		I			None		None
Omena	l I B						. !		!
Ollena	P	ı Jan-Dec		 			None		None
	i	İ	i	i	i i	i	i i		i
190808:	1	ļ	1	l			ļ ļ		!
Emmet	l B	 Jan-Dec		l 			 None		 None
	i İ	l Dec	İ	! 	: i		l None l		I None
Omena	I B	i İ	i	i İ	i i	i	i i		i
	!	Jan-Dec	!	!			None		None
190809:	 	l I	1	 					-
Emmet	В	i i	i	i	i i		i i		i
	I	Jan-Dec		I			None		None
Omena	l I B	l	1	<u> </u>			!		!
Omena	•	ı Jan-Dec		 			None		None
	i	İ	i	i	i i	i	i i		i
190811:		! :	1	ļ	!!!		!!		!
Hettinger	C/D	 January	1 0.0	 	 0.0-1.0	Long	 Frequent		 None
		February	0.0	•	10.0-1.01		Frequent Frequent		None
		March	0.0	•	0.0-1.0		Frequent		None
	i	 April	0.0		0.0-1.0	-	Frequent		None
	I	May	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	November	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	December	0.0	>6.0	0.0-1.0	Long	Frequent		None
Muck	 A/D	 	1	 					1
140x		। January	1 0.0	' >6.0	10.0-1.01	Very long			None
		February	0.0				Frequent		None
		March	0.0			Very long	-		None
	I	April	0.0	>6.0	10.0-1.0	Very long	Frequent		None
	I	May	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	I	June	0.0	>6.0	0.0-1.0	Very long	Frequent		None
		November	0.0				Frequent		None
	I	December	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	i	 necemmen	1	, ,0.0 		very rong	rreduenc		140.

Table 19.-Water Features-Continued

	I	I		table	<u> </u>	Ponding	<u> </u>	Flood	
<u> </u>	Hydro-		Upper	•		Duration	Frequency	Duration	Frequency
and soil name	logic	I	limit	limit	water		l I		1
	group	l	1	l	depth		l I		1
	I	I	Ft	Ft	Ft		I I		1
	I	I	1	ı —	. — .		l l		1
190812:	I	I	1	I	1 1		l l		1
Hettinger	C/D	I	1	I	1 1		l l		1
	I	January	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	February	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	March	0.0	>6.0	0.0-1.0	Long	Frequent		None
		April	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	May	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	November	0.0	>6.0	0.0-1.0	Long	Frequent		None
		December	0.0	>6.0	0.0-1.0	Long	Frequent		None
		I	1	I	1 1		l I		1
Tonkey	B/D	I	1	I	1 1		l I		1
	I	January	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	February	0.0	>6.0	0.0-1.0	Long	Frequent		None
		March	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	April	0.0		0.0-1.0	-	Frequent		None
	1	May	0.0	>6.0	0.0-1.0	Long	Frequent		None
	•	November	0.0		0.0-1.0	-	Frequent		None
	1	December	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	I	1	I	1 1		l l		1
190814:	1	I	1	I	1 1		l l		1
Kalkaska	A	I	1	I	1 1		l l		1
	I	Jan-Dec					None		None
	I	I	1	I	1 1				1
190815:	I	I	1	I	1 1				1
Kalkaska	A	I	1	I	1 1				1
	I	Jan-Dec		I			None		None
	1		!	!	!!!				1
190816:		1	1	!	!!!				1
Kalkaska	A	1	1	!	!!!				1
	!	Jan-Dec		!	!!		None		None
	!	!	!	!	!!!		!		1
190817:	! _	!	!	!	!!!		!		!
Kalkaska	l A	!	!	!	!!!				!
	!	Jan-Dec	!		! !		None		None
100010	!	!	!	!	!!!		!		!
190818:		!	!	!	!!!		!		!
Kalkaska		 	!	!	!!!				
	!	Jan-Dec					None		None
190819:	I	1	!	I					!
Kalkaska	I 7	1	1	! !					1
Naikaska	A	l Ton Don	!	I			I None '		Ness
	I	Jan-Dec	!				None		None
Foot John	l 7.	1	!	I					!
East Lake	A	I	1	I	1 1				1
	ı	Jan-Dec	1	i .	1		None		l None

Table 19.-Water Features-Continued

	I	l	·	table	<u> </u>	Ponding	<u> </u>	Floodi	
Map unit symbol and soil name	Hydro- logic group		Upper limit 		Surface water depth		Frequency 	Duration	Frequency
	Ī	I	<u>Ft</u>	Ft	Ft				<u> </u>
190820: Kiva		 Jan-Dec	 	 		 			 None
Mancelona	•	 Jan-Dec	 	 	i i I i	 	 		 None
190821: Kiva		 Jan-Dec	 	 		 			 None
Mancelona	 A	 Jan-Dec	 	 					 None
190823: Kiva	•	 Jan-Dec	 	 	 	 			 None
Mancelona	 A	 Jan-Dec	 	 	 		None		None
190824. Lake beaches	 	 		 					
190825. Lake bluffs	 	 	 	 					!
190826: Leelanau	•	 Jan-Dec	 	 	 				 None
East Lake		 Jan-Dec 	 	 		 	 None 		 None
190827: Leelanau	•	 Jan-Dec	 	 			 None		 None
East Lake	•	 Jan-Dec	 	 	 				 None
190828: Leelanau	•	 Jan-Dec	 	 		 			 None
East Lake	 A 	 Jan-Dec	 	 	 	 			 None

Table 19.-Water Features-Continued

	ī	I	Water	table	Ī	Ponding	1	Floodi	.ng
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequency
and soil name	logic	I	limit	limit	water		I I		1
	group	I	I	I	depth		I I		1
	ī	I	Ft	Ft	Ft		1		ī
	I	I					1		I
190829:	I	I	I	I	1 1		1		1
Leelanau	l A	I	I	I	1 1		1		1
	I	Jan-Dec			1 1		None		None
	I	I	I	I	1 1		1		1
East Lake	l A	I	I	I	1 1		I I		1
		Jan-Dec					None		None
		I	I	I	1 1		I I		1
190830:		I	I	I	1 1		I I		1
Leelanau	l A	I	I	I	1 1		I I		1
		Jan-Dec					None		None
	I	I	I	I	1 1		1		1
East Lake	l A	I	I	I	1 1		1		1
	I	Jan-Dec			1 1		None		None
		I	I	I	1 1		I I		1
190831:		I	I	I	1 1		I I		1
Lupton	A/D	I	I	I	1 1		I I		1
		January	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
		February	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
		March	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	I	April	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	I	May	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	I	September	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	I	October	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	I	November	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	I	December	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	İ	İ	İ	İ	i i	i	i		İ
Markey	A/D	I	I	I	1 1		1		1
_	I	January	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	Ì	February	0.0	>6.0	10.0-1.0	Very long	Frequent		None
	I	March	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	I	April	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	I	May	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	I	June	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	I	November	0.0	J >6.0	0.0-1.0	Very long	Frequent		None
	I	December	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	I	I	I	I	1 1	-	I		1
190832:	I	I	I	I	I i	ı İ	İ		1
Mancelona	l A	I	I	I	1 1		1		1
	I	Jan-Dec			1 1		None		None
	I	I	I	I	I i	ı İ	İ		I
190833:	I	I	I	I	I i	ı İ	İ		1
Mancelona	l A	I	I	I	I i	ı i	İ		1
	I	Jan-Dec			I i	i	None		None
	I	I	I	I	ı i	ı i	i		I

Table 19.-Water Features-Continued

	I	I		table	<u> </u>	Ponding	<u> </u>	Flooding		
Map unit symbol and soil name	Hydro- logic group		Upper limit		Surface water depth	Duration 	Frequency 	Duration	Frequenc	
	l	<u> </u> 	 <u>Ft</u>	 <u>Ft</u>	Ft	<u> </u> 	<u> </u>		'	
190834:		 	 	 	 	 	 		 	
Mancelona	- A	 Jan-Dec	 	 		 	 None		 None	
East Lake	İ	İ	į	İ	į	İ	į		į	
East have	•	 Jan-Dec	ļ	! 			None		None	
190835:		I 		! 		 			1	
Mancelona		 Jan-Dec	 	l I	 	 	 None		 None	
East Lake	 - A	 	1	 	1	<u> </u>			1	
	į	Jan-Dec	i		i		None		None	
190836:			!						!	
Mancelona		 Jan-Dec		 			None		None	
East Lake	 - A	 	 	 	 				 	
	I	Jan-Dec 	 	l		 	None 		None	
190837: Mancelona	 - A	İ	į	İ	į	İ	į į		į	
Mandelona		 Jan-Dec	ļ				None		None	
East Lake	•	I 		! 		 			1	
	 	Jan-Dec 	 	 	 	 	None 		None	
190838: Mancelona	 - A	 	 	 	 	<u> </u>			1	
	į	Jan-Dec	i		i		None		None	
East Lake	•	 	į							
		Jan-Dec 		I		 	None 		None	
190839: Mancelona	 - A	 	 	 					1	
		Jan-Dec	i		i		None		None	
Richter	- B	 			į	 				
		January February	1.0 1.0	>6.0 >6.0		 	None None		None	
		March	1.0	>6.0	•	, I	None		None	
		April	1 1.0				None		None	
		May	1 1.0	>6.0			None		None	
		November	1.0	>6.0	•		None		None	
			1.0			i	None		None	

Table 19.-Water Features-Continued

	1	I	Water	table	<u> </u>	Ponding	_	Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	I	limit	limit	water		l I		1
	group	I	I	l	depth	l	l I		1
	ī	I	Ft	Ft	Ft	l			ī
	I	I				l	1		1
190840:	I	I	I	l	1	I	l I		1
Nester	l C	I	I	l	1	l	l I		1
	1	Jan-Dec					None		None
	1	I	I	l	1		l I		1
190841:	1	I	I	l	1	l	l I		1
Nester	l C	I	I	l	1	l	l I		I
	I	Jan-Dec			I		None		None
	1	1	1		!		<u> </u>		
190842:		!	!	<u> </u>	!		!		!
Nester	l C	!	!	<u> </u>	!				
	!	Jan-Dec			!		None		None
00043	!	!	!		!				!
190843:	1 0	!	!	 	!		!		!
Nester	l C	l Ton Don	!	 	!	l I	l None l		 None
	!	Jan-Dec					None		None
.90844:		1	1	 		l I	! !		1
Nester	i c	! !		! !		! !	, , , ,		1
Nescel		 Jan-Dec					l None I		l None
	<u> </u>	I Dec	1	! 		! !	l Mone I		I None
190846.	i	<u> </u>	i .	! 		! 	;		<u> </u>
Pits, gravel	<u> </u>	i	i	' 		i	i :		i
, g	i	i	i	' 	i	i	i		i
190847:	i	i	i	i I	i i	i	i i		i
Richter	I B	i	i	I	i i	i	i i		i
	i	January	1.0	>6.0	i i		None		None
		February	1.0	>6.0	i		None		None
		March	1.0	· >6.0	i		None		None
	İ	April	1.0	>6.0	i		None		None
	İ	May	1.0	>6.0	i		None		None
	I	November	1.0	>6.0			None		None
	I	December	1.0	>6.0			None		None
	I	I	I	l	1	l	l I		1
Alcona	l B	I	I	l	1	l	l I		1
	1	Jan-Dec					None		None
	I	I	1	l		l	l I		1
190848:	I	I	1	l	1	l	l I		1
Richter	l B	I	1	l	1	l	l I		1
		January	1.0	>6.0	I		None		None
			1.0	>6.0	I		None		None
		March	1.0	>6.0	•		None		None
		April		>6.0			None		None
		12	1.0	>6.0			None		None
	I	November	1.0	>6.0			None		None
		December	1.0	l >6.0	1	l	None		None

