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.

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

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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

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

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: 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 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

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

Iosco 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 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

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

Iosco 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

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: 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.

Setting
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 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: 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 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: 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-Iosco 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
Iosco and similar soils: 25 percent
Dissimilar minor components: 10 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 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-Iosco 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
Iosco 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 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: 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

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

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 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 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: 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 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

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

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

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

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

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 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

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

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

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

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

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: 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

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, 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
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 (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
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 (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 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 (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; USDA-NRCS, 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 poor source. The number 1.00 indicates that the layer is a good source. A number between 0.00 and 1.00 indicates the degree to which the layer is a likely source.

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_{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 CO_2 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 post-glacial 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/m^2 of soil inorganic carbon. This equals 128 kg/m^2 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/m^2) but only 5 kg/m^2 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/m^2. 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/m^2—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.

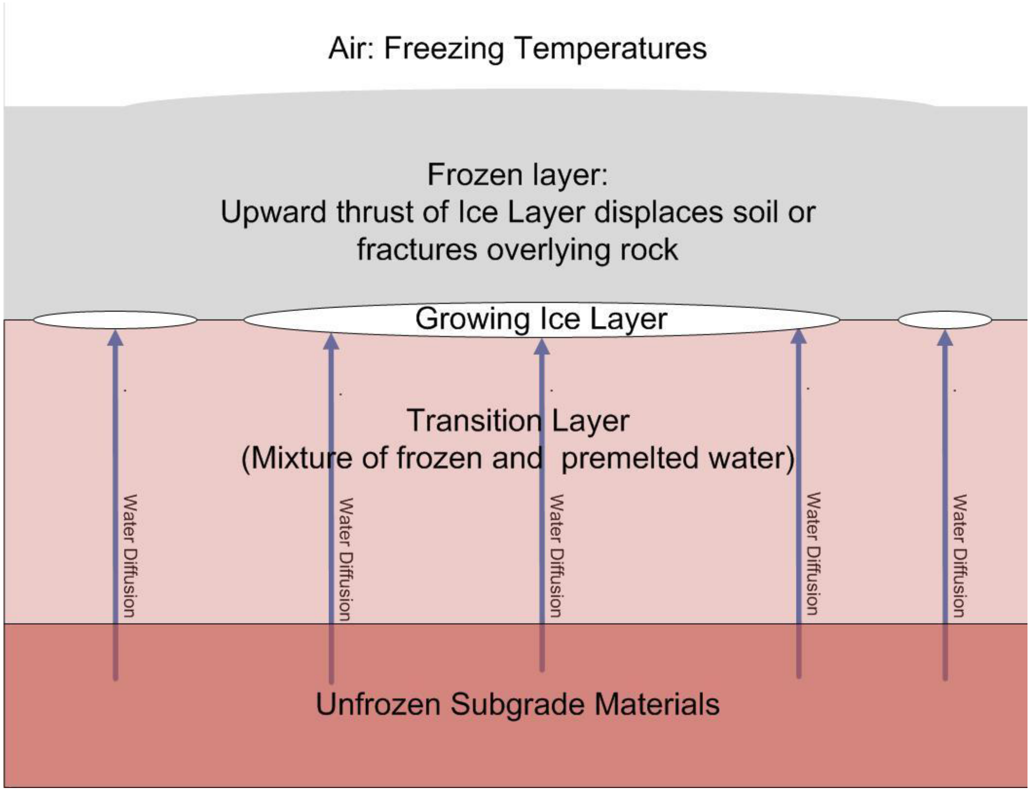

Figure 7.—Diagram illustrating ice lens formation in soils, which results in frost heave or frost action. (Image is from Williamborg [2009].)

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 topograhy 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 quartz-rich 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

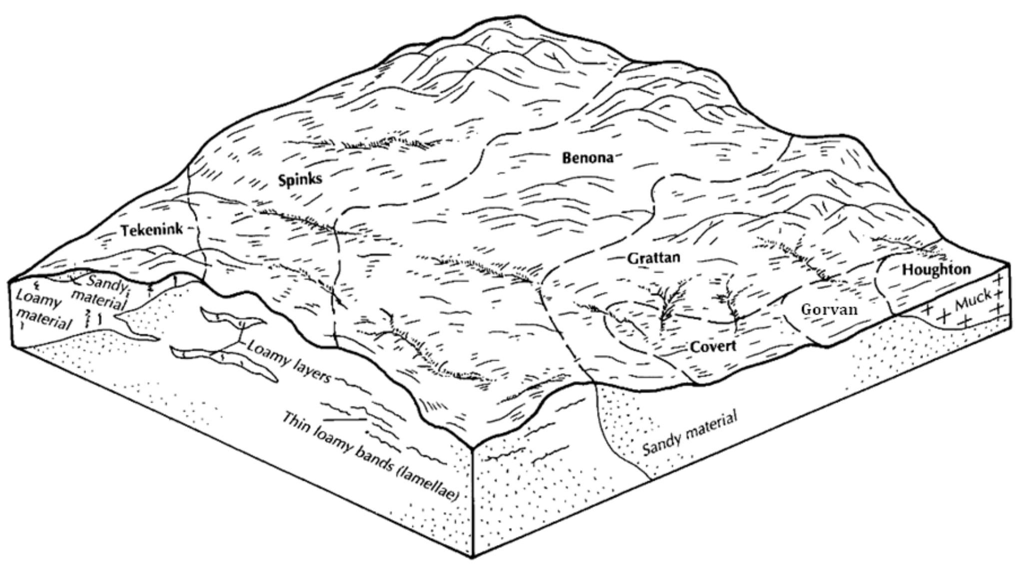

Figure 12.—Soils such as Benona, Spinks, and Grattan are on moraines and outwash plains in the southern portion of the park. Gorvan and Houghton soils are on flood plains. Houghton soils formed in residual plant material, while Gorvan soils formed in silty and clayey alluvium over sandy glaciofluvial 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	very high

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
Very slow	0.01 to 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management, such as slope, stoniness, and flooding.
pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)
Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.
Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Potential native plant community. See Climax plant community.

Potential rooting depth (effective rooting depth). Depth to which roots could penetrate if the content of moisture in the soil were adequate. The soil has no properties restricting the penetration of roots to this depth.

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 ground-water runoff or seepage flow from ground water.

Saline soil. A soil containing soluble salts in an amount that impairs growth of plants. A saline soil does not contain excess exchangeable sodium.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-sized particles.

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
Moderate	13-30:1
Strong	more than 30:1

Sodium adsorption ratio (SAR). A measure of the amount of sodium (Na) relative to calcium (Ca) and magnesium (Mg) in the water extract from saturated soil paste. It is the ratio of the Na concentration divided by the square root of one-half of the Ca + Mg concentration.

Soft bedrock. Bedrock that can be excavated with trenching machines, backhoes, small rippers, and other equipment commonly used in construction.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes, in millimeters, of separates recognized in the United States are as follows:

Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the material below the solum. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally, it is indicative of an old weathered surface. In a cross section, the line may be one fragment or more thick. It generally overlies material that weathered in place and is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter if rounded or 15 to 24 inches (38 to 60 centimeters) in length if flat.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

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
	Hettinger	15
190778:		
Alcona-Richter sandy loams, 2 to 6 percent slopes	Alcona	65
	Richter	25
	East Lake	5
	Kalkaska	5
190779:		
Alpena gravelly sandy loam, 0 to 12 percent slopes	Alpena	90
	Kiva	5
	Mancelona	5
190780:		
Au Gres-Kalkaska sands, 0 to 4 percent slopes	Au Gres	45
	Kalkaska	35
	Markey	10
	Roscommon	10
190781:		
Bach loam	Bach	90
	Edwards	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

Map unit symbol and map unit name	Components in map unit	Percent of map unit
190787:		
East Lake loamy sand, 0 to 6 percent slopes	East Lake	90
	Kalkaska	5
	Mancelona	5
190788:		
East Lake loamy sand, 6 to 12 percent slopes	East Lake	90
	Iosco	2
	Kalkaska	2
	Mancelona	2
	Munuscong	2
	Tonkey	2
190789:		
East Lake loamy sand, 12 to 18 percent slopes	East Lake	90
	Kalkaska	5
	Mancelona	5
190790:		
East Lake loamy sand, 18 to 25 percent slopes	East Lake	90
	Kalkaska	5
	Mancelona	5
190791:		
Eastport sand, 0 to 6 percent slopes	Eastport	93
	Alpena	7
190792:		
Edwards muck-Marl beds complex	Edwards	70
	Marl beds	20
	Lupton	5
	Markey	5
190794:		
Emmet-Leelanau complex, 2 to 6 percent slopes	Emmet	60
	Leelanau	30
	East Lake	4
	Alcona	3
	Nester	3

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
190795:		
Emmet-Leelanau complex, 6 to 12 percent slopes	Emmet	60
	Leelanau	30
	East Lake	5
	Nester	5
190796:		
Emmet-Leelanau complex, 12 to 18 percent slopes	Emmet	50
	Leelanau	30
	East Lake	5
	Kalkaska	5
	Nester	3
	Wallace	3
	Alcona	2
	Richter	2
190797:		
Emmet-Leelanau complex, 18 to 25 percent slopes	Emmet	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:		
Emmet-Mancelona gravelly sandy loams, 4 to 12 percent slopes	Emmet	70
	Mancelona	25
	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 slopes	Emmet	60
	Mancelona	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	2
	Leelanau	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	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 in map unit	Percent of map unit
190809: Emmet-Omena sandy loams, 25 to 50 percent slopes	Emmet	50
	Omena	45
	Kiva	2
	Leelanau	2
	Nester	1
190811: Hettinger-Muck complex	Hettinger	45
	Muck	30
	Kiva	5
	Lupton	5
	Mancelona	5
	Markey	3
	Tonkey	3
	Edwards	2
	Roscommon	2
190812: Hettinger-Tonkey loams	Hettinger	45
	Tonkey	30
	Mancelona	5
	Markey	5
	Munuscong	5
	Roscommon	5
	Lupton	3
	Epoufette	2
190814: Kalkaska sand, 0 to 6 percent slopes	Kalkaska	85
	Au Gres	3
	East Lake	3
	Iosco	3
	Mancelona	2
	Munuscong	2
	Tonkey	2

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
190815:		
Kalkaska sand, 6 to 12 percent slopes	Kalkaska	85
	East Lake	5
	Emmet	5
	Leelanau	3
	Mancelona	2
190816:		
Kalkaska sand, 12 to 18 percent slopes	Kalkaska	90
	East Lake	4
	Alcona	3
	Mancelona	3
190817:		
Kalkaska sand, 18 to 25 percent slopes	Kalkaska	90
	East Lake	3
	Leelanau	3
	Emmet	2
	Mancelona	2
190818:		
Kalkaska sand, 25 to 45 percent slopes	Kalkaska	90
	East Lake	3
	Mancelona	3
	Deer Park	2
	Wallace	2
190819:		
Kalkaska-East Lake loamy sands, 0 to 6 percent slopes	Kalkaska	55
	East Lake	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	30
	Alpena	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	Kiva	50
	Mancelona	30
	Alcona	5
	Alpena	5
	Emmet	5
	Richter	5
190823: Kiva-Mancelona gravelly sandy loams, 18 to 25 percent slopes	Kiva	50
	Mancelona	30
	Alpena	10
	Leelanau	10
190824: 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	30
	Alcona	4
	Kalkaska	3
	Mancelona	3
190827: Leelanau-East Lake loamy sands, 6 to 12 percent slopes	Leelanau	65
	East Lake	25
	Mancelona	3
	Alcona	2
	Kalkaska	2
	Nester	1
	Richter	1
	Tonkey	1

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
190828:		
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---	Leelanau	50
	East Lake	35
	Alcona	3
	Kalkaska	3
	Mancelona	3
	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 in map unit	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	3
	Leelanau	2
	Sanilac	2
190835:		
Mancelona-East Lake loamy sands, 6 to 12 percent slopes	Mancelona	55
	East Lake	35
	Alpena	3
	Kalkaska	3
	Kiva	3
	Tonkey	1
190836:		
Mancelona-East Lake loamy sands, 12 to 18 percent slopes	Mancelona	50
	East Lake	30
	Kalkaska	10
	Kiva	10
190837:		
Mancelona-East Lake loamy sands, 18 to 25 percent slopes	Mancelona	45
	East Lake	30
	Kalkaska	10
	Kiva	10
	Adrian	3
	Houghton	2

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components in map unit	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	2
	Leelanau	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 in map unit	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	Roscommon	50
	Markey	30
	Au Gres	10
	East Lake	5
	Kalkaska	5
190850:		
Sanilac silt loam, 0 to 6 percent slopes	Sanilac	90
	Bach	4
	Epoufette	3
	Hettinger	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 in map unit	Percent of map unit
190852:		
Tonkey-Munuscong-Iosco sandy loams, 2 to 6 percent slopes	Tonkey	35
	Munuscong	30
	Iosco	20
	Au Gres	4
	Kalkaska	4
	Nester	4
	Hettinger	3
190853:		
Water	Water	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	Wind eroded land	100
193236:		
Beaches	Beaches	100
193237:		
Thompsonville-Milnichol fine sands, 0 to 3 percent slopes	Thompsonville	50
	Milnichol	40
	Covert	5
	Pipestone	5
193255:		
Spinks-Coloma sands, 0 to 6 percent slopes	Spinks	50
	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	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	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	Kaleva	95
	Benzonia	2
	Nessen	2
	Grattan	1

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
193265:		
Grattan sand, 0 to 6 percent slopes	Grattan	95
	Kaleva	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	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	2
	Shavenaugh	2
193271:		
Pipestone sand, 0 to 4 percent slopes	Pipestone	90
	Saugatuck	4
	Covert	3
	Dair	3
193272:		
Dair muck	Dair	90
	Adrian	5
	Pipestone	5
193277:		
Benona sand, 0 to 6 percent slopes	Benona	90
	Benzonia	3
	Coloma	3
	Grattan	2
	Shavenaugh	2

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
193278:		
Benona sand, 6 to 12 percent slopes	Benona	90
	Benzonia	3
	Coloma	3
	Grattan	2
	Shavenaugh	2
193279:		
Benona sand, 12 to 18 percent slopes	Benona	90
	Coloma	4
	Fogg	3
	Shavenaugh	3
193284:		
Udorthents-Udipsamments complex, very steep	Udorthents	55
	Udipsamments	35
	Coloma	5
	Filer	5
193285:		
Lumley-Makinen complex	Lumley	55
	Makinen	40
	Saugatuck	5
193286:		
Histosols and Aquents, ponded	Histosols	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	100
193342:		
Gorvan-Houghton-Glendora complex, frequently flooded	Gorvan	35
	Houghton	30
	Glendora	20
	Abscota	5
	Adrian	5
	Dair	3
	Aquents	2

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
193349:		
Spinks-Coloma sands, 35 to 70 percent slopes	Spinks	50
	Coloma	40
	Benona	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	Shavenaugh	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 in map unit	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	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	100
193496:		
Nordhouse sand, 6 to 18 percent slopes	Nordhouse	95
	Platteriver	3
	Dair	2
193497:		
Nordhouse sand, 0 to 6 percent slopes	Nordhouse	95
	Platteriver	3
	Dair	2
193498:		
Nordhouse-Platteriver-Dair complex, 0 to 6 percent slopes	Nordhouse	40
	Platteriver	35
	Dair	25
193503:		
Spinks-Shavenaugh sands, 0 to 6 percent slopes	Spinks	50
	Shavenaugh	40
	Coloma	4
	Boyer	3
	Tekenink, sandy substratum	3
193504:		
Spinks-Shavenaugh sands, 6 to 12 percent slopes	Spinks	50
	Shavenaugh	40
	Coloma	4
	Boyer	3
	Tekenink, sandy substratum	3
193505:		
Spinks-Shavenaugh sands, 12 to 18 percent slopes	Spinks	50
	Shavenaugh	40
	Coloma	4
	Boyer	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
193506:		
Spinks-Shavenaugh sands, 18 to 35 percent slopes	Spinks	50
	Shavenaugh	40
	Coloma	6
	Tekenink, sandy substratum	4
193507:		
Spinks-Shavenaugh sands, 35 to 50 percent slopes	Spinks	50
	Shavenaugh	40
	Coloma	4
	Boyer	3
	Tekenink, sandy substratum	3
193508:		
Madaus muck	Madaus	90
	Dair	5
	Houghton	5
193509:		
Boyer-Shavenaugh complex, 0 to 6 percent slopes	Boyer	50
	Shavenaugh	40
	Nessen	4
	Coloma	3
	Covert	3
193510:		
Boyer-Shavenaugh complex, 6 to 12 percent slopes	Boyer	50
	Shavenaugh	40
	Coloma	5
	Nessen	5
193511:		
Boyer-Shavenaugh complex, 18 to 35 percent slopes	Boyer	50
	Shavenaugh	40
	Coloma	5
	Nessen	5
193513:		
Dair-Adrian mucks	Dair	50
	Adrian	45
	Covert	5

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
193514:		
Platteriver-Pipestone sands, 0 to 4 percent slopes	Platteriver	55
	Pipestone	40
	Dair	5
202010:		
Houghton-Adrian mucks	Houghton	55
	Adrian	40
	Dair	5
202016:		
Spinks-Tekenink, sandy substratum, complex, 0 to 6 percent slopes	Spinks	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	50
	Benzonia	40
	Mollineaux	4
	Coloma	3
	Grattan	3
631172:		
Fogg-Benzonia sands, 12 to 18 percent slopes	Fogg	50
	Benzonia	40
	Benona	4
	Coloma	3
	Mollineaux	3