Table 19.-Water Features-Continued

	I	l	Water	table	<u> </u>	Ponding		Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	I	limit	limit	water	l l			1
	group	l	1 1	l	depth	l l			1
		<u> </u>	Ft	Ft	Ft				1
	i	I		<u> </u>	i — i	i	i		i
.90848:	i	i i	i i	i I	i i	i	i		i
Alcona	і в	i	i i	I	i i	i	i		i
	•	Jan-Dec	i i	i	i i	i	None		I None
	i	1	iii	i	i i	i	1		1
.90849:	i	i i	i i	' 	i i	i	i		i
Roscommon	A/D	i	i i	I	i i	i	i		i
		' January	i 0.0 i	I >6.0	10.0-1.01	Long	Frequent		l None
		February	0.0		10.0-1.01	Long	Frequent		None
	•	March	0.0		10.0-1.01		Frequent		None
	•	April	0.0		10.0-1.01		Frequent		None
		May	0.0		10.0-1.01		Frequent		None
		June	0.0		10.0-1.0	Long	Frequent		None
	•	September	1 0.0		10.0-1.01		Frequent		None
	•	October	1 0.0 1						None
	•	•			0.0-1.0	Long	Frequent		,
	•	November	0.0	•	0.0-1.0		Frequent		None
	!	December	0.0) <i>></i> 6.0	0.0-1.0	Long	Frequent		None
	! - /-	!	!!!	!	!!!	!			!
Markey	A/D	!				!	!		
		January	0.0			Very long	-		None
		February	0.0			Very long	-		None
	•	March	0.0			Very long	-		None
		April	0.0			Very long	-		None
		May	0.0			Very long	-		None
	I	June	0.0			Very long	-		None
	I	November	0.0			Very long	-		None
	I	December	0.0	>6.0	0.0-1.0	Very long	Frequent		None
	I	l	1 1	l	1 1	I			1
.90850:	I	l	1 1	l	1 1	l l	1		1
Sanilac	I C	l	1 1	l	1 1	l l			1
	I	January	1.2				None	Brief	Occasiona
	I	February	1.2	>6.0			None	Brief	Occasiona
	1	March	1.2	>6.0			None	Brief	Occasiona
	1	April	1.2	>6.0			None	Brief	Occasiona
	i	December	1.2	>6.0	i i	i	None	Brief	Occasiona
	i	İ	i i	İ	i i	i	i		i
.90851:	i	İ	i i	İ	i i	i	i		i
Tonkey	B/D	i	i i	i	i i	i	i		i
		January	i 0.0 i	l >6.0	10.0-1.01	Long	Frequent		I None
		February	0.0		10.0-1.01		Frequent		None
		March	0.0		0.0-1.0		Frequent		None
	•	April	0.0		0.0-1.0		Frequent		None
		May	0.0		10.0-1.01	Long	Frequent		None
		November	0.0	•	10.0-1.01	-	Frequent		None
	•	December	0.0	•	10.0-1.0	Long	Frequent		None
		1 pecemper	1 0.0	, /0.0	10.0 1.01	nong l	rreducur		, none

Table 19.-Water Features-Continued

	ı	I	Water	table	I	Ponding		Flooding	
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	I	limit	limit	water		l I		1
	group	I	1	l	depth		I I		1
	I		Ft	Ft	Ft		I I		
	i I	I	_		i — i		i i		i
190851:	i	i	i i	i	i i		i i		i
Munuscong	B/D	i	i i	i	i i		i i		i
		January	i 0.0	>6.0	10.0-1.01	Long	Frequent		I None
	•	February	0.0		10.0-1.01	_	Frequent		None
	•	March	0.0		0.0-1.0	_	Frequent		None
	i	April	0.0		0.0-1.0	-	Frequent		None
		May	0.0		0.0-1.0	-	Frequent		None
		November	0.0		0.0-1.0	-	Frequent		None
	i	December	0.0		0.0-1.0	Long	Frequent		None
	i	i	i i	i	i i	_	i i		i
Iosco	В	İ	İ	l	i i		i i		İ
	İ	January	1.0	>6.0	i i		None		None
	İ	February	1.0	>6.0	i i		None		None
	İ	March	1.0	>6.0	i i		None		None
	İ	April	1.0	>6.0	i i		None		None
	I	May	1.0	>6.0			None		None
	I	June	1.0	>6.0			None		None
	I	November	1.0	>6.0			None		None
	I	December	1.0	>6.0			None		None
	I	I	1		1 1		I I		1
190852:	I	I	1	l	1 1		1		1
Tonkey	B/D	I	1		1 1		I I		1
	I	January	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	February	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	March	0.0	>6.0	0.0-1.0	Long	Frequent		None
		April	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	May	0.0	>6.0	0.0-1.0	Long	Frequent		None
		November	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	December	0.0	>6.0	0.0-1.0	Long	Frequent		None
		I	1	l	1 1		I I		1
Munuscong	B/D	I	1	l	1 1		l I		1
	1	January	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	February	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	March	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	April	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	May	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	November	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	December	0.0	>6.0	[0.0-1.0]	Long	Frequent		None

Table 19.-Water Features-Continued

	I	1	_Water	table	1	Ponding		Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	1	limit	limit	water		l I		1
	group	1	I	I	depth		l l		1
	T	1	Ft	Ft	Ft		l I		T
	1	1		. —			l l		1
90852:	i	İ	İ	İ	i i		i i		İ
Iosco	- B	1	I	I	1 1		l l		1
	I	January	1.0	J >6.0			None		None
	I	February	1.0	>6.0			None		None
	1	March	1.0	>6.0			None		None
	1	April	1.0	>6.0			None		None
	1	May	1.0	>6.0			None		None
	1	June	1.0	>6.0			None		None
	1	November	1.0	>6.0			None		None
	1	December	1.0	>6.0			None		None
	1	1		I	1 1		l l		1
90853.	1	1	I	I	1 1		l l		1
Nater	1	1	1	I	1 1		l I		1
	1	1	1	I	1 1		l I		1
90854:	1	1	1	I	1 1		l I		1
Vallace	- B	1	1	I	1 1		l I		1
	I	Jan-Dec		I			None		None
	1	1	1	I	1 1		l I		1
Kalkaska	- A	1	I	I	1 1		l l		I
	I	Jan-Dec		I			None		None
	1	1	1	I	1 1		l I		1
0855:	I	1	I	I	1 1		l l		I
ind eroded land	- A	1	I	I	1 1		l l		I
	I	Jan-Dec		I			None		None
	I	1	I	I	1 1		l l		I
0856:	I	1	I	I	1 1		l l		I
ind eroded land	- A	1	I	I	1 1		l l		I
	I	Jan-Dec		I			None		None
	I	1	I	I	1 1		l l		I
3236.	I	1	I	I	1 1		l l		I
eaches	I	1	I	I	1 1		l l		I
	I	1	I	I	1 1		l l		I
3237:	I	1	I	I	1 1		l l		I
hompsonville	- A	1	I	I	1 1		l l		I
	1	January	3.0	>6.0			None		None
	1	February	2.5	>6.0			None		None
	1	March	2.0	>6.0			None		None
	I	April	1.5	>6.0			None		None
		May	3.0	J >6.0			None		None
		June	4.0	J >6.0			None		None
		July	4.5	J >6.0			None		None
		August	5.0	J >6.0			None		None
		September		J >6.0			None		None
	1	October	2.5	J >6.0			None		None
	1	November	2.5	J >6.0			None		None
	1	December	1 3.0	J >6.0	1 1		l None l		l None

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Table 19.-Water Features-Continued

	I	1	Water	table	<u> </u>	Ponding		Floodi	_ -
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequency
and soil name	logic	1	limit	limit	water		1		1
	group	1	l	l	depth		l		1
	1	1	Ft	Ft	Ft				1
	1	I	ı —	ı —	-		l I		I
193237:	1	I	I	I	1 1		l I		I
Milnichol	l B	I	I	I	1 1		l I		I
	1	January	1.5	>6.0			None		None
	1	February	1.5	>6.0			None		None
	1	March	1.0	>6.0			None		None
	1	April	1.0	J >6.0			None		None
	1	May	0.5	>6.0			None		None
	1	June	1.0	J >6.0			None		None
	1	July	2.0	J >6.0			None		None
	1	August	3.0	J >6.0			None		None
	1	September		>6.0			None		None
	1	October	2.0	>6.0			None		None
	1	November	1.0	>6.0			None		None
	1	December	1.0	>6.0			None		None
	1	I	I	I	1 1		l I		1
193255:	1	I	I	l	1 1		l I		I
Spinks	A	1	I	I	1 1		l I		I
	1	Jan-Dec					None		None
	1	I	I	l	1 1		l I		I
Coloma	A	I	I	I	1 1		l I		1
	1	Jan-Dec					None		None
	1	1	I	I	1 1		l I		I
193256:	1	1	I	I	1 1		l I		I
Spinks	A	1	I	I	1 1		l I		I
	1	Jan-Dec					None		None
	1	1	I	I	1 1		l I		I
Coloma	A	1	I	I	1 1		l I		I
	1	Jan-Dec					None		None
	1	I	I	I	1 1		l I		I
193257:	1	1	I	I	1 1		l l		I
Spinks	A	1	I	I	1 1		l l		I
	1	Jan-Dec					None		None
	I	1	I	I	1 1		l l		I
Coloma	A	1	I	I	1 1		l l		I
	1	Jan-Dec	I				None		None
	1	1	I	I	1 1		l l		I
193258:	1	1	I	I	1 1		l l		I
Spinks	A	1	I	I	1 1		l l		I
	1	Jan-Dec	I				None		None
	1	1	I	I	1 1		l l		I
Coloma	A	1	I	I	1 1		l l		I
	1	Jan-Dec	·				None		None
	!	1	1	!	ļ l		! I		!
193260:	1	!	1	I	<u> </u>		! I		!
Copemish	A	!	1	I	! !		ļ		ļ
	1	Jan-Dec	·	I	!		None		None
	I	I	I	I	1		I I		I

Table 19.-Water Features-Continued

	I	1	'	table	<u> </u>	Ponding		Floodi	
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	1	limit	limit	water		l l		1
	group	1	I	I	depth		l l		1
	ī	1	Ft	Ft	Ft		l l		1
	I	1		. —			1 1		1
193262:	i	İ	İ	İ	i i		i i		i
Kaleva	A	1	I	I	1 1		1		1
	1	Jan-Dec					None		None
	1	1	I	1	1 1		l I		1
193263:	1	1	I	I	1 1		1		1
Kaleva	A	1	I	I	1 1		1		1
	1	Jan-Dec					None		None
	1	1	I	I	1 1		1 1		1
193265:	1	1	I	I	1 1		l I		1
Grattan	A	1	I	I	1 1		l I		1
	1	Jan-Dec					None		None
	1	1	I	I	1 1		l I		1
193266:	1	1	I	I	1 1		I I		1
Grattan	A	1	I	I	1 1		1		1
	1	Jan-Dec		I			None		None
	!	1	!	!	!!!		!!!		!
193267:	! -	1	!	!	!!!		!!!		!
Grattan	A	!	!	!	!!!				
	!	Jan-Dec			!!		None		None
193269:	!	1	!	!	!!!		! !		!
193209: Grattan	I A	1	!	! !	; ;				1
Gractan	1 4	 Jan-Dec		! !			None		None
	1	I Dec	i	1	; ;		I NOILE I		I None
193270:	;	1	i	! !	; ;		: :		;
Covert	i A	i	i	i	i i		ii		i
33.323	•	January	3.0	, >6.0	i i		I None I		None
		February		>6.0	i i		l None l		None
		March	2.5	>6.0			l None l		None
	•	April	2.5	•			l None I		None
		May	2.0	· >6.0	i i		None		None
		June	4.0				None		None
	•	July	4.5) >6.0	i i		None		None
		August	5.0	>6.0	i i		None		None
		September	4.0	>6.0	i i		None		None
		October	3.0	>6.0	i i		None		None
	1	November	2.5	>6.0	i i		None		None
	1	December	3.0	>6.0	i i		None		None
	1	1	1	1	1 i		ı i		1

Table 19.-Water Features-Continued

		1	Water	table	1	Ponding	1	Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequency
and soil name	logic	1	limit	limit	water		1 1		1
	group	1	I	I	depth		1		1
	Ī	I	Ft	Ft	Ft		l I		T
	1	1			. — .		1		1
193271:	1	1	I	I	1 1		I I		1
Pipestone	B	1	I	I	1 1		I I		1
	1	January	1.5	J >6.0			None		None
	1	February	1.5	J >6.0			None		None
	1	March	1.0	>6.0			None		None
	1	April	0.5	>6.0			None		None
	1	May	0.5	J >6.0			None		None
	1	June	1.0	J >6.0			None		None
	I	July	2.0	J >6.0			None		None
	I	August	3.0	J >6.0			None		None
	1	September	3.0	J >6.0			None		None
	1	October	2.5	J >6.0			None		None
	1	November	1.0	J >6.0			None		None
	1	December	1.0	J >6.0			None		None
	1	1	I	I	1 1		1 1		1
193272:	İ	İ	İ	İ	i i		i i		İ
Dair	A/D	İ	į.	İ	i i		i i		İ
	İ	January	0.0	>6.0	i i		None		None
	i	February	0.0	>6.0	i i		None		None
	i	March	0.0	•	10.0-1.0	Long	Frequent		None
	i	April	0.0		10.0-1.0		Frequent		None
	i	May	i 0.0		10.0-1.01	-	Frequent		l None
	i	June	0.0	>6.0			None		None
	i	July	0.5	>6.0	i i		None		None
	i	August	1.0	>6.0	i i		None		None
	i	September	•	>6.0			l None l		l None
	i	October	0.0	•	0.0-1.0	Long	Frequent		l None
	i	November	0.0		10.0-1.0	-	Frequent		l None
	i	December	0.0	>6.0			None		l None
	i	I	1	1	; ;		1 10110 1		1
193277:	;	i	i	;	; ;		; ;		i
Benona	·IA	! 	;	:	; ;		;		<u> </u>
Deliona	1 44	 Jan-Dec			: :		l None l		None
	i	I Dec		! !	; ;		I NOME I		I Hone
193278:		1	1	' 	; ;		·		1
Benona	 A	1		! !	: :		! !		<u> </u>
Bellolla	1 🙃	 Jan-Dec		! !			ı I I None I		l None
	1	logii-nec			!	- 	I MOHE		I NOHE
193279:	1	1	-	! !	; !				1
	I I 3	1	1	I I	!!!		! !		1
Benona	A A	I Ton Don	!	! !			l None '		1 27
	1	Jan-Dec					None		None
	1	1	1	1			1		

Table 19.-Water Features-Continued

Map unit symbol									
	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	I	limit	limit	water		l l		1
	group	I	I		depth		l l		1
	ī	ı	Ft	Ft	Ft		I I		ī
	1	I					1 1		1
193284:	i	İ	i	İ	i i		i i		i
Udorthents	- B	I	I	l	1 1		1		1
	1	Jan-Dec					None		None
	1	I	I		1 1		l l		1
Udipsamments	- A	I	I		1 1		l l		1
	1	Jan-Dec					None		None
	1	I	I	l	1 1		l I		1
193285:	1	I	I	l	1 1		l l		1
Lumley	- A/D	I	I		1 1		l l		1
	I	January	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	February	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	March	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	April	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	May	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	June	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	July	0.5	>6.0			None		None
	1	August	0.5	>6.0			None		None
	1	September	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	October	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	November	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	December	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	I	I	l	1 1		I - I		1
Makinen	- A/D	I	I	l	1 1		1		1
	1	January	0.0	>6.0	0.0-1.0	Long	Frequent		None
	i	February	0.0	>6.0	0.0-1.0	Long	Frequent		None
	i	March	0.0	>6.0	0.0-1.0	Long	Frequent		None
	i	April	0.0	>6.0	0.0-1.0	Long	Frequent		None
	i	May	0.0	>6.0	0.0-1.0	Long	Frequent		None
	i	June	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	July	0.5	>6.0	i i		None		None
		August	0.5		i i		None		None
	•	September	0.0	>6.0	0.0-1.0	Long	Frequent		None
		October	0.0		10.0-1.01	_	Frequent		None
	•	November	0.0		0.0-1.0	_	Frequent		None
	i	December	0.0		0.0-1.0	-	Frequent		None

Table 19.-Water Features-Continued

	1	1	Water	table	1	Ponding		Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	1	limit	limit	water	I	1		1
	group	1	I	l	depth	I	1		1
	ī	I	Ft	Ft	Ft				ı
	I	1	. —			ı	1		1
193286:	i	i	i	i	i i	i	i		i
Histosols	. D	i	i	i	i i	i	i		i
	i	January	i 0.0	>6.0	10.0-1.01	Very long	Frequent		I None
	i	February	0.0			Very long	-		l None
		March	0.0			Very long	-		l None
	•	April	0.0			Very long			l None
		May	0.0			Very long			l None
	•	June	0.0			Very long	-		l None
	•	July	0.0			Very long	-		l None
	•	August	0.0			Very long			None
	•	September	0.0			Very long			None
	•	October	0.0			Very long			None
	•	November	0.0			Very long	-		None
	•	December	0.0			Very long			None
	i	1 December	1 0.0		10.0 1.01	very rong	rrequenc		i Hone
Aquents	l D	1	1	! !	; ;				<u> </u>
Aquencs		 January	0.0	 	10 0-1 01	Very long	Eromiont I		l None
	•	February	0.0			Very long			None
		March	0.0			Very long	-		None
	•	April	1 0.0			Very long	-		None
	•	May	0.0			Very long	-		None
	•		0.0						None
	•	June	•			Very long	-		
		July	0.0			Very long	-		None
	•	August	0.0			Very long			None
	•	September	0.0			Very long	-		None
	•	October	0.0			Very long			None
	!	November	0.0			Very long	-		None
	!	December	0.0	>6.0	10.0-1.01	Very long	Frequent		None
	!	1	!		!!!	!	!		!
193287:	I	1	1	l	!!!	ļ			1
Dune land.		1	1		!!!	ļ			1
	1	1	I	l	1 1	ı	1		I
Quartzipsamments	A	1	I			I	I		I
	I	Jan-Dec	I				None		None
	1	1	I		1 1	I	I		I
193288:	1	1	I		1 1	I	I		I
Udipsamments	A	1	I		1 1	I	I		I
	1	Jan-Dec					None I		l None

Table 19.-Water Features-Continued

	I	I	Water	table	1	Ponding		Flood	ling
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	I	limit	limit	water		l I		1
	group	I	1 1		depth		l l		1
	Ϊ	ī	Ft	Ft	Ft		ı ı		1
	I	I			. — .		l I		1
.93342:	I	I	1 1		1 1		l l		1
Gorvan	- B/D	I	1 1		1 1		l l		1
	I	January	0.0	>6.0			None	Brief	Occasiona
	I	February	0.0	>6.0			None	Brief	Occasiona
	1	March	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
	I	April	0.0	>6.0	[0.0-1.0]	Long	Frequent	Long	Frequent
	I	May	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
	I	June	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	July	0.5	>6.0			None		None
	I	August	1.0	>6.0			None		None
	I	September	0.0	>6.0			None		None
	I	October	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Occasiona
	I	November	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Occasiona
	I	December	0.0	>6.0			None		None
	I	I	1 1		1 1		l l		1
Houghton	- B/D	I	1 1		1 1		l l		1
	I	January	0.0	>6.0			None	Brief	Occasiona
	I	February	0.0	>6.0			None	Brief	Occasiona
	I	March	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
	I	April	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
	I	May	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
	1	June	0.0	>6.0	[0.0-1.0]	Long	Frequent		None
	I	July	0.5	>6.0			None		None
	I	August	1.0	>6.0			None		None
	I	September	0.0	>6.0			None		None
	I	October	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Occasiona
	I	November	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Occasiona
	1	December	0.0	>6.0			None		None
	I	I	1 1		1 1		l l		1
Glendora	- A/D	I	1 1		1 1		l l		1
	I	January	0.0	>6.0			None	Brief	Occasiona
	I	February	0.0	>6.0			None	Brief	Occasiona
	I	March	0.0	>6.0	10.0-0.5	Long	Frequent	Long	Frequent
	1	April	0.0	>6.0	10.0-0.5	Long	Frequent	Long	Frequent
	I	May	0.0	>6.0	10.0-0.5	Long	Frequent	Long	Frequent
	1	June	0.0	>6.0	10.0-0.5	Long	Frequent		None
	1	July	1.0	>6.0			None		None
	1	August	1.0	>6.0			None		None
	1	September	0.0	>6.0			None		None
	1	October	0.0	>6.0	10.0-0.5	Long	Frequent	Brief	Occasiona
	1	November	0.0		10.0-0.5	Long	Frequent	Brief	Occasiona
	1	December	0.0	>6.0	1 1		l None l	Brief	Occasiona

Table 19.-Water Features-Continued

	1	1	Water	table	<u> </u>	Ponding	I	Floodi	
Map unit symbol and soil name	Hydro- logic		Upper limit		Surface water	Duration	Frequency 	Duration	Frequency
	group	1	<u> </u>	<u> </u>	depth	l <u> </u>	<u> </u>		<u> </u>
	1	1	Ft	<u>Ft</u>	Ft				1
193349:	i	! 	i	İ	i		i i		
Spinks		 Jan-Dec	 	l I	 	 	 None		 None
Coloma	 - A	į	į	İ	į į		į į		į
Colonia	•	 Jan-Dec		 			None		None
193351:	1	 	 	 		 	 		
Benona	· A	<u>.</u>	į	į	į į		i <u>.</u> i		į
		Jan-Dec 		 			None 		None
193354: Dune land.	1	1	1	 					1
	i	! 	i	İ	i		i i		İ
Quartzipsamments		 Jan-Dec		l I		 	 None		 None
193357:	į	į	į	į	į į		į		į
Shavenaugh	 - A	1	i	 					
	1	Jan-Dec		 			None		None
193359:	į _	į	į	į	į		į į		
Shavenaugh		 Jan-Dec		l 		 	 None		 None
193360:	1	1	1	 	1 1				1
Shavenaugh	· A	<u>.</u>		į	į į		i <u>.</u> i		
	1	Jan-Dec 		 			None 		None
193362: Benzonia	l ·I A	 	1	 					1
20120114	•	Jan-Dec	·		i i		None		None
193363:		 	 	 					
Benzonia	- A	 Jan-Dec	 	l I		 	 None		 None
	i		i	i	i i				
193364: Benzonia	 - A	 	 	 	 				
	1	Jan-Dec					None		None
193365:	i	İ	i	İ	: 		; ;		
Benzonia	- A. 	 Jan-Dec	 	l I		 	 None		 None
	i		i	İ	i i				i

Table 19.-Water Features-Continued

	1	1	Water table		Ponding			Flooding	
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequency
and soil name	logic group	 	limit 	limit 	water depth				
	Ī	Ī	Ft	Ft	Ft		l I		1
193371:	 	 	 	 	 				
Dair	A/D	İ	İ	l	i i		i i		İ
	i	January	0.0	>6.0	i i		None		None
	1	February	0.0	>6.0			None		None
	1	March	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	April	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	May	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	June	0.0	>6.0			None		None
	1	July	0.5	>6.0			None		None
	1	August	1.0	>6.0			None		None
	1	September	0.0	>6.0			None		None
	1	October	0.0	>6.0	0.0-1.0	Long	Frequent		None
	1	November	0.0	>6.0	0.0-1.0	Long	Frequent		None
	İ	December	0.0	>6.0	i i		None		None
	1	I	I	l	1 1		1		I
Pipestone	B	I	I	l	1 1		1		I
	1	January	1.5	>6.0			None		None
	1	February	1.5	>6.0			None		None
	1	March	1.0	>6.0			None		None
	1	April	0.5	>6.0			None		None
	İ	May	0.5	>6.0	i i		None		None
	İ	June	1.0	>6.0	i i		None		None
	İ	July	2.0	>6.0	i i		None		None
	İ	August	3.0	>6.0	i i		None		None
	İ	September	3.0	>6.0	i i		None		None
	İ	October	2.5	>6.0	i i		None		None
	İ	November	1.0	>6.0	i i		None		None
	İ	December	1.0	>6.0	i i		None		None
193372.	 	 	 	l I]		
Access Denied	i	İ	i	i İ	i i		i i		i
	1	I	I	l	1 1		I I		1
193423:	1	I	I	l	1 1		I I		I
Benona	A	I	I	l	1 1		I I		1
	1	Jan-Dec					None		None
	1	I	I	l	1 1		I I		I
193484.	1	I	I	l	1 1		I I		I
Pits, sand and gravel	1	I	I	l	1 1		I I		I
	1	I	I	l	1 1		I I		I
193494:	1	I	I	l	1 1		1		I
Nordhouse	A	I	I	l	1 1		I I		I
	1	Jan-Dec	I				None		None
	1	I	1	l	1 1		l l		I
193496:	1	I	1	l	1 1		1		I
Nordhouse	A	I	I	l	1 1		I I		I
	1	Jan-Dec					None		None
	1	I	I	I	1 1		1 1		1