Table 1.—Soil Legend—Continued

Map unit symbol and map unit name	Components in map unit	Percent of map unit
631173:		
Fogg-Benzonia sands, 6 to 12 percent slopes	Fogg	50
	Benzonia	40
	Tekenink, sandy substratum	4
	Benona	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	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 in map unit	Percent of map unit
680971:		
Nessen-Kaleva sands, 18 to 35 percent slopes	Nessen	50
	Kaleva	40
	Shavenaugh	5
	Benzonia	3
	Boyer	2
680972:		
Nessen-Kaleva sands, 12 to 18 percent slopes	Nessen	50
	Kaleva	40
	Shavenaugh	5
	Benzonia	3
	Boyer	2
680973:		
Nessen-Kaleva sands, 6 to 12 percent slopes	Nessen	50
	Kaleva	40
	Shavenaugh	5
	Benzonia	3
	Boyer	2
680974:		
Nessen-Kaleva sands, 0 to 6 percent slopes	Nessen	50
	Kaleva	40
	Shavenaugh	5
	Benzonia	3
	Boyer	2
893251:		
Boyer-Shavenaugh complex, 12 to 18 percent slopes	Boyer	50
	Shavenaugh	40
	Coloma	5
	Nessen	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 in map unit	Percent of map unit
894063:		
Remus-Spinks complex, 12 to 18 percent slopes	Remus	50
	Spinks	40
	Coloma	4
	Benzonia	3
	Tekenink, sandy substratum	3
894064:		
Fern-Remus complex, 6 to 12 percent slopes	Fern	50
	Remus	40
	Coloma	5
	Marlette	5
894065:		
Fern-Remus complex, 0 to 6 percent slopes	Fern	50
	Remus	40
	Coloma	5
	Marlette	5
894104:		
Mollineaux-Remus complex, 18 to 35 percent slopes	Mollineaux	50
	Remus	40
	Coloma	5
	Benzonia	3
	Onekama	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	50
	Tekenink, sandy substratum	40
	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	Kaleva	90
	Benzonia	5
	Grattan	5
899722:		
Goodharbor sand, 1 to 12 percent slopes	Goodharbor	90
	Nordhouse	5
	Platteriver	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:	
Alcona	2s
Richter	2w
190778:	
Alcona	2e
Richter	2e
190779:	
Alpena	6s
190780:	
Au Gres	4w
Kalkaska	4s
190781:	
Bach	5w
190782:	
Deer Park	7s
190783:	
Deer Park	7s
190784:	
Deer Park	7s
Roscommon	6w
190787:	
East Lake	4s
190788:	
East Lake	6s
190789:	
East Lake	6s
190790:	
East Lake	7s
190791:	
Eastport	6s
190792:	
Edwards	6w
Marl beds	7w

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	Land capability
190794:	
Emmet	2e
Leelanau	3s
190795:	
Emmet	3e
Leelanau	3e
190796:	
Emmet	4e
Leelanau	4e
190797:	
Emmet	6e
Leelanau	6e
190799:	
Emmet	7e
Leelanau	7e
190801:	
Emmet	3e
Mancelona	---
190803:	
Emmet	7e
Mancelona	7e
190805:	
Emmet	2e
Omena	2e
190806:	
Emmet	3e
Omena	3e
190807:	
Emmet	4e
Omena	4e
190808:	
Emmet	6e
Omena	6e
190809:	
Emmet	7e
Omena	7e
190811:	
Hettinger	5w
Muck	6w

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	Land capability
190812:	
Hettinger	5w
Tonkey	5w
190814:	
Kalkaska	4s
190815:	
Kalkaska	6s
190816:	
Kalkaska	6s
190817:	
Kalkaska	7s
190818:	
Kalkaska	7s
190819:	
Kalkaska	4s
East Lake	4s
190820:	
Kiva	3s
Mancelona	---
190821:	
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:	
Leelanau	7e
East Lake	7s

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	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

Map unit symbol and component name	Land capability
190848:	
Richter	2e
Alcona	2e
190849:	
Roscommon	6w
Markey	5w
190850:	
Sanilac	2e
190851:	
Tonkey	5w
Munuscong	5w
Iosco	3w
190852:	
Tonkey	5w
Munuscong	5w
Iosco	3w
190854:	
Wallace	6s
Kalkaska	6s
193237:	
Thompsonville	4s
Milnichol	4w
193255:	
Spinks	3s
Coloma	4s
193256:	
Spinks	3e
Coloma	6s
193257:	
Spinks	4e
Coloma	6s
193258:	
Spinks	6e
Coloma	7s
193260:	
Copemish	6s
193262:	
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	6w
Makinen	6w
193286:	
Histosols	8w
Aquents	8w
193287:	
Quartzipsamments	---
193288:	
Udipsamments	7s
193342:	
Gorvan	6w
Houghton	5w
Glendora	6w

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	Land capability
193349:	
Spinks	7e
Coloma	7s
193351:	
Benona	7s
193354:	
Quartzipsamments	---
193357:	
Shavenaugh	7s
193359:	
Shavenaugh	6s
193360:	
Shavenaugh	4s
193362:	
Benzonia	7s
193363:	
Benzonia	6s
193364:	
Benzonia	6s
193365:	
Benzonia	4s
193371:	
Dair	5w
Pipestone	4w
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

Map unit symbol and component name	Land capability
193504:	
Spinks	3e
Shavenaugh	6s
193505:	
Spinks	4e
Shavenaugh	6s
193506:	
Spinks	6e
Shavenaugh	7s
193507:	
Spinks	7e
Shavenaugh	7s
193508:	
Madaus	5w
193509:	
Boyer	3s
Shavenaugh	4s
193510:	
Boyer	3e
Shavenaugh	6s
193511:	
Boyer	7e
Shavenaugh	7s
193513:	
Dair	5w
Adrian	5w
193514:	
Platteriver	4s
Pipestone	4w
202010:	
Houghton	5w
Adrian	5w
202016:	
Spinks	3s
Tekenink, sandy substratum	2e
631170:	
Fogg	7s
Benzonia	7s

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	Land capability
631171:	
Fogg	7s
Benzonia	7s
631172:	
Fogg	7s
Benzonia	6s
631173:	
Fogg	6s
Benzonia	6s
631174:	
Fogg	3s
Benzonia	4s
680939:	
Fern	3e
Spinks	3e
680943:	
Milnichol	4w
680945:	
Fern	3e
680946:	
Fern	3s
680971:	
Nessen	7s
Kaleva	7s
680972:	
Nessen	6s
Kaleva	7s
680973:	
Nessen	6s
Kaleva	6s
680974:	
Nessen	4s
Kaleva	4s
893251:	
Boyer	4e
Shavenaugh	6s
894062:	
Remus	7e
Spinks	6e

Table 2.—Land Capability Classification—Continued

Map unit symbol and component name	Land capability
894063:	
Remus	4e
Spinks	4e
894064:	
Fern	3e
Remus	3e
894065:	
Fern	3s
Remus	2e
894104:	
Mollineaux	7e
Remus	7e
894105:	
Mollineaux	4e
Remus	4e
894165:	
Spinks	7e
Tekenink, sandy substratum	7e
899682:	
Kaleva	7s
899722:	
Goodharbor	6s
899731:	
Covert	4s
Pipestone	4w
899733:	
Covert	4s
Dair	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
190806	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
190812	Hettinger-Tonkey loams	Prime farmland if drained
190820	Kiva-Mancelona gravelly sandy loams, 2 to 6 percent slopes	Farmland of local importance
190821	Kiva-Mancelona gravelly sandy loams, 6 to 12 percent slopes	Farmland of local importance
190826	Leelanau-East Lake loamy sands, 0 to 6 percent slopes	Farmland of local importance
190827	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
190840	Nester silt loam, 2 to 6 percent slopes	All areas are prime farmland
190841	Nester silt loam, 6 to 12 percent slopes	Farmland of local importance
190842	Nester silt loam, 12 to 18 percent slopes	Farmland of local importance
190847	Richter-Alcona sandy loams, 0 to 2 percent slopes	Prime farmland if drained
190848	Richter-Alcona sandy loams, 2 to 6 percent slopes	Prime farmland if drained
190850	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
190852	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)