Table 19.-Water Features-Continued

	ī	I	Water	table	T	Ponding	ı	Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequency
and soil name	logic	I	limit	limit	water		I - I		1
	group	I	I	I	depth		I I		1
	Ī	Ī	Ft	Ft	Ft		I I		1
	İ	I	i —	<u> </u>	i — i	· 	i i		i
193497:	i	i	i	i	i i		i i		i
Nordhouse	i A	i	i	i	i i		i i		i
	i	Jan-Dec	i	i	i i		I None I		l None
	i	I	i	i	i i		i		i
193498:	i	i	i	i	i i		i i		i
Nordhouse	i A	i	i	i	i i		i i		i
	i	Jan-Dec	i	i	i i		None		None
	i	I	i	i	i i		i		i
Platteriver	i A	i	i	i	i i		i i		i
	•	January	i 3.0	>6.0	i i		None		None
		February	2.5	>6.0	i i		None		None
		March	2.0	>6.0	i i		None I		l None
	•	April	1.5	>6.0	i i		None I		l None
		May	2.5	i >6.0	i i		None I		l None
		June	3.5	i >6.0	i i		None I		l None
	•	July	1 4.5	i >6.0	i i		None I		l None
		August	1 5.0	i >6.0	i i		None I		l None
		September	•	>6.0	i i		None		None
		October	3.0	>6.0	i i		None I		None
	i	November	2.5	>6.0	i i		None I		None
	i	December	3.0	>6.0	i i		None I		None
	i	i	i	i	i i		i i		i
Dair	A/D	İ	İ	İ	i i		i i		İ
	i	January	0.0	>6.0	i i		None		None
	İ	February	0.0	>6.0	i i		None		None
	İ	March	0.0	>6.0	10.0-1.0	Long	Frequent		None
	İ	April	0.0	>6.0	10.0-1.0	Long	Frequent		None
	İ	May	0.0	>6.0	10.0-1.0	Long	Frequent		None
	1	June	0.0	J >6.0			None		None
	1	July	0.5	J >6.0			None		None
	1	August	1.0	J >6.0			None		None
	1	September	0.0	J >6.0			None		None
	1	October	0.0	J >6.0	0.0-1.0	Long	Frequent		None
	1	November	0.0	J >6.0	0.0-1.0	Long	Frequent		None
	1	December	0.0	J >6.0			None		None
	1	I	I	I	1 1		1		1
193503:	1	I	I	I	I i		i i		1
Spinks	A	I	I	I	1 1		1		1
-	I	Jan-Dec			ı i		None		None
	1	I	I	I	I i		i i		1
Shavenaugh	A	I	I	I	I i		i i		1
	1	Jan-Dec			I Î		None		None
	1	I	I	I	I i		ı İ		1

Table 19.-Water Features-Continued

	I	1	Water	table	<u> </u>	Ponding	Flooding		
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	1	limit	limit	water		1		1
	group	1	1	I	depth		1 1		1
	1	1	Ft	Ft	Ft	l	T T		I
	1	1	1	ı —			1		1
93504:	I	1	1	l	1	1	1 1		1
Spinks	A	1	1	I	1 1		1 1		1
	l l	Jan-Dec					None		None
Clarate al	! .	!	!	!	!		!!!		!
Shavenaugh	A	I Tan Dan		!			1		
	-	Jan-Dec					None		None
.93505:	-	1 1	;	! !	;) 	: :		i
Spinks	i A	i	i		; ;	! 	i i		i
-p5	i	Jan-Dec	i		i i		l None l		l None
	i	1	i	i	i i	i I	i i		i
Shavenaugh	A	i	i	İ	j i	Ì	i i		i
_	1	Jan-Dec					None		None
	1	1	I	I	1 1	l	1		1
93506:	I	1	I	I	1 1	1	1		1
Spinks	A	1	1	I	1		1 1		1
	I	Jan-Dec					None		None
	I	I	I	I	1		1		1
Shavenaugh	A	1	I	I	1		1		1
	I	Jan-Dec					None		None
	I	1	1	I	1		1 1		I
.93507:	Į.	1	1	!	! !		! !		!
Spinks	A	!	!	!	! !		! !		!
	!	Jan-Dec	!		! !		None		None
Oh anna annah	7		!	!	!		!!!		!
Shavenaugh	A	l Ton Don	!	l	! !	 	Name		l None
	-	Jan-Dec					None		None
.93508:	-	1 1	;	! !	;) 	: :		i
Madaus	B/D	i	i		; ;	! 	i i		i
	-/-	January	0.0	, >6.0	i i		l None l		l None
	i	February	0.0	>6.0	i i		None		None
	i	March	1 0.0	•	0.0-1.0	Long	Frequent		None
	i	April	0.0		0.0-1.0	-	Frequent		None
	İ	May	0.0		10.0-1.0	-	Frequent		None
	1	June	0.0	>6.0	i i		None		None
	1	July	0.5	>6.0			None		None
	1	August	1.0	>6.0			None		None
	1	September	0.0	>6.0			None		None
	1	October	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	November	0.0	>6.0	0.0-1.0	Long	Frequent		None
	I	December	0.0	>6.0			None		None
	1	1	1	I	1 1	ı	1 1		1

	1	I	Water	table	Ponding			Flooding	
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	I	limit	limit	water		1		1
	group	I	1		depth		1		1
	Ī	ı	Ft	Ft	Ft		l l		ī
	İ	I			i — i	· 	i i		i
93509:	i	i	i i	i I	i i		i i		i
Boyer	I B	i	i i	I	i i		i i		i
-	i	Jan-Dec	i		i i		None		l None
	İ	İ	İ	İ	i i		i i		İ
Shavenaugh	A	İ	İ		i i		i i		Ì
-	Ì	Jan-Dec			i i		None		None
	I	I	1	I	1 1		1 1		1
93510:	I	I	1	I	1 1		1 1		1
Boyer	l B	I	1	l	1 1		1		1
	I	Jan-Dec					None		None
	I	I	1	l	1 1		1		1
Shavenaugh	l A	I	1	l	1 1		1		1
		Jan-Dec					None		None
		I		l	1 1		1		I
93511:	1	I		l	1 1		I I		1
Boyer	l B	I		l	1 1		I I		1
	1	Jan-Dec					None		None
	1	I	1	l	1 1		1		1
Shavenaugh	A	I		l	1 1		1		1
	1	Jan-Dec					None		None
	1	I	1	l	1 1		1		1
93513:	1	I		l	1 1		1		I
Oair	A/D	I	1	l	1 1		I I		I
	•	January	0.0	>6.0			None		None
		February	0.0	>6.0			None		None
	•	March	0.0		0.0-1.0		Frequent		None
		April	0.0		0.0-1.0	-	Frequent		None
		May	0.0		0.0-1.0	_	Frequent		None
	•	June	0.0	•			None		None
		July	0.5	>6.0			None		None
		August	1.0	>6.0			None		None
		September		•			None		None
	•	October	0.0	•	10.0-1.01	_	Frequent		None
	•	November	0.0		0.0-1.0	-	Frequent		None
	1	December	0.0	>6.0			None		None
	I	I	1	l	1 1		1		1

Table 19.-Water Features-Continued

	I	I	Water	table	Ponding			Flooding	
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	I	limit	limit	water		I I		1
	group	I	1	l	depth		I I		1
	1	ı	Ft	Ft	Ft		l l		1
	1	I		. —			1 1		1
193513:	i	i	i i	i I	i i		i i		i
Adrian	A/D	i	i i	i I	i i		i i		i
		January	0.0	l >6.0	i i		I None I		None
		February	0.0	>6.0	i i		l None l		l None
		March	0.0		10.0-1.01	Long	Frequent		l None
		April	0.0	•	0.0-1.0	Long	Frequent		None
		May	0.0		10.0-1.01	Long	Frequent		None
		June	0.0	•	0.0-1.0	Long	Frequent		None
		July	0.5	>6.0			None		None
		August	1 1.0	>6.0			None		None
		September		>6.0	i i		None		None
		October	0.0		0.0-1.0	Long	Frequent		None
	•	November	0.0		10.0-1.0	Long	Frequent		None
	•	December	0.0	>6.0 >6.0			None		None
	-	December	0.0	, ,0.0	: :		I NOTIE I		i none
.93514:	-	1		!	: :		! !		-
Platteriver	A	1		 	: :		! ! ! !		-
Platteriver	•	 Tomom	3.0	ı I >6.0	!!!		ı ı I None I		 None
		January	1 2.5	>6.0 >6.0	 		None		None
		February	1 2.0	>6.0 >6.0	 				None
		March	1 1.5		' '		None		
		April	•	>6.0			None		None
		May	2.5	>6.0	!!!		None		None
		June	3.5	>6.0			None		None
		July	4.5	>6.0			None		None
		August	5.0	>6.0	! !		None		None
		September		>6.0			None		None
	•	October	3.0	>6.0	! !		None		None
		November	2.5	>6.0	! !		None		None
	!	December	3.0	>6.0	! !		None		None
	ļ	1	!		!!!		! !		1
Pipestone	B	1	!		!!!		! !		1
		January	1.5	>6.0			None		None
		February	1.5	>6.0			None		None
		March	1.0	>6.0			None		None
		April	0.5	>6.0			None		None
		May	0.5	>6.0			None		None
		June	1.0	>6.0			None		None
		July	2.0	>6.0			None		None
		August	3.0	>6.0			None		None
		September		>6.0			None		None
		October	2.5	>6.0			None		None
	•	November	1.0	>6.0			None		None
	1	December	1.0	>6.0			None		None
	- 1	1	1	I	1 1		1 1		1

Table 19.-Water Features-Continued

Map unit symbol and soil name	on Frequence
	- None
	- None
	- None
Houghton	- None
Houghton	- None
Houghton	- None
January 0.0 >6.0 0.0-1.0 Long Frequent	- None
	- None
	•
April 0.0 >6.0 0.0-1.0 Long Frequent	,
May	- l None
June 0.0 >6.0 0.0-1.0 Long Frequent	- None
July 0.5 >6.0 None August 1.0 >6.0 None	
	•
November	
Adrian	
January 0.0 >6.0 None February 0.0 >6.0 None	, None
January 0.0 >6.0 None February 0.0 >6.0 None	!
	1 27
March 0.0 >6.0 0.0-1.0 Long Frequent	l none
April 0.0 >6.0 0.0-1.0 Long Frequent	l none
May 0.0 >6.0 0.0-1.0 Long Frequent June 0.0 >6.0 0.0-1.0 Long Frequent July 0.5 >6.0 None August 1.0 >6.0 None September 0.5 >6.0 None October 0.0 >6.0 0.0-1.0 Long Frequent	l none
June 0.0 >6.0 0.0-1.0 Long Frequent	l none
July 0.5 >6.0 None	l none
August 1.0 >6.0 None	l none
September 0.5 >6.0 None	1 110110
October 0.0 >6.0 0.0-1.0 Long Frequent	l none
	- None
	- None
November 0.0 $>$ 6.0 0.0-1.0 Long Frequent	- None
December 0.0 >6.0 None	- None
	1
202016:	1
Spinks A	1
Jan-Dec None	- None
	I
Tekenink, sandy substratum	I
Jan-Dec None	- None
	İ
631170:	İ
Fogg A	İ
Jan-Dec None	· · None
	i
Benzonia A	i
Jan-Dec None	
	- None

Table 19.-Water Features-Continued

	I	1	Water	table	Ponding			Flooding	
Map unit symbol	Hydro-		Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	I	limit	limit	water		l I		1
	group	1	1	l	depth		l l		1
	ı	ı	Ft	Ft	Ft		l I		I
	I	I	ı —	ι —	. — .		l I		I
631171:	I	I	I	l	1 1		l I		I
Fogg	A	I	I	I	1 1		l l		I
	I	Jan-Dec					None		None
	! -	1	!	!	!!!		! !		ļ.
Benzonia		!	!	!	!!!				!
	!	Jan-Dec					None		None
631172:	-	! !	-	 	: :				!
Fogg	A	! !	1	! !	; ;		! !		;
rogg	1 4	 Jan-Dec		' I	· i		None		None
	i	l	i	i	i i		10110		1
Benzonia	i A	i	i	i i	i i		i i		i
	i	Jan-Dec	i		i i		None		None
	İ	İ	İ	İ	i i		İ		İ
631173:	I	I	I	I	1 1		l I		1
Fogg	A	I	I	l	1 1		l l		1
	1	Jan-Dec					None		None
	I	I	I	l	1 1		l l		I
Benzonia	•	I	I	l	1 1		l I		I
	ļ	Jan-Dec					None		None
C21174	!	!	!	!	!!!		!		!
631174: Fogg	7	!	!	!	!!!		!		!
Fogg		 Jan-Dec		l 			l None l		l None
	-	I Dan-Dec	i	 			None		I None
Benzonia	i A		i	' 	; ;		i i		i
	•	 Jan-Dec	i	' 	i i		l None I		l None
	i	I	i	i i	i i		i i		i
680939:	i	İ	i	İ	i i		i i		i
Fern	B	I	I	I	1 1		l l		1
	I	February] 3.0	>6.0			None		None
	I	March	2.5	>6.0			None		None
	I	April	2.5	>6.0			None		None
		May	1 2.0	>6.0			None		None
		June	4.0	>6.0			None		None
		September		>6.0			None		None
		October	3.0	>6.0			None		None
	!	November	2.5	>6.0	! !		None		None
0.1.1.	! .	!	<u> </u>	!	!!!		!!!		!
Spinks		I Ton Don	1	I	!!!				1 27000
	1	Jan-Dec					None		None

Table 19.-Water Features-Continued

		I	Water	table	I	Ponding	1	Floodi	ng
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequency
and soil name	logic	I	limit	limit	water	l	l I		1
	group	I	1	I	depth	l	l I		1
	ī	ı	Ft	Ft	Ft	l	l I		T
	1	I		. —		I	1 1		I
680943:	i	İ	İ	İ	İ	l	i i		İ
Milnichol	В	İ	İ	İ	İ	l	i i		İ
	1	January	1.5	>6.0			None		None
	1	February	1.5	>6.0			None		None
	1	March	1.0	>6.0			None		None
	1	April	1.0	J >6.0			None		None
	1	May	0.5	J >6.0			None		None
	1	June	1.0	>6.0			None		None
	1	July	2.0	>6.0			None		None
	1	August	3.0	>6.0			None		None
	1	September	2.5	>6.0			None		None
	1	October	2.0	>6.0			None		None
	1	November	1.0	>6.0			None		None
	1	December	1.0	>6.0			None		None
	1	I	I	I	1	l	1		1
680945:	1	I	1	I	1	l	l I		1
Fern	B	I	I	I	1	l	l I		1
	1	February	3.0	>6.0			None		None
	•	March	2.5	>6.0			None		None
	1	April	2.5	>6.0			None		None
	1	May	2.0	>6.0			None		None
	1	June	4.0	>6.0			None		None
	1	September	4.0	>6.0			None		None
	1	October	3.0	>6.0			None		None
	1	November	2.5	>6.0			None		None
	1	I	I	I		l	l I		1
680946:	1	I	I	I	1	l	l I		1
Fern	B	I	I	I	1	l	l I		1
	1	February	3.0	>6.0			None		None
	1	March	2.5	>6.0			None		None
	1	April	2.5	>6.0			None		None
	1	May	2.0	>6.0			None		None
	1	June	4.0	>6.0			None		None
	1	September		>6.0			None		None
	1	October	3.0	>6.0			None		None
	1	November	2.5	>6.0			None		None
	1	I	I	I	1	l	l I		1
680971:	1	I	1	I	1	l	l I		I
Nessen	A	I	I	I	1	l	l I		1
	1	Jan-Dec					None		None
	1	I	1	I	1	l	l I		I
Kaleva	A	I	I	I	1	l	l I		1
	1	Jan-Dec					None		None
	1	I	I	I	1	l	l I		1

Table 19.-Water Features-Continued

	1	1	Water	table	Ponding			Flooding	
Map unit symbol and soil name	Hydro-	ĺ	Upper limit	Lower limit	water	Duration	Frequency 	Duration	Frequency
	group	<u> </u> 	 <u>Ft</u>	l <u>Ft</u>	depth <u>Ft</u>		<u> </u>		<u> </u>
680972: Nessen	•	 		 			 		
Kaleva	 A	Jan-Dec 		 			None 		None
680973:	i I	Jan-Dec 		 			None 		None
Nessen	i	 Jan-Dec 	 	 	 		 None 		None
Kaleva	•	 Jan-Dec 	 	 			 None 		 None
680974: Nessen	 A 	 Jan-Dec		 			 None		 None
Kaleva	•	 Jan-Dec 		 					 None
893251: Boyer		 Jan-Dec	 	 	 				 None
Shavenaugh		 Jan-Dec		 			 None		 None
894062: Remus	 B	 Jan-Dec	 	 					 None
Spinks		 Jan-Dec		 					 None
894063: Remus	 B 	 Jan-Dec	 	 					 None
Spinks		 Jan-Dec	 	 					 None

Table 19.-Water Features-Continued

		I	Water	table	1	Ponding	1	Floodi	.ng
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequency
and soil name	logic	I	limit	limit	water		I I		1
	group	I	I	l	depth		1		1
	T	ı	Ft	Ft	Ft		l l		1
	I	I					1 1		1
894064:	1	I	I	I	1 1		I I		1
Fern	B	I	I	I	1 1		I I		1
	1	February	3.0	>6.0			None		None
	1	March	2.5	>6.0			None		None
	1	April	2.5	>6.0			None		None
	1	May	2.0	>6.0			None		None
	I	June	4.0	J >6.0			None		None
	I	September	4.0	>6.0			None		None
	I .	October	3.0	>6.0			None		None
	İ	November	1 2.5	>6.0	i i		None		None
	i	İ	i	i	i i		i i		i
Remus	i B	i	i	i	i i		i i		i
		Jan-Dec	i	i	i i		I None I		l None
	i	1	i	i	i i		1 1		1
894065:	<u> </u>	<u>'</u>	i	<u> </u>	; ;		;		i
Fern	l I B	! !	1	! !	; ;		! !		1
rem	•	 February	3.0	 >6.0	: :		ı l I None l		 None
		•	•	>6.0 >6.0	! !				•
	•	March	2.5	•	! !		None		None
		April	2.5	>6.0			None		None
		May	2.0	>6.0			None		None
	•	June	4.0	>6.0			None		None
		September		>6.0			None		None
	•	October] 3.0	>6.0			None		None
	I	November	2.5	>6.0			None		None
	I	I	I	I	1 1		I I		1
Remus	l B	l	I	I	1 1		I I		1
	I	Jan-Dec					None		None
	I	I	I	I	1 1		1		1
894104:	I .	I	I	I	1 1		1 1		1
Mollineaux	I A	İ	İ	İ	i i		i i		İ
	i	Jan-Dec	i		i i		l None l		l None
	i	İ	i	i	i i		i i		i
Remus	I B	i i	i	i	i i		i i		i
10.1145	•	 Jan-Dec		I	: i		l None l		None
		, - a Dec	i	' !	; ;		, 110116 I		, 110116
894105:	-	! !		<u>'</u>	; ;		! ! ! !		
Mollineaux	1 7	! !	1	! !			! !		
MOTITUGAUX	•	l LTan Dan	!	!	!!!				1 27.00
	!	Jan-Dec	!		! !		None		None
_	! _	!	!	!	!!!		! !		!
Remus	l B	!	!	!	! !		I I		ļ
	I	Jan-Dec	ı	I	ı l		None		None
	1	I	1	I	1 1		1 1		1

Table 19.-Water Features-Continued

	1	l	Water	table	<u> </u>	Ponding		Flood	ing
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	l	limit	limit	water		l l		1
	group	l	I	I	depth		l l		1
	Ī	l	Ft	Ft	Ft		l I		ī
	1	I					1 1		1
894165:	i	i	i	i	i i	i	i i		i
Spinks	i A	İ	i	i	i i	i	i i		i
•	i	Jan-Dec	i		i i		None		l None
	i	İ	i	i	i i	i	i i		i
Tekenink, sandy substratum	l B	l	İ	İ	i i	Ì	i i		i
· -	1	Jan-Dec		I			None		None
	1	I	I	I	1 1		l l		1
899682:	1	I	I	I	1 1		l l		1
Kaleva	A	l	I	I	1 1		l l		1
	1	Jan-Dec					None		None
	1	l	I	I	1 1		l l		1
899722:	1	l	I	I	1 1		l l		1
Goodharbor	A	l	I	I	1 1		l l		1
	1	Jan-Dec					None		None
	1	l	I	I	1 1		l l		1
899731:	1	l	I	l	1 1		l I		1
Covert	A	l	I	I	1 1		l l		1
	1	January	3.0	>6.0			None		None
	1	February	2.5	>6.0			None		None
	1	March	2.5	>6.0			None		None
	1	April	2.5	>6.0			None		None
	1	May	2.0	>6.0			None		None
	1	June	4.0	>6.0			None		None
	1	July	4.5	>6.0			None		None
	1	August	5.0	>6.0			None		None
	1	September	4.0	>6.0			None		None
	1	October	3.0	>6.0			None		None
	1	November	2.5	>6.0			None		None
	1	December	3.0	>6.0			None		None
	1	l	I	l	1 1		l I		1
Pipestone	l B	l	I	I	1 1		l l		1
	1	January	1.5	>6.0			None		None
	1	February	1.5	>6.0			None		None
	1	March	1.0	>6.0			None		None
	1	April	0.5	>6.0	I I		None		None
	1	May	0.5	>6.0	I I		None		None
	1	June	1.0	>6.0			None		None
	1	July	2.0	>6.0			None		None
	1	August	3.0	>6.0			None		None
		September		>6.0	I I		None		None
	1	October	2.5	>6.0	I I		None		None
	1	November	1.0	>6.0	I I		None		None
	1	December	1.0	>6.0			None		None
	1		1	I	1 1		I I		1

Table 19.-Water Features-Continued

	1	I	Water	table	1	Ponding	I	Floodi	ng
Map unit symbol	Hydro-	Months	Upper	Lower	Surface	Duration	Frequency	Duration	Frequenc
and soil name	logic	I	limit	limit	water		l l		1
	group	I	I	I	depth		l l		1
	ī	ı	Ft	Ft	Ft		l I		1
	1	I		. —			1		1
899733:	i	i	i	i	i i		i i		i
Covert	- I A	i	i	i	i i		i i		i
	i	January	3.0	>6.0	i i		None		None
	i	February	2.5	>6.0	i i		None		None
		March	1 2.5	>6.0	i i		None		None
	i	April	1 2.5	>6.0	i i		None		None
		May	2.0	>6.0	i i		None		None
		June	1 4.0	>6.0	i i		None		None
	i	July	4.5	>6.0	i i		None		None
		August	I 5.0	>6.0	i i		None		None
		September	1 4.0	>6.0	i i		None		None
	i	October	3.0	>6.0	i i		None		None
	i	November	2.5	>6.0	i i		None		None
	i	December	3.0	>6.0	i i		None		None
	i	İ	İ	İ	i i		i i		İ
Dair	- A/D	İ	İ	İ	i i		i i		İ
	i	January	0.0	>6.0	i i		None		None
	i	February	0.0	>6.0	i i		None		None
	i	March	0.0	>6.0	[0.0-1.0]	Long	Frequent		None
	i	April	0.0	>6.0	[0.0-1.0]	Long	Frequent		None
	i	May	0.0	>6.0	[0.0-1.0]	Long	Frequent		None
	i	June	0.0	>6.0	i i		None		None
	1	July	0.5	>6.0			None		None
	i	August	1.0	>6.0	i i		None		None
	i	September	0.0	>6.0	i i		None		None
		October	0.0	>6.0	10.0-1.0	Long	Frequent		None
	1	November	0.0	>6.0	10.0-1.0	Long	Frequent		None
	1	December	0.0	>6.0	i i		None		None
	1	I	I	I	I İ		ı İ		1
899734:	1	I	I	I	I İ		ı İ		1
Benzonia	- A	I	I	I	I İ		ı İ		1
	1	Jan-Dec			i		None		None
	1	I	I.	ı	ı i		i i		1

Table 20.—Soil Features

(See text for definitions of terms used in this table. Absence of an entry indicates that data were not estimated)

Map unit symbol		Restric	tive layer		Potential	Risk of	Risk of corrosion	
and soil name		Depth	ī ī		for	Uncoated	l	
İ	Kind	to top	Thickness	Hardness	frost action	steel	Concrete	
		In	In		1		I	
1					1 1		I	
90775:		I	1		1 1		l	
Adrian					High	High	Moderate	
I		I	1		1 1		l	
Houghton		!	! !		High	High	Low	
 90777 :		!	!!!					
90///: Alcona		 				Moderate	l Low	
AICONA			 		Moderate	Moderate	I TOM	
 Richter		 			High	High	ı Moderate	
1		i	i i		112911		1100021000	
90778:		i	i i		i i		i i	
Alcona		i	i i		Moderate	Moderate	Low	
1		I	1		1 1		I	
Richter					High	High	Moderate	
I		I	1		1		l	
90779:		I	1 1		1 1		I	
Alpena					Low	Low	l Low	
		!	!!!		!!!!		!	
90780: Au Gres								
u Gres					Moderate	Low	Moderate	
 		l I			l Low l	Low	I High	
l l		i	i i		1 204 1	10#	l mråm	
90781:		i	i i		iii		i I	
Bach		i	i i		High	High	Low	
1		I	1		1 1	_	I	
90782:		I	1 1		1 1		l	
Deer Park					Low	Low	Low	
1		I	1 1		1		I	
90783:		ļ.	!!!		! !	_	<u> </u>	
Deer Park		!			Low	Low	Low	
90784: I		!	!!!		!		! !	
90/84: Deer Park		 			l Low l	Low	l Low	
Deel Faik			 		I TOW I	TOW	I TOW	
Roscommon		i	: :		Moderate	High	l Low	
		i	i i		i	9	i –	
90786:		i	i i		i i		İ	
Oune land		I	1		1 1		I	
I		I	1 1		1 1		I	
90787:		1	1		1 1		I	
East Lake					Low	Low	Moderate	
		ļ.	I I		1		!	
90788:		!	! !		1 .			
East Lake					Low	Low	Moderate	