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
190775: Adrian-Houghton mucks	Adrian	55	depressions on outwash plains, depressions on moraines	3, 1	No	No	Yes
	Houghton	45	depressions on lake plains, depressions on outwash plains	3, 1	No	No	Yes
190777: Alcona-Richter sandy loams, 0 to 2 percent slopes	Hettinger	15	depressions on lake plains	3, 2B3	Yes	No	Yes
190780: Au Gres-Kalkaska sands, 0 to 4 percent slopes	Markey	10	depressions on outwash plains, depressions on lake plains, depressions on moraines	1, 3	No	No	Yes
	Roscommon	10	depressions on lake plains, depressions on outwash plains	2B1, 3	Yes	No	Yes
190781: Bach loam	Bach	90	depressions, lake plains	2B3, 3	Yes	No	Yes
	Edwards	5	depressions on moraines, depressions on outwash plains	3, 1	No	No	Yes
190784: Deer Park-Roscommon sands, 0 to 6 percent slopes	Roscommon	25	depressions on lake plains, depressions on outwash plains	2B1, 3	Yes	No	Yes
	Markey	5	depressions on outwash plains, depressions on lake plains, depressions on moraines	1, 3	No	No	Yes

Table 4.—Hydric Soils—Continued

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
190788: East Lake loamy sand, 6 to 12 percent slopes	Munuscong	2	depressions on lake plains, depressions on outwash plains	2B3, 3	Yes	No	Yes
	Tonkey	2	outwash plains, depressions on lake plains, depressions on glacial drainageways	2B3, 3	Yes	No	Yes
190792: Edwards muck-Marl beds complex	Edwards	70	depressions on moraines, depressions on outwash plains	1, 3	No	No	Yes
	Marl beds	20	depressions	3, 2B3	Yes	No	Yes
	Lupton	5	depressions on lake terraces, moraines, till plains	3, 1	No	No	Yes
	Markey	5	depressions on outwash plains, depressions on lake plains, depressions on moraines	3, 1	No	No	Yes
190803: Emmet-Mancelona gravelly sandy loams, 18 to 35 percent slopes	Lupton	2	depressions, lake terraces, moraines, till plains	3, 1	No	No	Yes
	Markey	2	depressions on outwash plains, depressions on lake plains, depressions on moraines	1, 3	No	No	Yes
190806: Emmet-Omena sandy loams, 6 to 12 percent slopes	Hettinger	1	depressions on lake plains	3, 2B3	Yes	No	Yes
	Tonkey	1	outwash plains, depressions on lake plains, depressions on glacial drainageways	2B3, 3	Yes	No	Yes

Table 4.—Hydric Soils—Continued

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
190811: Hettinger-Muck complex	Hettinger	45	depressions on lake plains	2B3, 3	Yes	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	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	Yes

Table 4.—Hydric Soils—Continued

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
190812: Hettinger-Tonkey loams	Hettinger	45	depressions on lake plains	3, 2B3	Yes	No	Yes
	Tonkey	30	outwash plains, depressions on lake plains, depressions on glacial drainageways	2B3, 3	Yes	No	Yes
	Markey	5	depressions on outwash plains, depressions on lake plains, depressions on moraines	1, 3	No	No	Yes
	Munuscong	5	depressions on lake plains, depressions on outwash plains	2B3, 3	Yes	No	Yes
	Roscommon	5	depressions on lake plains, depressions on outwash plains	2B1, 3	Yes	No	Yes
	Lupton	3	depressions, lake terraces, moraines, till plains	1, 3	No	No	Yes
	Epoufette	2	depressions on lake plains	2B2, 3	Yes	No	Yes
190814: Kalkaska sand, 0 to 6 percent slopes	Munuscong	2	depressions on lake plains, depressions on outwash plains	2B3, 3	Yes	No	Yes
	Tonkey	2	outwash plains, depressions on lake plains, depressions on glacial drainageways	3, 2B3	Yes	No	Yes
190827: Leelanau-East Lake loamy sands, 6 to 12 percent slopes	Tonkey	1	outwash plains, depressions on lake plains, depressions on glacial drainageways	2B3, 3	Yes	No	Yes

Table 4.—Hydric Soils—Continued

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
190831: Lupton-Markey mucks	Lupton	60	depressions on lake terraces, moraines, till plains	1, 3	No	No	Yes
	Markey	30	depressions on outwash plains, depressions on lake plains, depressions on moraines	3, 1	No	No	Yes
	Edwards	5	depressions on moraines, depressions on outwash plains	3, 1	No	No	Yes
	Roscommon	5	depressions on lake plains, depressions on outwash plains	2B1, 3	Yes	No	Yes
190835: Mancelona-East Lake loamy sands, 6 to 12 percent slopes	Tonkey	1	outwash plains, depressions on lake plains, depressions on glacial drainageways	3, 2B3	Yes	No	Yes
190837: Mancelona-East Lake loamy sands, 18 to 25 percent slopes	Adrian	3	depressions on moraines, depressions on outwash plains	3, 1	No	No	Yes
	Houghton	2	depressions on outwash plains, depressions on lake plains	1, 3	No	No	Yes
190839: Mancelona-Richter gravelly sandy loams, 0 to 6 percent slopes	Epoufette	2	depressions on lake plains	3, 2B2	Yes	No	Yes
	Tonkey	2	outwash plains, depressions on lake plains, depressions on glacial drainageways	2B3, 3	Yes	No	Yes
190847: Richter-Alcona sandy loams, 0 to 2 percent slopes	Tonkey	15	outwash plains, depressions on lake plains, depressions on glacial drainageways	3, 2B3	Yes	No	Yes

Table 4.—Hydric Soils—Continued

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
190848: Richter-Alcona sandy loams, 2 to 6 percent slopes	Tonkey	10	outwash plains, depressions on lake plains, depressions on glacial drainageways	3, 2B3	Yes	No	Yes
190849: Roscommon sand-Markey muck	Roscommon	50	depressions on lake plains, depressions on outwash plains	3, 2B1	Yes	No	Yes
	Markey	30	depressions on outwash plains, depressions on lake plains, depressions on moraines	3, 1	No	No	Yes
190850: Sanilac silt loam, 0 to 6 percent slopes	Bach	4	lake plains, depressions	2B3, 3	Yes	No	Yes
	Epoufette	3	depressions on lake plains	2B2, 3	Yes	No	Yes
	Hettinger	2	depressions on lake plains	2B3, 3	Yes	No	Yes
	Edwards	1	depressions on moraines, depressions on outwash plains	1, 3	No	No	Yes
190851: Tonkey-Munuscong-Iosco sandy loams, 0 to 2 percent slopes	Tonkey	40	outwash plains, depressions on lake plains, depressions on glacial drainageways	3, 2B3	Yes	No	Yes
	Munuscong	25	depressions on lake plains, depressions on outwash plains	3, 2B3	Yes	No	Yes

Table 4.—Hydric Soils—Continued

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
190852: Tonkey-Munuscong-Iosco sandy loams, 2 to 6 percent slopes	Tonkey	35	outwash plains, depressions on lake plains, depressions on glacial drainageways	2B3, 3	Yes	No	Yes
	Munuscong	30	depressions on lake plains, depressions on outwash plains	2B3, 3	Yes	No	Yes
	Hettinger	3	depressions on lake plains	2B3, 3	Yes	No	Yes
193271: Pipestone sand, 0 to 4 percent slopes	Dair	3	depressions on outwash plains, depressions on lake plains, depressions on beach ridges	3, 2B3	Yes	No	Yes
193272: Dair muck	Dair	90	depressions on lake plains, drainageways on lake plains, drainageways on outwash plains, depressions on outwash plains	2B3, 3	Yes	No	Yes
	Adrian	5	drainageways on lake plains, depressions on lake plains, drainageways on outwash plains, depressions on outwash plains	3, 1	No	No	Yes
193285: Lumley-Makinen complex	Lumley	55	depressions on lake plains, depressions on moraines, depressions on outwash plains	1, 3	No	No	Yes
	Makinen	40	depressions on lake plains, depressions on moraines, depressions on outwash plains	3, 1	No	No	Yes

Table 4.—Hydric Soils—Continued

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
193286: Histosols and Aquents, ponded	Histosols	55	marshes	3, 1	No	No	Yes
	Aquents	45	marshes	2B3, 3	Yes	No	Yes
193342: Gorvan-Houghton-Glendora complex, frequently flooded	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	No	No	Yes
	Dair	3	flood plains	3, 2B3	Yes	No	Yes
	Aquents	2	flood plains	3, 2B3	Yes	No	Yes
193371: Dair-Pipestone complex, 0 to 2 percent slopes	Dair	50	depressions on lake plains, depressions on outwash plains	2B3, 3	Yes	No	Yes
	Houghton	5	depressions on lake plains, depressions on outwash plains	3, 1	No	No	Yes
193496: Nordhouse sand, 6 to 18 percent slopes	Dair	2	depressions on dunes, depressions on beach ridges	3, 2B3	Yes	No	Yes
193497: Nordhouse sand, 0 to 6 percent slopes	Dair	2	depressions on beach ridges, depressions on dunes, depressions on lake plains	2B3, 3	Yes	No	Yes
193498: Nordhouse-Platteriver-Dair complex, 0 to 6 percent slopes	Dair	25	depressions on lake plains, depressions on dunes, depressions on beach ridges	2B3, 3	Yes	No	Yes