Table 20.-Soil Features-Continued

Map unit symbol	T	Restric	tive layer		Potential	Risk of	corrosion
and soil name	<u> </u>	Depth			for	Uncoated	!
	Kind		Thickness	Hardness	frost action	steel	Concrete
	1	I In	<u>In</u>				1
190789:	! !	I I					1
East Lake		i	i i		Low	Low	Moderate
	İ	İ	i i		i i		İ
190790:	I	1	1 1		1 1		1
East Lake					Low	Low	Moderate
190791:	I I	1	1 1				1
Eastport	' 	i	i i		Low	Low	Moderate
	İ	i	i i		i i		İ
190792:	I	1	1 1		1 1		1
Edwards	ļ		! !		High	High	Low
Marl beds	 	 			High	High	 Low
Mail Deus	! !	<u> </u>	;		l mign i	myn	I TOW
190794:	i	i	i i		i i		i
Emmet					Moderate	Low	Moderate
- 1	 	!	!!!		! -!	_	! -
Leelanau					Low	Low	Low
190795:	i I	i	i		i		i
Emmet		i	i i		Moderate	Low	Moderate
	I	I	1 1		1 1		1
Leelanau					Low	Low	Low
190796:	! 	I I					1
Emmet	i	i	i i		Moderate	Low	Moderate
	I	1	1 1		1 1		1
Leelanau					Low	Low	Low
190797:	 	1					1
Emmet	' 	i	i i		Moderate	Low	Moderate
	İ	Ì	i i		i i		İ
Leelanau					Low	Low	Low
190799:	1	1	! !				
Emmet	 		·		Moderate	Low	 Moderate
	İ	i	i i				
Leelanau					Low	Low	Low
190801:		!			! !		1
Emmet	l I	I I	I I			Low	 Moderate
	i	i	i i				
Mancelona	I				Low	Low	Low
10000	I	1	1 !				1
190803: Emmet	 	 			 Moderate	Low	 Moderate
	 I		!		Moderace	TOM	Moderate
Mancelona	i	·	i i		Low	Low	Low
	I	1	1 1		1 1		I

Table 20.-Soil Features-Continued

Map unit symbol	l	Restric	tive layer		Potential	Risk of	corrosion
and soil name	1	Depth	1 1		- for	Uncoated	ı
	Kind	to top	Thickness	Hardness	frost action	steel	Concrete
	I	In	<u>In</u>		1 1		I
	!	!	!!!		!!!		!
190805: Emmet	l 	l 				Low	 Moderate
Enule C	 		, , , ,		Moderate	TOW	Moderate
Omena	i	i	i i		Moderate	Low	Low
	!	1	! !		! !		1
190806: Emmet	 	 			Madamata	Low	 Moderate
Enune C	 	1			Moderate	TOM	Moderate
Omena			i i		Moderate	Low	Low
	I	I	1 1		1 1		I
190807: Emmet	!	!	!!!			_	
Emmet	 				Moderate	Low	Moderate
Omena	' 	i	i i		Moderate	Low	Low
	İ	İ	i i		i i		İ
190808:	<u> </u>	1	! !		1 1		1
Emmet					Moderate	Low	Moderate
Omena	I I					Low	l Low
	i i	i	i i				i
190809:	I	1	1 1		1 1		I
Emmet			! !		Moderate	Low	Moderate
Omena	l I	I I				Low	l Low
one in	! 	i	i i		1100021000	2011	1 20"
190811:	İ	Ì	i i		i i		İ
Hettinger	ļ		! !		High	High	Low
Muck	 	 			High	High	 Low
Muck	! 	i	iii		111gii	iiigii	1 10**
190812:	İ	i	i i		i i		i İ
Hettinger					High	High	Low
Tonkey	 				High	High	
Tonkey	 		 		l urdu l	нтдп	Low
190814:	i İ	i	i i		i i		i
Kalkaska					Low	Low	High
190815:		!	!!!		!!!!		1
Kalkaska	l I	I I			l Low	Low	 High
Tid Tid Sid	! 	i	i i		20"	2011	
190816:	I	I	ı i		ı i		I
Kalkaska	!	ļ	! !		Low	Low	High
190817:	 	1					1
Kalkaska	' 				Low	Low	 High
	I	i	i i		i i		 -

Table 20.—Soil Features—Continued

Map unit symbol	I	Restric	tive layer		Potential	Risk of	corrosion
and soil name	1	Depth	1		for	Uncoated	I
	Kind	to top	Thickness	Hardness	frost action	steel	Concrete
	I	In	<u>In</u>		1 1		I
100010	!	!	!!!		!!!		!
190818: Kalkaska	l I				l Low l	Low	 High
Naikaska	 	1			I TOW I	TOW	l High
190819:	I	i	i i		i i		i
Kalkaska	i	i	i i		l Low	Low	High
	l	1	1		1 1		I
East Lake	ļ		! !		l Low	Low	Moderate
190820:		1	!		!!!		!
190820: Kiva	l I		I I	 	l Low	Low	Low
MIVA	' 	i	;		1 204 1	TOW	1 20#
Mancelona		i	i i		Low	Low	Low
	I	1	1 1		1 1		I
190821:	I	1	1 1		1 1		I
Kiva			! !		Low	Low	Low
Mancelona	l I			 	l Low	Low	Low
Mancerona	! 	i	;		I LOW I	HOW	I HOW
190823:	i	i	i i		i i		i
Kiva			i i		Low	Low	Low
	l	1	1 1		1 1		I
Mancelona	ļ		! !		l Low	Low	Low
190824.	 	1	!				
Lake beaches	! 						<u> </u>
	I	i	i i		i i		i
190825.	İ	İ	i i		i i		İ
Lake bluffs	l	1	1 1		1 1		I
100006	!	!	! !		!!!		!
190826: Leelanau	l I			 	l Low l	Low	 Low
Lee Lanau	 	1			I TOW I	TOW	I TOM
East Lake	' 	i	i i		l Low	Low	 Moderate
	İ	İ	i i		i i		İ
190827:	l	1	1 1		1 1		I
Leelanau	ļ		! !		Low	Low	Low
East Lake	l I				l Low l	Low	 Moderate
East hake	! 	<u> </u>	;		I LOW I	HOW	Moderace
190828:	I	i	i i		i i		i
Leelanau			i i		Low	Low	Low
	l	1	1 1		1 1		I
East Lake	ļ		! !		l Low	Low	Moderate
190829:	 	1	1	 			I I
Leelanau	l I		 	 	l Low	Low	Low
	i I	i	i	, 	2011	20#	2011
East Lake		i	i i		Low	Low	Moderate
	I	1	1 1		1 1		I

Table 20.-Soil Features-Continued

Map unit symbol		Restric	tive layer		Potential	Risk of corrosion	
and soil name		Depth	ī ī		_ for	Uncoated	1
1	Kind	to top	Thickness	Hardness	frost action	steel	Concrete
1		In	In		I I		l
1		1	ı — ı		1 1		I
190830:		1	I I		1 1		I
Leelanau			! !		Low	Low	Low
East Lake			! !		Low	Low	Moderate
190831:		1					
Lupton		i	i i		High	High	Low
 			 			High	 Low
markey			 		l urdu l	HIGH	I TOM
190832:		i	i i		i i		i
Mancelona			! !		Low	Low	Low
190833:			; ;				!
Mancelona		i	i i		l Low	Low	Low
100004		!	!!		!!!!		1
190834: Mancelona		 	! !		l Low l	Low	l Low
İ		i	i i		-0		i
East Lake					Low	Low	Moderate
190835:		1	!!!				1
Mancelona		i	i i		Low	Low	Low
1		1	I I		1 1		I
East Lake					Low	Low	Moderate
190836:		i	i i		iii		i
Mancelona			I I		Low	Low	Low
 			 		l Low l	Low	 Moderate
East make			 		l FOM I	LOW	Moderate
190837:		İ	i i		i i		İ
Mancelona			! !		Low	Low	Low
 East Lake		 			l Low l	Low	 Moderate
1		i	i i		-0"		
190838:		1	! !		! !		1
Mancelona					Low	Low	Low
East Lake			¦ ¦		Low	Low	Moderate
1		1	1 1		1 1		I
190839: Mancelona			l I		l Low l	Low	Low
i		<u> </u>	; ;		10w	TO.	10**
Richter			i i		High	High	Moderate
100040		1	!!!		!!!		Į.
190840: Nester		 				High	 Low
		i	i i			9	. 20

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Table 20.-Soil Features-Continued

Map unit symbol		Restric	tive layer		Potential	Risk of	of corrosion	
and soil name		Depth			for	Uncoated	ī	
	Kind	to top	Thickness	Hardness	frost action	steel	Concrete	
I		In	<u>In</u>		1 1		1	
190841:		!	!!		!!!		1	
Nester					Moderate	High	Low	
1		i	i i		1100001000		1	
190842:		İ	i i		i i		İ	
Nester					Moderate	High	Low	
190843:		!	!!!		!!!			
Nester					Moderate	High	Low	
Nester		i	i i		Moderace	niign	1 20*	
190844:		İ	i i		i i		İ	
Nester					Moderate	High	Low	
190846.		!	!!!		!!!			
Pits, gravel	 						1	
		i	i i		i i		i	
190847:		İ	i i		i i		İ	
Richter					High	High	Moderate	
 Alcona						T	T	
Alcona	_ 				Moderate	Low	Low	
190848:		i	i i		ii		i	
Richter		i	i i		High	High	Moderate	
!		1	!!!		1 1		1	
Alcona					Moderate	Low	Low	
190849:	 	i	; ;				1	
Roscommon		i	i i		Moderate	High	Low	
I		1	1 1		1 1		1	
Markey		!	! !		High	High	Low	
190850:		1	! !		! !		1	
Sanilac			i i		High	High	l Low	
i		i	i i		i i		i	
190851:		1	1 1		1 1		1	
Tonkey					High	High	Low	
 Munuscong		 			High	High	Low	
		i	i i				1	
Iosco			i i		Moderate	High	Low	
I I		1	1 1		1 1		1	
190852: Tonkey					11:4-1	II i alb	 	
ronkey					High	High	Low	
Munuscong		i	¦ ¦		High	High	Low	
i		Í	i i		i	,	İ	
Iosco					Moderate	High	Low	
I		I	1		1 1		1	

Table 20.—Soil Features—Continued

Map unit symbol		Restric	tive layer		Potential	Risk of corrosion	
and soil name		Depth		l	for	Uncoated	I
	Kind	to top	Thickness	Hardness	frost action	steel	Concrete
		I In	I In	<u> </u>	! !		1
 190853.				 	 		
Water		i	<u> </u>	! 	;		! !
		i	i	i I	i i		i
190854:		I	I	I	I I		I
Wallace	Ortstein	8	ļ	Strongly cemented	Low	Low	High
 Kalkaska				 	Low	Low	 High
190855:				 			1
Wind eroded land		 	i	' 	l Low I	Low	 Moderate
		i	i	i İ	i i		İ
190856:		I	I	l	I I		I
Wind eroded land					Low	Low	Moderate
 193236.		1		 	! ! ! !		
Beaches		i	i	! 	i i		İ
İ		İ	İ	İ	i i		ĺ
193237:		I	I	l	I I		I
Thompsonville					Low	Low	Moderate
Milnichol				 	Moderate	Low	 Moderate
 193255:				 			1
Spinks				! 	Low	Low	Low
1		i	i	i İ	i i		i
Coloma				 	Low	Low	Moderate
193256:		i	i	i I	i i		i
Spinks					Low	Low	Low
!		!	!	! :	! . !	_	1
Coloma				 	Low	Low	Moderate
193257:		i	i	! 	i i		i I
Spinks		i	i		Low	Low	Low
1		I	I	l	I I		I
Coloma					Low	Low	Moderate
193258:		 	i i	 			I I
Spinks					l Low	Low	Low
1		İ	İ	İ	i i		İ
Coloma			ļ	!	Low	Low	Moderate
 193260:		1	1	 	I I		I I
193260: Copemish	Ortstein	I I 8-14	I 8-28	 Moderately	l Low I	Low	 High
				cemented	. <u></u> !	_•	
į		I	I	I	i i		I
193262:		!	!	<u> </u>		_	
Kaleva					Low	Low	High

Table 20.-Soil Features-Continued

Map unit symbol		Restric	tive layer		Potential	Risk of	corrosion
and soil name		Depth			_ for	Uncoated	I
	Kind	to top	Thickness	Hardness	frost action	steel	Concrete
I		In	<u>In</u>		1 1		I
		!	!!!		!!!!		!
193263: Kaleva		!				- .	
kaleva					Low	Low	High
193265:		i .	; ;		i i		i i
Grattan		i	i i		Low	Low	High
İ		İ	i i		i i		i
193266:		T	1		1 1		1
Grattan		!			Low	Low	High
193267:		!	!!!		! !		
Grattan					I Low I	Low	 High
Graccan		1	;		I HOW I	HOW	l mråm
193269:		i	i i		i i		i
Grattan		i	i i		Low	Low	High
I		1	1		1 1		1
193270:		I	1		1 1		1
Covert		!			Low	Low	Moderate
193271: I		-	! !				1
Pipestone					Moderate	Low	 Moderate
I I		i	i i		Moderate	TOW	Moderate
193272:		i	i i		i i		i
Dair					Moderate	Low	Moderate
		1	! !		1 1		1
193277: Benona		!	!!!			T	1 77:1
Benona					Low	Low	High
193278:		i	i i		iiii		İ
Benona		i	i i		Low	Low	High
I		1	1		1 1		1
193279:		1	1		1 1		1
Benona		!			Low	Low	High
193284:		!	! !		! !		
Udorthents		 			Moderate	High	Low
		i	i i		Moderate	111911	1 10#
Udipsamments		i	i i		Low	Low	Moderate
I		1	1 1		1 1		1
193285:		I	1		1 1		1
Lumley			! !		High	High	High
 Makinen		!			High	High	 High
naxinen					11±911	111911	1 111911
193286:		i	i i		i		i
Histosols			i i		High	High	Moderate
I		1	1 1		1 1		I
Aquents					High		
I		1	1 1		- I I		

Table 20.-Soil Features-Continued

Map unit symbol		Restric	tive layer		Potential Risk of corrosion		
and soil name		Depth		_	for	Uncoated	1
	Kind		Thickness	Hardness	frost action	steel	Concrete
		In	<u>In</u>		1 1		1
193287:		i	; ;				!
Dune land.		i	i i		i i		i
1		1	1 1		1		I
Quartzipsamments					Low		
193288:		<u> </u>	! ! ! !		1 1		! !
Udipsamments		i	i i		Low	Low	Moderate
1		1	1 1		1 1		I
193342:		!	!!!			1	! _
Gorvan					High	High	Low
Houghton		i	' 		High	High	Low
1		İ	i i		i i	_	İ
Glendora			! !		Moderate	High	Moderate
193349:		!	 		1 1		
Spinks		i	' 		Low	Low	Low
1		i	i i		i i		İ
Coloma			! !		Low	Low	Moderate
193351:		!	 		1 1		
Benona		i	' 		Low	Low	 High
į		İ	i i		i i		ĺ
193354:		!	!!!		!!!!		!
Dune land.		1					1
Quartzipsamments		i	' '		Low		'
1		i	i i		i i		İ
193357:		!	!!!		! !	_	!
Shavenaugh					Low	Low	Low
193359:		i	; ;		i i		!
Shavenaugh		i	i i		l Low	Low	Low
!		!	!!!		!!!!		!
193360: Shavenaugh					l Low l	Low	 Low
		i	; ;		10w	HOW	l now
193362:		i	i i		i i		İ
Benzonia		!	! !		Low	Low	High
193363:		1					1
Benzonia			' '		Low	Low	 High
1		i	i i		i i	-	İ
193364:		!	! !		! _ !	_	1
Benzonia					Low	Low	High
193365:			·				!
Benzonia		i	i i		Low	Low	High
į		1	ı i		i i		i -

Table 20.-Soil Features-Continued

Map unit symbol		Restric	tive layer		_ Potential	Risk of corrosion	
and soil name	l	Depth			for	Uncoated	
	Kind	to top	Thickness	Hardness	frost action	steel	Concrete
I	I	l <u>In</u>	<u>In</u>		1 1		1
1000-1	 -	!	!!!		!!!!		!
193371: Dair	 					T	 Moderate
Dair	 				Moderate	Low	Moderate
Pipestone	' 	i	¦ ¦		Moderate	Low	Moderate
	İ	i	i i		i		
193372.	l	1	1 1		1 1		1
Access Denied		I	1 1		1 1		I
		1	!!!		1 1		1
193423:		!	!!		! !	_	
Benona	 				Low	Low	High
193484.	l 	-	; ;				1
Pits, sand and gravel		i	i i		i		i
	İ	i	i i		i i		i
193494:		i	i i		i i		Ì
Nordhouse		I			Low	Low	Moderate
	l	I	1 1		1 1		1
193496:		!	!!		! !	_	1
Nordhouse					Low	Low	Moderate
193497:	l 	-	; ;				1
Nordhouse	' 	i	i i		l Low l	Low	Moderate
	İ	i	i i		i i		İ
193498:	l	1	1 1		1 1		1
Nordhouse					Low	Low	Moderate
		!	!!!		! !	_	!
Platteriver		!	! !		Low	Low	Moderate
Dair	l I					Low	 Moderate
Dair	 		 		Moderate	TOW	Moderate
193503:		i	i i		iii		i
Spinks		i	i i		l Low	Low	Low
_	l	1	1 1		1 1		1
Shavenaugh					Low	Low	Low
100504		1	!!!		!!!!		1
193504: Spinks	 				1 7	T	7
ppinks	 	1			Low	Low	Low
Shavenaugh	' 		¦ ¦		l Low l	Low	l Low
		i	i i				
193505:		i	i i		i		İ
Spinks					Low	Low	Low
I	l	1	1 1		1 1		I
Shavenaugh			! !		Low	Low	Low
	I	1	1 1		- I I		

Table 20.—Soil Features—Continued

Map unit symbol		tive layer	Potential Risk of corrosion				
and soil name		Depth		_	for	Uncoated	
	Kind		Thickness	Hardness	frost action	steel	Concrete
l l		<u>In</u>	! <u>In</u> !				!
193506:		 	! ! ! !		1 1		
Spinks			; ;		Low	Low	l Low
1		İ	i i		i i		İ
Shavenaugh		l			Low	Low	Low
193507:			!!!				<u> </u>
Spinks		 	' '		l Low l	Low	l Low
		i	i i			_0	i
Shavenaugh					Low	Low	Low
100500		!	!!		! !		!
193508: Madaus		l I			High	High	l Low
Hadaus		i i	i i			111911	1
193509:		ĺ	i i		i i		İ
Boyer		!	! !		Moderate	Low	Moderate
 Shavenaugh		 			l Low l	Low	l I Low
Snavenaugn		 	, , , ,		I TOW I	LOW	l TOM
193510:		i	i i		i i		i İ
Boyer		l			Moderate	Low	Moderate
 Shavenaugh		l 				T	
Snavenaugn			 		Low	Low	Low
193511:		i	i i		i i		i i
Boyer		I	I I		Moderate	Low	Moderate
 Shavenaugh			!!!			T	
Snavenaugn			 		Low	Low	Low
193513:		i	i i		i i		
Dair			I I		Moderate	Low	Moderate
 Adrian		!	!!			*** . 1.	
Adrian					High	High	Moderate
193514:		i i	i i		i i		!
Platteriver			i i		Low	Low	Moderate
		!	!!!		! !	_	!
Pipestone					Moderate	Low	Moderate
202010:		i i	i i		i		i I
Houghton		i	i i		High	High	Low
1		1	!!!		! !		!
Adrian					High	High	Moderate
202016:		' 					!
Spinks			i i		Low	Low	Low
1		I	I I		1 1		I
Tekenink, sandy substratum			! !		Moderate	Low	Moderate
		1			1 1		ı

Table 20.-Soil Features-Continued

Map unit symbol		Restric	tive layer	Potential	Risk of corrosion		
and soil name		Depth		- ,	for	Uncoated	!
	Kind		Thickness	Hardness	frost action	steel	Concrete
ļ.		l In	! <u>In</u> !				1
631170:		1	 				1
Fogg		i	; 		l Low	Low	Moderate
I		i	i i		i i		i
Benzonia					Low	Low	High
631171:		!	!!!		!!!		!
Fogg					I Low I	Low	 Moderate
1099		i	i i		1 20 1	10#	Moderate
Benzonia		i	i i		Low	Low	High
I		1	1 1		1 1		I
631172:		!	!!!		! !	_	!
Fogg					Low	Low	Moderate
Benzonia		i	' '		l Low	Low	 High
		i	i i		i i		9
631173:		İ	i i		i i		İ
Fogg					Low	Low	Moderate
 Benzonia		!			! <u>.</u> !	- .	
Benzonia					Low	Low	High
631174:		i	i i		i i		i
Fogg		i	i i		l Low	Low	Moderate
I		1	1 1		1 1		I
Benzonia			! !		Low	Low	High
680939: I							
Fern		i	' '		l Low l	Low	 Moderate
		i	i i				
Spinks					Low	Low	Low
!		1	! !		!!!		1
680943: Milnichol					Moderate	T 0	 Moderate
MIIIICIIOI					Moderate	Low	Moderate
680945:		i	i i		i i		i
Fern		i	i i		Low	Low	Moderate
I		1	1 1		1 1		1
680946: Fern		!			! <u>.</u> !	- .	
rern					Low	Low	Moderate
680971:		i	i i		i i		i
Nessen		i	i i		Low	Low	Moderate
I		1	1 1		1 1		I
Kaleva			! !		Low	Low	High
680972: I		I					1
Nessen					l Low	Low	 Moderate
		i	i i		10"	20"	
Kaleva		i	i i		Low	Low	High
I		1	1 1		1 1		I

Table 20.-Soil Features-Continued

and soil name Kind Depth Kind to top In		Hardness	for	Low Low Low Low	Concrete Concrete High Moderate High
680973: Nessen	In	 		Low Low Low	 Moderate Moderate High Moderate
680973: Nessen		 	Low	Low	 High Moderate
Nessen		 	Low	Low	 High Moderate
Nessen		 	Low	Low	 High Moderate
Kaleva		 	Low	Low	 High Moderate
680974:			Low Low Low 	Low	 Moderate
Nessen			Low Low		İ
Nessen			Low Low		İ
	 		Low Low		İ
893251:	 		i i	Low	High
Boyer	i i				!
1	i i		Moderate		I
				Low	Moderate
Shavenaugh			1 1		l
			Low	Low	Low
894062:					l i
Remus			Moderate	Moderate	l Low
	i i				i
Spinks	i i		Low	Low	Low
894063:					
Remus			Moderate	Moderate	l Low
	i i		i		İ
Spinks			Low	Low	Low
004064					 -
894064:			l Low l	Low	l I Moderate
	; ;		104	TOW	Moderace
Remus	i i		Moderate	Moderate	Low
I	1		1 1		l
894065:				- .	
Fern			Low	Low	Moderate
Remus			Moderate	Moderate	l Low
i	i i		i i		İ
894104:	1		1 1		l
Mollineaux			Low	Low	Moderate
				Moderate	l Low
	; ;		Moderate	Moderace	l HOw
894105:	i i		iiii		İ
Mollineaux			Low	Low	Moderate
<u> </u>	1				
Remus			Moderate	Moderate	l Low

Table 20.-Soil Features-Continued

Map unit symbol		Restrict	ive layer	Potential	Risk of corrosion		
and soil name		Depth	ı		 for	Uncoated	I
1	Kind	to top	Thickness	Hardness	frost action	steel	Concrete
<u> </u>		In	In		T		I
1					1		I
894165:		1 1	I		1		l
Spinks					Low	Low	Low
		!!!!	!			_	<u> </u>
Tekenink, sandy substratum					Moderate	Low	Moderate
899682: I		-					
Kaleva		i i	;		l Low l	Low	' High
		i i	i		i i		
899722:		i i	İ		i i		İ
Goodharbor					Low	Low	Low
1		1 1	I		1		I
899731:		!!!	!		! !	_	<u> </u>
Covert					Low	Low	Moderate
Pipestone						Low	 Moderate
ripescone		i i	i		Moderace	HOW	Moderace
899733:		i i	i		i i		i i
Covert					Low	Low	Moderate
I		1 1	I		1 1		l
Dair					Moderate	Low	Moderate
000724		!!!	!		!!!		!
899734:		!!!	!		I .	- .	
Benzonia					Low	Low	High