Table 4.—Hydric Soils—Continued

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
193508: Madaus muck	Madaus	90	depressions on outwash plains, depressions on lake plains	2B3, 3	Yes	No	Yes
	Dair	5	depressions on outwash plains, depressions on lake plains	2B3, 3	Yes	No	Yes
	Houghton	5	depressions on outwash plains, depressions on lake plains	3, 1	No	No	Yes
193513: Dair-Adrian mucks	Dair	50	depressions on lake plains, drainageways on lake plains, drainageways on outwash plains, depressions on outwash plains	2B3, 3	Yes	No	Yes
	Adrian	45	depressions on lake plains, depressions on outwash plains, drainageways on lake plains, drainageways on outwash plains	3, 1	No	No	Yes
193514: Platteriver-Pipestone sands, 0 to 4 percent slopes	Dair	5	depressions on dunes, depressions on beach ridges	3, 2B3	Yes	No	Yes

Table 4.—Hydric Soils—Continued

Map unit symbol and map unit name	Component	Percent of map unit	Landform	Hydric soils criteria: Hydric criteria code	Meets saturation criteria	Meets flooding criteria	Meets ponding criteria
202010: Houghton-Adrian mucks	Houghton	55	depressions on lake plains, depressions on moraines, depressions on outwash plains, flood plains	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	2B3, 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	No	Yes
	Houghton	2	depressions on outwash plains	3, 1	No	No	Yes

Explanation of hydric criteria codes

1. 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.
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.

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)

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190775:						
Adrian	55	0-2	600-1499	25-35	Depression on lake plain	16 to 51 inches of organic material over sandy glaciofluvial deposits
Houghton	45	0-2	600-1401	27-34	Depression on lake plain	More than 51 inches of organic material
190777:						
Alcona	55	0-2	600-1601	28-34	Lake plain	Stratified sandy and loamy glaciofluvial deposits and/or glaciolacustrine deposits
Richter	30	0-2	600-1401	27-33	Lake plain	25 to 40 inches of sandy and/or loamy material over stratified, calcareous sandy and silty glaciofluvial deposits
190778:						
Alcona	65	2-6	600-1601	28-34	Lake plain	Stratified sandy and loamy glaciofluvial deposits and/or glaciolacustrine deposits
Richter	25	2-6	600-1401	27-33	Lake plain	25 to 40 inches of sandy and/or loamy material over stratified, calcareous sandy and silty glaciofluvial deposits
190779:						
Alpena	90	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

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190780:						
Au Gres	45	0-4	600-1801	27-34	Lake plain	Sandy glaciofluvial deposits
Kalkaska	35	0-4	600-1900	27-34	Lake plain	Sandy glaciofluvial deposits
190781:						
Bach	90	0-2	600-1201	27-33	Depression on lake plain	Calcareous silty lacustrine deposits
190782:						
Deer Park	100	6-18	600-699	27-34	Dunes	Sandy eolian deposits and/or lacustrine deposits
190783:						
Deer Park	100	18-45	600-699	27-34	Dunes	Sandy eolian deposits and/or lacustrine deposits
190784:						
Deer Park	70	0-6	600-699	27-34	Lake plain	Sandy eolian deposits and/or lacustrine deposits
Roscommon	25	0-2	600-1499	22-34	Depression on lake plain	Sandy glaciofluvial deposits
190787:						
East Lake	90	0-6	600-1001	27-32	Outwash plain	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190788:						
East Lake	90	6-12	600-1001	27-32	Outwash plain	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190789:						
East Lake	90	12-18	600-1001	27-32	Outwash plain	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190790:						
East Lake	90	18-25	600-1001	27-32	Outwash plain	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190791:						
Eastport	93	0-6	600-699	27-31	Dunes	Sandy eolian deposits
190792:						
Edwards	70	0-2	669-1401	19-33	Depression	16 to 51 inches of organic material over marl deposits
Marl beds	20	0-1	600-1001	27-32	Depression	---
190794:						
Emmet	60	2-6	600-1201	28-32	Ice-margin complex	24 to 50 inches of loamy material over calcareous loamy till
Leelanau	30	2-6	600-1401	27-32	Ice-margin complex	20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits
190795:						
Emmet	60	6-12	600-1201	28-32	Ice-margin complex	24 to 50 inches of loamy material over calcareous loamy till
Leelanau	30	6-12	600-1401	27-32	Ice-margin complex	20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits
190796:						
Emmet	50	12-18	600-1201	28-32	Ice-margin complex	24 to 50 inches of loamy material over calcareous loamy till
Leelanau	30	12-18	600-1401	27-32	Ice-margin complex	20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits
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	18-25	600-1401	27-32	Ice-margin complex	20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190799:						
Emmet	45	25-50	600-1201	28-32	Ice-margin complex	24 to 50 inches of loamy material over calcareous loamy till
Leelanau	30	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	70	4-12	600-1201	28-32	Ice-margin complex	24 to 50 inches of loamy material over calcareous loamy till
Mancelona	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	60	18-35	600-1201	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	50	2-6	600-1201	28-32	Moraine	24 to 50 inches of loamy material over calcareous loamy till
Omena	45	2-6	600-801	28-30	Moraine	Loamy till
190806:						
Emmet	50	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

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
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	600-801	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	24 to 50 inches of loamy material over calcareous loamy till
Omena	45	25-50	600-801	28-30	Moraine	Loamy till
190811:						
Hettinger	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	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

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190816:						
Kalkaska	90	12-18	600-1900	27-34	Moraine	Sandy glaciofluvial deposits over till
190817:						
Kalkaska	90	18-25	600-1900	27-34	Moraine	Sandy glaciofluvial deposits over till
190818:						
Kalkaska	90	25-45	600-1900	27-34	Moraine	Sandy glaciofluvial deposits over till
190819:						
Kalkaska	55	0-6	600-1900	27-34	Moraine	Sandy glaciofluvial deposits over till
East Lake	35	0-6	600-1001	27-32	Moraine	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
190820:						
Kiva	65	2-6	600-1001	27-32	Outwash plain	10 to 24 inches of loamy material over sandy and gravelly glaciofluvial deposits
Mancelona	30	2-6	600-1001	27-32	Outwash plain	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190821:						
Kiva	50	6-12	600-1001	27-32	Ice-margin complex	10 to 24 inches of loamy material over sandy and gravelly glaciofluvial deposits
Mancelona	30	6-12	600-1001	27-32	Ice-margin complex	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190823:						
Kiva	50	18-25	600-1001	27-32	Moraine	10 to 24 inches of loamy material over sandy and gravelly glaciofluvial deposits and till

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190823:						
Mancelona----------	30	18-25	600-1001	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	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	0-6	600-1001	27-32	Beach ridge	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190827:						
Leelanau-----------	65	6-12	600-1401	27-32	Moraine	20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits and till
East Lake----------	25	6-12	600-1001	27-32	Moraine	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
190828:						
Leelanau-----------	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----------	25	12-18	600-1001	27-32	Moraine	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
190829:						
Leelanau-----------	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	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190829:						
East Lake	35	18-25	600-1001	27-32	Moraine	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
190830:						
Leelanau	50	25-45	600-1401	27-32	Moraine	20 to 52 inches of sandy and loamy material over calcareous sandy glaciofluvial deposits and till
East Lake	35	25-45	600-1001	27-32	Moraine	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits and till
190831:						
Lupton	60	0-2	600-1401	27-34	Depression on lake plain and moraine	More than 51 inches of organic material
Markey	30	0-2	600-1401	22-44	Depression on lake plain and moraine	16 to 51 inches of organic material over sandy glaciofluvial deposits and till
190832:						
Mancelona	90	0-6	600-1001	27-32	Outwash plain	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190833:						
Mancelona	90	6-12	600-1001	27-32	Outwash plain	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
190834:						
Mancelona	60	0-6	600-1001	27-32	Outwash plain	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190834:						
East Lake	30	0-6	600-1001	27-32	Beach ridge and outwash plain	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190835:						
Mancelona	55	6-12	600-1001	27-32	Outwash plain	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
East Lake	35	6-12	600-1001	27-32	Outwash plain	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190836:						
Mancelona	50	12-18	600-1001	27-32	Outwash plain	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
East Lake	30	12-18	600-1001	27-32	Outwash plain	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
190837:						
Mancelona	45	18-25	600-1001	27-32	Outwash plain	18 to 40 inches of sandy and/or gravelly material over calcareous sandy and gravelly glaciofluvial deposits
East Lake	30	18-25	600-1001	27-32	Outwash plain	20 to 40 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190838:						
Mancelona----------	50	25-45	600-1001	27-32	Outwash plain	18 to 40 inches of 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
190839:						
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	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	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	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	18-25	600-1401	27-32	Moraine	20 to 36 inches of loamy and clayey material over calcareous loamy and clayey till

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190844:						
Nester	90	25-50	600-1401	27-32	Moraine	20 to 36 inches of loamy and clayey material over calcareous loamy and clayey till
190847:						
Richter	45	0-2	600-1401	27-33	Ice-margin complex	25 to 40 inches of sandy and/or loamy material over stratified, calcareous sandy and silty glaciofluvial deposits
Alcona	40	0-2	600-1601	28-34	Ice-margin complex	Stratified sandy and loamy glaciofluvial deposits and/or glaciolacustrine deposits
190848:						
Richter	45	2-6	600-1401	27-33	Ice-margin complex	25 to 40 inches of sandy and/or loamy material over stratified, calcareous sandy and silty glaciofluvial deposits
Alcona	40	2-6	600-1601	28-34	Ice-margin complex	Stratified sandy and loamy glaciofluvial deposits and/or glaciolacustrine deposits
190849:						
Roscommon	50	0-2	600-1499	22-34	Depression on lake plain	Sandy glaciofluvial deposits
Markey	30	0-2	600-1401	22-44	Depression on lake plain	16 to 51 inches of organic material over sandy glaciofluvial deposits
190850:						
Sanilac	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	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
190851:						
Tonkey	40	0-2	600-1601	27-34	Depression on moraine	Stratified loamy and sandy glaciofluvial deposits
Iosco	25	0-2	600-1401	28-32	Moraine	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	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	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

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
193255:						
Spinks	50	0-6	577-1119	28-38	Moraine	Sandy glaciofluvial deposits, till or eolian deposits
Coloma	40	0-6	577-1119	28-38	Moraine	Sandy glaciofluvial deposits and till
193256:						
Spinks	50	6-12	577-1119	28-38	Moraine	Sandy glaciofluvial deposits, till, or eolian deposits
Coloma	40	6-12	577-1119	28-38	Moraine	Sandy glaciofluvial deposits and/or till
193257:						
Spinks	55	12-18	577-1119	28-38	Moraine	Sandy glaciofluvial deposits, till, or eolian deposits
Coloma	35	12-18	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till
193258:						
Spinks	50	18-35	577-1119	28-38	Moraine	Sandy glaciofluvial deposits, till, or eolian deposits
Coloma	40	18-35	577-1119	28-38	Moraine	Sandy glaciofluvial deposits and/or till
193260:						
Copemish	95	3-12	591-981	27-38	Beach ridge and dune on lake plain	Ortstein in sandy glaciofluvial deposits
193262:						
Kaleva	95	0-6	577-1119	28-38	Outwash plain	Sandy glaciofluvial deposits
193263:						
Kaleva	95	6-12	577-1119	28-38	Outwash plain	Sandy glaciofluvial deposits
193265:						
Grattan	95	0-6	577-1119	28-38	Lake plain	Sandy glaciofluvial deposits
193266:						
Grattan	95	6-12	577-1119	28-38	Lake plain	Sandy glaciofluvial deposits
193267:						
Grattan	95	12-18	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till
193269:						
Grattan	95	35-50	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
193270:						
Covert	90	0-6	577-1119	28-38	Lake plain	Sandy glaciofluvial deposits
193271:						
Pipestone	90	0-4	577-1119	28-38	Glacial drainage channel	Sandy glaciofluvial deposits
193272:						
Dair	90	0-2	577-1119	28-38	Depression on outwash plain	4 to 8 inches of organic material over sandy glaciofluvial deposits
193277:						
Benona	90	0-6	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till
193278:						
Benona	90	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	55	35-70	577-1119	28-38	---	Loamy and/or clayey material
Udipsamments	35	35-70	577-1119	28-38	---	Sandy material
193285:						
Lumley	55	0-2	577-1119	28-38	Depression on lake plain	More than 51 inches of acid organic material
Makinen	40	0-2	577-1119	28-38	Depression on lake plain	16 to 51 inches of organic material over sandy glaciofluvial deposits
193286:						
Histosols	55	0-2	577-1119	28-38	Marsh	16 to more than 51 inches of organic material
Aquents	45	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	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
193288:						
Udipsamments	100	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	0-2	577-1119	28-38	Flood plain	More than 51 inches of organic material
Glendora	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	35-70	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till
193351:						
Benona	95	18-35	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till
193354:						
Quartzipsamments	40	6-18	577-1119	28-38	Dunes	Sandy eolian deposits and/or glaciofluvial deposits
193357:						
Shavenaugh	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	6-12	577-1119	28-38	Moraine	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits or till
193360:						
Shavenaugh	85	0-6	577-1119	28-38	Moraine	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits or till
193362:						
Benzonia	90	18-35	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
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	Depression on lake plain	4 to 8 inches of organic material over sandy glaciofluvial deposits
Pipestone	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	100	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	95	0-6	577-1119	28-38	Dunes	Sandy eolian deposits
193498:						
Nordhouse	40	0-6	577-1119	28-38	Dunes	Sandy eolian deposits
Platteriver	35	0-6	577-1119	28-38	Dunes	Sandy glaciofluvial deposits
Dair	25	0-2	577-1119	28-38	Depression on lake plain	4 to 8 inches of organic material over sandy glaciofluvial deposits
193503:						
Spinks	50	0-6	577-1119	28-38	Moraine	Sandy glaciofluvial deposits, till, or eolian deposits
Shavenaugh	40	0-6	577-1119	28-38	Moraine	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	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
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	50	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:						
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:						
Spinks	50	35-50	577-1119	28-38	Moraine	Sandy glaciofluvial deposits, till, and eolian deposits
Shavenaugh	40	35-50	577-1119	28-38	Moraine	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits or till
193508:						
Madaus	90	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	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
193509:						
Boyer	50	0-6	577-1119	28-38	Outwash plain	20 to 40 inches of loamy and sandy material over calcareous sandy and gravelly glaciofluvial deposits
Shavenaugh	40	0-6	577-1119	28-38	Outwash plain	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
193510:						
Boyer	50	6-12	577-1119	28-38	Outwash plain	20 to 40 inches of loamy and sandy material over calcareous sandy and gravelly glaciofluvial deposits
Shavenaugh	40	6-12	577-1119	28-38	Outwash plain	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
193511:						
Boyer	50	18-35	577-1119	28-38	Outwash plain	20 to 40 inches of loamy and sandy material over calcareous sandy and gravelly glaciofluvial deposits
Shavenaugh	40	18-35	577-1119	28-38	Outwash plain	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
193513:						
Dair	50	0-2	577-1119	28-38	Depression on lake plain	4 to 8 inches of organic material over sandy glaciofluvial deposits
Adrian	45	0-2	577-1119	28-38	Depression on lake plain	16 to 51 inches of organic material over sandy glaciofluvial deposits

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
193514:						
Platteriver	55	0-4	577-1119	28-38	Lake plain	Sandy glaciofluvial deposits
Pipestone	40	0-4	577-1119	28-38	Lake plain	Sandy glaciofluvial deposits
202010:						
Houghton	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	Depression on lake plain	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
Tekenink, sandy substratum	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	50	35-50	577-1119	28-38	Moraine	40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial deposits
Benzonia	40	35-50	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till
631171:						
Fogg	50	18-35	577-1119	28-38	Moraine	40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial deposits
Benzonia	40	18-35	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
631172:						
Fogg	50	12-18	577-1119	28-38	Moraine	40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial deposits
Benzonia	40	12-18	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till
631173:						
Fogg	50	6-12	577-1119	28-38	Moraine	40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial deposits
Benzonia	40	6-12	577-1119	28-38	Moraine	Sandy glaciofluvial deposits
631174:						
Fogg	50	0-6	577-1119	28-38	Moraine	40 to 60 inches of sandy glaciofluvial deposits over loamy till over sandy glaciofluvial deposits
Benzonia	40	0-6	577-1119	28-38	Moraine	Sandy glaciofluvial deposits or till
680939:						
Fern	50	6-12	577-1119	28-38	Moraine	20 to 40 inches of sandy glaciofluvial deposits over loamy till
Spinks	40	6-12	577-1119	28-38	Moraine	Sandy glaciofluvial deposits, till, or eolian deposits
680943:						
Milnichol	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