Table 21.—Taxonomic Classification of the Soils

Soil name	Family or higher taxonomic class
Abscota	 Mixed, mesic Oxyaquic Udipsamments
	Sandy or sandy-skeletal, mixed, euic, mesic Terric Haplosaprists
	Coarse-loamy, mixed, active, frigid Alfic Haplorthods
	Sandy-skeletal, mixed, frigid Entic Hapludolls
Aquents	Aquents
Au Gres	Sandy, mixed, frigid Typic Endoaquods
Bach taxadjunct	Fine-loamy, mixed, semiactive, calcareous, frigid Mollic Haplaquepts
Benona	Sandy, mixed, mesic Lamellic Haplorthods
	Sandy, isotic, mesic Lamellic Haplorthods
	Coarse-loamy, mixed, semiactive, mesic Typic Hapludalfs
	Mixed, mesic Lamellic Udipsamments
=	Sandy, mixed, mesic, ortstein Entic Haplorthods
	Sandy, mixed, mesic Oxyaquic Haplorthods
	Mixed, mesic Typic Psammaquents
	Mixed, frigid Spodic Udipsamments
	Sandy, mixed, frigid Entic Haplorthods
	Mixed, frigid Spodic Udipsamments
	Marly, euic, mesic Limnic Haplosaprists
	Coarse-loamy, mixed, active, frigid Typic Eutroboralfs
	Coarse-loamy, mixed, superactive, frigid Mollic Ochraqualfs
	Loamy, mixed, active, mesic Arenic Oxyaquic Glossudalfs
	Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs
	Sandy, mixed, mesic Alfic Haplorthods
	Mixed, mesic Mollic Psammaquents
	Mesic, uncoated Typic Quartzipsamments
	Fine-loamy over sandy or sandy-skeletal, mixed, semiactive, mesic
	Fluvaquentic Endoaquolls
	Sandy, mixed, mesic Entic Haplorthods
=	Fine-loamy, mixed, active, nonacid, frigid Mollic Haplaquepts
Histosols	INISCOSOIS
Houghton	Euic, mesic Typic Haplosaprists
=	Sandy over loamy, mixed, active, frigid Argic Endoaquods
	Sandy, mixed, mesic Typic Haplorthods
	Sandy, mixed, frigid Typic Haplorthods
	Sandy, mixed, frigid Entic Haplorthods
	Sandy, mixed, frigid Alfic Haplorthods
	Dysic, mesic Typic Haplosaprists
	Euic, frigid Typic Haplosaprists
_	Coarse-silty over sandy or sandy-skeletal, carbonatic over mixed, mesic
	Histic Humaquepts
	 Sandy or sandy-skeletal, mixed, dysic, mesic Terric Haplosaprists
	Sandy, mixed, frigid Alfic Haplorthods
	Sandy or sandy-skeletal, mixed, euic, frigid Terric Haplosaprists
	Fine-loamy, mixed, semiactive, mesic Oxyaquic Glossudalfs
	Sandy, mixed, mesic Typic Epiaquods
	Sandy over loamy, mixed, active, mesic Lamellic Haplorthods
	Coarse-loamy over clayey, mixed, active, nonacid, frigid Mollic Haplaquept
Nessen	Sandy, mixed, mesic Typic Haplorthods
Nester taxadjunct	Fine, mixed, semiactive, frigid Typic Eutroboralfs
Nordhouse	Mesic, uncoated Spodic Quartzipsamments
	Coarse-loamy, mixed, active, frigid Typic Eutroboralfs
Onekama	Fine, mixed, active, mesic Haplic Glossudalfs
Perrinton	Fine, mixed, active, mesic Oxyaquic Glossudalfs
	Sandy, mixed, mesic Typic Endoaquods
Pipestone Platteriver	Mixed, mesic Oxyaquic Udipsamments
PlatteriverQuartzipsamments	Quartzipsamments
PlatteriverQuartzipsammentsRemus	Quartzipsamments Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs
PlatteriverQuartzipsammentsRemus	Quartzipsamments
PlatteriverQuartzipsammentsRemusRichter	Quartzipsamments Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs
Platteriver	Quartzipsamments Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs Coarse-loamy, mixed, semiactive, frigid Alfic Haplaquods Mixed, frigid Mollic Psammaquents Fine-loamy, mixed, semiactive, calcareous, frigid Aeric Endoaquepts
Platteriver	Quartzipsamments Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs Coarse-loamy, mixed, semiactive, frigid Alfic Haplaquods Mixed, frigid Mollic Psammaquents

Soil Survey of Sleeping Bear Dunes National Lakeshore, Michigan

Table 21.—Taxonomic Classification of the Soils—Continued

Soil name	 Family or higher taxonomic class
Spinks	 Sandy, mixed, mesic Lamellic Hapludalfs
Tekenink	Coarse-loamy, mixed, semiactive, mesic Typic Glossudalfs
Thompsonville	Sandy, mixed, mesic Alfic Oxyaquic Haplorthods
Tonkey	Coarse-loamy, mixed, semiactive, nonacid, frigid Mollic Haplaquepts
Udipsamments	Udipsamments
Udorthents	Udorthents
Wallace	Sandy, mixed, frigid, shallow, ortstein Typic Haplorthods
	i = : - : - : - : - : - : - : - : - : - :

Table 22.-Soil Classification Key

(An asterisk indicates a taxadjunct to the series)

```
ORDER
  Suborder
    Great Group
       Subgroup
         Series or Higher Category
ALFISOLS
  Aqualfs
    Ochraqualfs
       Mollic Ochragualfs
         Epoufette----- Coarse-loamy, mixed, superactive, frigid Mollic Ochraqualfs
  Boralfs
    Eutroboral fs
       Typic Eutroboralfs
         Emmet------Coarse-loamy, mixed, active, frigid Typic Eutroboralfs
         Omena-----Coarse-loamy, mixed, active, frigid Typic Eutroboralfs
         *Nester----- frigid Typic Eutroboralfs
  Udalfs
    Glossudalfs
       Typic Glossudalfs
         Tekenink------Coarse-loamy, mixed, semiactive, mesic Typic Glossudalfs
       Haplic Glossudalfs
         Onekama-----Fine, mixed, active, mesic Haplic Glossudalfs
         Filer-----Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs
         Remus-----Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs
       Oxyaquic Glossudalfs
         Perrinton-----Fine, mixed, active, mesic Oxyaquic Glossudalfs
         Marlette-----Fine-loamy, mixed, semiactive, mesic Oxyaquic Glossudalfs
       Arenic Oxyaquic Glossudalfs
         Fern-----Loamy, mixed, active, mesic Arenic Oxyaquic Glossudalfs
    Hapludalfs
       Typic Hapludalfs
         Boyer-----Coarse-loamy, mixed, semiactive, mesic Typic Hapludalfs
       Psammentic Hapludalfs
         Shavenaugh-----Mixed, mesic Psammentic Hapludalfs
       Lamellic Hapludalfs
         Spinks-----Sandy, mixed, mesic Lamellic Hapludalfs
ENTISOLS
  Aquents
         Aquents-----Aquents
    Psammaquents
       Typic Psammaquents
         Dair-----Mixed, mesic Typic Psammaquents
       Mollic Psammaquents
         Roscommon------Mixed, frigid Mollic Psammaquents
         Glendora-----Mixed, mesic Mollic Psammaquents
  Orthents
    Udorthents
         Udorthents------Udorthents
```

Table 22.-Soil Classification Key-Continued

```
ORDER
  Suborder
    Great Group
       Subgroup
         Series or Higher Category
ENTISOLS-Continued
  Psamments
    Quartzipsamments
         Quartzipsamments-----Quartzipsamments
       Typic Quartzipsamments
         Goodharbor-----Mesic, uncoated Typic Quartzipsamments
       Spodic Ouartzipsamments
         Nordhouse-----Mesic, uncoated Spodic Quartzipsamments
    Udipsamments
         Udipsamments------Udipsamments
       Oxyaquic Udipsamments
         Abscota-----Mixed, mesic Oxyaquic Udipsamments
         Platteriver-----Mixed, mesic Oxyaquic Udipsamments
       Spodic Udipsamments
         *Deer Park-----Mixed, frigid Spodic Udipsamments
         Eastport-----Mixed, frigid Spodic Udipsamments
       Lamellic Udipsamments
         Coloma-----Mixed, mesic Lamellic Udipsamments
HISTOSOLS
         Histosols-----Histosols
  Saprists
    Haplosaprists
       Typic Haplosaprists
         Lupton-----Euic, frigid Typic Haplosaprists
         Lumley-----Dysic, mesic Typic Haplosaprists
         Houghton-----Euic, mesic Typic Haplosaprists
       Limnic Haplosaprists
         Edwards----- Harly, euic, mesic Limnic Haplosaprists
       Terric Haplosaprists
         Markey-----Sandy or sandy-skeletal, mixed, euic, frigid Terric
Haplosaprists
         Makinen-----Sandy or sandy-skeletal, mixed, dysic, mesic Terric
                                  Haplosaprists
         Adrian-----Sandy or sandy-skeletal, mixed, euic, mesic Terric
                                  Haplosaprists
INCEPTISOLS
  Aquepts
    Haplaquepts
       Mollic Haplaguepts
         Munuscong------Coarse-loamy over clayey, mixed, active, nonacid, frigid
                                 Mollic Haplaquepts
         Tonkey-----Coarse-loamy, mixed, semiactive, nonacid, frigid Mollic
                                  Haplaquepts
         Hettinger-----Fine-loamy, mixed, active, nonacid, frigid Mollic Haplaquepts
         *Bach-----, calcareous, frigid Mollic
                                  Haplaquepts
    Humaquepts
       Histic Humaquepts
         Madaus-----Coarse-silty over sandy or sandy-skeletal, carbonatic over
                                  mixed, mesic Histic Humaquepts
    Endoaguepts
       Aeric Endoaquepts
         Sanilac-----Fine-loamy, mixed, semiactive, calcareous, frigid Aeric
                                  Endoaquepts
```

Table 22.-Soil Classification Key-Continued

```
ORDER
  Suborder
    Great Group
       Subgroup
         Series or Higher Category
MOLLISOLS
  Aquolls
    Endoaquolls
       Fluvaquentic Endoaquolls
         Gorvan------Fine-loamy over sandy or sandy-skeletal, mixed, semiactive,
                                  mesic Fluvaquentic Endoaquolls
  Udolls
    Hapludolls
       Entic Hapludolls
        *Alpena-----Sandy-skeletal, mixed, frigid Entic Hapludolls
SPODOSOLS
  Aquods
    Duraquods
       Typic Duraquods
         Saugatuck------Sandy, mixed, mesic, shallow, ortstein Typic Duraquods
    Haplaquods
       Alfic Haplaguods
         Richter-----Coarse-loamy, mixed, semiactive, frigid Alfic Haplaquods
    Endoaquods
       Typic Endoaquods
         Au Gres-----Sandy, mixed, frigid Typic Endoaquods
         Pipestone-----Sandy, mixed, mesic Typic Endoaquods
       Argic Endoaguods
         Iosco-----Sandy over loamy, mixed, active, frigid Argic Endoaquods
    Epiaguods
       Typic Epiaquods
         Milnichol-----Sandy, mixed, mesic Typic Epiaquods
  Orthods
    Haplorthods
       Typic Haplorthods
         Kalkaska-----Sandy, mixed, frigid Typic Haplorthods
         Kaleva-----Sandy, mixed, mesic Typic Haplorthods
         Nessen-----Sandy, mixed, mesic Typic Haplorthods
       Alfic Haplorthods
         Alcona-----Coarse-loamy, mixed, active, frigid Alfic Haplorthods
         Leelanau----Sandy, mixed, frigid Alfic Haplorthods
         Mancelona-----Sandy, mixed, frigid Alfic Haplorthods
         Fogg-----Sandy, mixed, mesic Alfic Haplorthods
         East Lake-----Sandy, mixed, frigid Entic Haplorthods
         Kiva-----Sandy, mixed, frigid Entic Haplorthods
         Grattan-----Sandy, mixed, mesic Entic Haplorthods
         Copemish-----Sandy, mixed, mesic, ortstein Entic Haplorthods
       Oxyaquic Haplorthods
         Covert-----Sandy, mixed, mesic Oxyaquic Haplorthods
       Alfic Oxyaquic Haplorthods
         Thompsonville-----Sandy, mixed, mesic Alfic Oxyaquic Haplorthods
       Lamellic Haplorthods
         Mollineaux-----Sandy over loamy, mixed, active, mesic Lamellic Haplorthods
         Benzonia-----Sandy, isotic, mesic Lamellic Haplorthods
         Benona-----Sandy, mixed, mesic Lamellic Haplorthods
    Durorthods
      Typic Haplorthods
         Wallace-----Sandy, mixed, frigid, shallow, ortstein Typic Haplorthods
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