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
680945:						
Fern	90	6-12	577-1119	28-38	Moraine	20 to 40 inches of sandy glaciofluvial deposits over loamy till
680946:						
Fern	90	0-6	577-1119	28-38	Moraine	20 to 40 inches of sandy glaciofluvial deposits over loamy till
680971:						
Nessen	50	18-35	577-1119	28-38	Outwash plain	40 to 55 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
Kaleva	40	18-35	577-1119	28-38	Outwash plain	Sandy glaciofluvial deposits
680972:						
Nessen	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	12-18	577-1119	28-38	Outwash plain	Sandy glaciofluvial deposits
680973:						
Nessen	50	6-12	577-1119	28-38	Outwash plain	40 to 55 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
Kaleva	40	6-12	577-1119	28-38	Outwash plain	Sandy glaciofluvial deposits
680974:						
Nessen	50	0-6	577-1119	28-38	Outwash plain	40 to 55 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
Kaleva	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	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
893251:						
Boyer	50	12-18	577-1119	28-38	Outwash plain	20 to 40 inches of loamy and sandy material over calcareous sandy and gravelly glaciofluvial deposits
Shavenaugh	40	12-18	577-1119	28-38	Outwash plain	30 to 50 inches of sandy material over calcareous sandy and gravelly glaciofluvial deposits
894062:						
Remus	50	18-35	577-1119	28-38	Moraine	40 to more than 60 inches of loamy material over calcareous loamy till
Spinks	40	18-35	577-1119	28-38	Moraine	Sandy glaciofluvial deposits, till, or eolian deposits
894063:						
Remus	50	12-18	577-1119	28-38	Moraine	40 to more than 60 inches of loamy material over calcareous loamy till
Spinks	40	12-18	577-1119	28-38	Moraine	Sandy glaciofluvial deposits, till, or eolian deposits
894064:						
Fern	50	6-12	577-1119	28-38	Moraine	20 to 40 inches of sandy glaciofluvial deposits over loamy till
Remus	40	6-12	577-1119	28-38	Moraine	40 to more than 60 inches of loamy material over calcareous loamy till
894065:						
Fern	50	0-6	577-1119	28-38	Moraine	20 to 40 inches of sandy glaciofluvial deposits over loamy till

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
894065:						
Remus	40	0-6	577-1119	28-38	Moraine	40 to more than 60 inches of loamy material over calcareous loamy till
894104:						
Mollineaux	50	18-35	577-1119	28-38	Moraine	Sandy glaciofluvial deposits over loamy till
Remus	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	12-18	577-1119	28-38	Moraine	40 to more than 60 inches of loamy material over calcareous loamy till
894165:						
Spinks	50	35-50	577-1119	28-38	Glacial drainage channel	Sandy glaciofluvial deposits and/or eolian deposits
Tekenink, sandy substratum	40	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	90	1-12	577-1119	28-38	Dunes on lake plain	Sandy eolian deposits
899731:						
Covert	50	0-6	577-1119	28-38	Lake plain	Sandy glaciofluvial deposits
Pipestone	40	0-3	577-1119	28-38	Lake plain	Sandy glaciofluvial deposits

Table 5.—Landform and Parent Material—Continued

Map unit symbol and soil name	Percent of map unit	Slope	Elevation	MAP	Landform	Parent material
	Pct	Pct	Ft	In		
899733:						
Covert	50	0-6	577-1119	28-38	Lake plain	Sandy glaciofluvial deposits
Dair	45	0-2	577-1119	28-38	Depression on lake plain	4 to 8 inches of organic material over sandy glaciofluvial deposits
899734:						
Benzonia	90	35-50	577-1119	28-38	Moraine	Sandy glaciofluvial deposits and/or till

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)

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
190775:							
Adrian	55	Well suited		Well suited		Severe	
						Low strength	1.00
Houghton	45	Well suited		Well suited		Severe	
						Low strength	1.00
190777:							
Alcona	55	Well suited		Well suited		Moderate	
						Low strength	0.50
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		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
				Rock fragments	0.50		
190780:							
Au Gres	45	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Kalkaska	35	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
190781:							
Bach	90	Well suited		Well suited		Severe	
						Low strength	1.00
190782:							
Deer Park	100	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190783:							
Deer Park	100	Well suited		Unsuited		Moderate	
				Slope	1.00	Low strength	0.50
190784:							
Deer Park	70	Well suited		Well suited		Moderate	
						Low strength	0.50
Roscommon	25	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
190786:							
Dune land	100	Not rated		Not rated		Not rated	

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
190787:							
East Lake	90	Well suited		Well suited		Moderate	
						Low strength	0.50
190788:							
East Lake	90	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190789:							
East Lake	90	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190790:							
East Lake	90	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
190791:							
Eastport	93	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
190792:							
Edwards	70	Poorly suited		Poorly suited		Severe	
		Wetness	0.75	Wetness	0.75	Low strength	1.00
						Wetness	0.50
Marl beds	20	Moderately suited		Poorly suited		Severe	
		Wetness	0.50	Wetness	0.75	Low strength	1.00
						Wetness	0.50
190794:							
Emmet	60	Well suited		Well suited		Moderate	
						Low strength	0.50
Leelanau	30	Well suited		Well suited		Moderate	
						Low strength	0.50
190795:							
Emmet	60	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Leelanau	30	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190796:							
Emmet	50	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Leelanau	30	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190797:							
Emmet	50	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
Leelanau	30	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
190799:							
Emmet	45	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
Leelanau	30	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
190801:							
Emmet	70	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Mancelona	25	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190803:							
Emmet	60	Well suited		Unsuited		Moderate	
				Slope	1.00	Low strength	0.50
Mancelona	30	Well suited		Unsuited		Moderate	
				Slope	1.00	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	0.50
190806:							
Emmet	50	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Omena	45	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190807:							
Emmet	50	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Omena	45	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190808:							
Emmet	50	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
Omena	45	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
190809:							
Emmet	50	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
Omena	45	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	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	1.00

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
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		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
190815:							
Kalkaska	85	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
190816:							
Kalkaska	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
190817:							
Kalkaska	90	Moderately suited		Poorly suited		Moderate	
		Sandiness	0.50	Slope	0.75	Low strength	0.50
				Sandiness	0.50		
190818:							
Kalkaska	90	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
		Slope	0.50	Sandiness	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		Moderate	
				Slope	0.50	Low strength	0.50
Mancelona	30	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190823:							
Kiva	50	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
Mancelona	30	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
190824:							
Lake beaches	100	Not rated		Not rated		Not rated	

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
190825:							
Lake bluffs	100	Not rated		Not rated		Not rated	
190826:							
Leelanau	60	Well suited		Well suited		Moderate	
						Low strength	0.50
East Lake	30	Well suited		Well suited		Moderate	
						Low strength	0.50
190827:							
Leelanau	65	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
East Lake	25	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190828:							
Leelanau	65	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
East Lake	25	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190829:							
Leelanau	50	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
East Lake	35	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
190830:							
Leelanau	50	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
East Lake	35	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	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		Moderate	
				Slope	0.50	Low strength	0.50
190834:							
Mancelona	60	Well suited		Well suited		Moderate	
						Low strength	0.50
East Lake	30	Well suited		Well suited		Moderate	
						Low strength	0.50

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
190835:							
Mancelona	55	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
East Lake	35	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190836:							
Mancelona	50	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
East Lake	30	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
190837:							
Mancelona	45	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
East Lake	30	Well suited		Poorly suited		Moderate	
				Slope	0.75	Low strength	0.50
190838:							
Mancelona	50	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
East Lake	30	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
190839:							
Mancelona	70	Well suited		Well suited		Moderate	
						Low strength	0.50
Richter	25	Well suited		Well suited		Moderate	
						Low strength	0.50
190840:							
Nester	90	Moderately suited		Moderately suited		Severe	
		Stickiness; high plasticity index	0.50	Stickiness; high plasticity index	0.50	Low strength	1.00
190841:							
Nester	90	Moderately suited		Moderately suited		Severe	
		Stickiness; high plasticity index	0.50	Slope	0.50	Low strength	1.00
				Stickiness; high plasticity index	0.50		
190842:							
Nester	90	Moderately suited		Moderately suited		Severe	
		Stickiness; high plasticity index	0.50	Slope	0.50	Low strength	1.00
				Stickiness; high plasticity index	0.50		
190843:							
Nester	90	Moderately suited		Poorly suited		Severe	
		Stickiness; high plasticity index	0.50	Slope	0.75	Low strength	1.00
				Stickiness; high plasticity index	0.50		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
190844:							
Nester	90	Moderately suited		Unsuited		Severe	
		Slope	0.50	Slope	1.00	Low strength	1.00
		Stickiness; high plasticity index	0.50	Stickiness; high plasticity index	0.50		
190846:							
Pits, gravel	100	Not rated		Not rated		Not rated	
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	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	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	0.50
Iosco	25	Well suited		Well suited		Moderate	
						Low strength	0.50
190852:							
Tonkey	35	Well suited		Well suited		Moderate	
						Low strength	0.50
Munuscong	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 map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
190854:							
Wallace	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
				Slope	0.50		
Kalkaska	45	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
				Slope	0.50		
190855:							
Wind eroded land	100	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
				Slope	0.50		
190856:							
Wind eroded land	100	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
193236:							
Beaches	100	Not rated		Not rated		Not rated	
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		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Coloma	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193256:							
Spinks	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Coloma	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193257:							
Spinks	55	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Coloma	35	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193258:							
Spinks	50	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
Coloma	40	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
193260:							
Copemish------------	95	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
		Restrictive layer	0.50	Slope	0.50		
193262:							
Kaleva--------------	95	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193263:							
Kaleva--------------	95	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193265:							
Grattan-------------	95	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193266:							
Grattan-------------	95	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193267:							
Grattan-------------	95	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193269:							
Grattan-------------	95	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
193270:							
Covert--------------	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193271:							
Pipestone-----------	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193272:							
Dair----------------	90	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
193277:							
Benona--------------	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193278:							
Benona--------------	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193279:							
Benona--------------	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
193284:							
Udorthents	55	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
Udipsamments	35	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
193285:							
Lumley	55	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
Makinen	40	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
193286:							
Histosols	55	Poorly suited		Poorly suited		Severe	
		Wetness	0.75	Wetness	0.75	Low strength	1.00
						Wetness	0.50
Aquents	45	Poorly suited		Poorly suited		Moderate	
		Wetness	0.75	Wetness	0.75	Wetness	0.50
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193287:							
Dune land	55	Not rated		Not rated		Not rated	
Quartzipsamments	40	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
193288:							
Udipsamments	100	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193342:							
Gorvan	35	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
Houghton	30	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
Glendora	20	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Wetness	0.50
		Wetness	0.50	Wetness	0.50	Low strength	0.50
193349:							
Spinks	50	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
Coloma	40	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
193351:							
Benona	95	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
193354:							
Dune land	50	Not rated		Not rated		Not rated	
Quartzipsamments	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193357:							
Shavenaugh	85	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
193359:							
Shavenaugh	85	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193360:							
Shavenaugh	85	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193362:							
Benzonia	90	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
193363:							
Benzonia	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193364:							
Benzonia	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193365:							
Benzonia	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193371:							
Dair	50	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
Pipestone	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193372:							
Access Denied	100	Not rated		Not rated		Not rated	
193423:							
Benona	95	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
193484:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
193494:							
Nordhouse	100	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
		Slope	0.50	Sandiness	0.50		
193496:							
Nordhouse	95	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193497:							
Nordhouse	95	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193498:							
Nordhouse	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Platteriver	35	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Dair	25	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
193503:							
Spinks	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Shavenaugh	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193504:							
Spinks	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Shavenaugh	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193505:							
Spinks	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Shavenaugh	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193506:							
Spinks	50	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
Shavenaugh	40	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
193507:							
Spinks	50	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
Shavenaugh	40	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
193508:							
Madaus	90	Moderately suited		Poorly suited		Severe	
		Wetness	0.50	Wetness	0.75	Low strength	1.00
						Wetness	0.50
193509:							
Boyer	50	Well suited		Moderately suited		Moderate	
				Rock fragments	0.50	Low strength	0.50
Shavenaugh	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
193510:							
Boyer	50	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
				Rock fragments	0.50		
Shavenaugh	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
193511:							
Boyer	50	Well suited		Unsuited		Moderate	
				Slope	1.00	Low strength	0.50
				Rock fragments	0.50		
Shavenaugh	40	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
193513:							
Dair	50	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
Adrian	45	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
193514:							
Platteriver	55	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Pipestone	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
202010:							
Houghton	55	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
Adrian	40	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
202016:							
Spinks	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Tekenink, sandy substratum	40	Well suited		Well suited		Moderate	
						Low strength	0.50
631170:							
Fogg	50	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
Benzonia	40	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
631171:							
Fogg	50	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
Benzonia	40	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
631172:							
Fogg	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Benzonia	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
631173:							
Fogg	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Benzonia	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
631174:							
Fogg	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Benzonia	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
680939:							
Fern	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Spinks	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
680943:							
Milnichol	90	Well suited		Well suited		Moderate	
						Low strength	0.50
680945:							
Fern	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
680946:							
Fern	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
680971:							
Nessen	50	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
Kaleva	40	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
680972:							
Nessen	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Kaleva	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
680973:							
Nessen	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Kaleva	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
680974:							
Nessen	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Kaleva	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
893251:							
Boyer	50	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
				Rock fragments	0.50		
Shavenaugh	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
894062:							
Remus	50	Well suited		Unsuited		Moderate	
				Slope	1.00	Low strength	0.50
Spinks	40	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
894063:							
Remus	50	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
Spinks	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
894064:							
Fern	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Remus	40	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
894065:							
Fern	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Remus	40	Well suited		Well suited		Moderate	
						Low strength	0.50
894104:							
Mollineaux	50	Moderately suited		Unsuited		Moderate	
		Sandiness	0.50	Slope	1.00	Low strength	0.50
				Sandiness	0.50		
Remus	40	Well suited		Unsuited		Moderate	
				Slope	1.00	Low strength	0.50
894105:							
Mollineaux	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Slope	0.50	Low strength	0.50
				Sandiness	0.50		
Remus	40	Well suited		Moderately suited		Moderate	
				Slope	0.50	Low strength	0.50
894165:							
Spinks	50	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
Tekenink, sandy substratum	40	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
899682:							
Kaleva	90	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		
899722:							
Goodharbor	90	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
				Slope	0.50		

Table 6.—Land Management, Part I (Planting)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for hand planting: Rating class and limiting features	Value	Suitability for mechanical planting: Rating class and limiting features	Value	Soil rutting hazard: Rating class and limiting features	Value
899731:							
Covert	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Pipestone	40	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
899733:							
Covert	50	Moderately suited		Moderately suited		Moderate	
		Sandiness	0.50	Sandiness	0.50	Low strength	0.50
Dair	45	Moderately suited		Moderately suited		Severe	
		Wetness	0.50	Wetness	0.50	Low strength	1.00
						Wetness	0.50
899734:							
Benzonia	90	Moderately suited		Unsuited		Moderate	
		Slope	0.50	Slope	1.00	Low strength	0.50
		Sandiness	0.50	Sandiness	0.50		

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)

Map unit symbol and soil name	Pct. of map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
190775:							
Adrian	55	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
Houghton	45	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
190777:							
Alcona	55	Slight		Slight		Well suited	
Richter	30	Slight		Slight		Moderately suited	
						Wetness	0.50
						Dusty	0.01
190778:							
Alcona	65	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
Richter	25	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Wetness	0.50
						Dusty	0.01
190779:							
Alpena	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
190780:							
Au Gres	45	Slight		Slight		Moderately suited	
						Wetness	0.50
						Sandiness	0.50
Kalkaska	35	Slight		Slight		Moderately suited	
						Sandiness	0.50
190781:							
Bach	90	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Low strength	0.50
						Dusty	0.01
190782:							
Deer Park	100	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
190783:							
Deer Park	100	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	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 map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
190784:							
Deer Park	70	Slight		Slight		Well suited	
Roscommon	25	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Sandiness	0.50
190786:							
Dune land	100	Not rated		Not rated		Not rated	
190787:							
East Lake	90	Slight		Slight		Well suited	
190788:							
East Lake	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
190789:							
East Lake	90	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
190790:							
East Lake	90	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
190791:							
Eastport	93	Slight		Slight		Moderately suited	
						Sandiness	0.50
190792:							
Edwards	70	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Flooding	1.00
						Wetness	1.00
						Dusty	0.01
Marl beds	20	Slight		Slight		Poorly suited	
						Low strength	1.00
						Dusty	0.03
190794:							
Emmet	60	Slight		Moderate		Well suited	
				Slope/erodibility	0.50	Dusty	0.01
Leelanau	30	Slight		Slight		Well suited	
190795:							
Emmet	60	Slight		Severe		Moderately suited	
				Slope/erodibility	0.95	Slope	0.50
						Dusty	0.01
Leelanau	30	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
190796:							
Emmet	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Leelanau	30	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
190797:							
Emmet	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Leelanau	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
190799:							
Emmet	45	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Leelanau	30	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
190801:							
Emmet	70	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Dusty	0.01
Mancelona	25	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
190803:							
Emmet	60	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Mancelona	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
190805:							
Emmet	50	Slight		Moderate		Well suited	
				Slope/erodibility	0.50	Dusty	0.01
Omena	45	Slight		Moderate		Well suited	
				Slope/erodibility	0.50	Dusty	0.01
190806:							
Emmet	50	Slight		Severe		Moderately suited	
				Slope/erodibility	0.95	Slope	0.50
						Dusty	0.01
Omena	45	Slight		Severe		Moderately suited	
				Slope/erodibility	0.95	Slope	0.50
						Dusty	0.01

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
190807:							
Emmet	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Omena	45	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
190808:							
Emmet	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Omena	45	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
190809:							
Emmet	50	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Omena	45	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
190811:							
Hettinger	45	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Low strength	0.50
						Dusty	0.02
Muck	30	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
190812:							
Hettinger	45	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Low strength	0.50
						Dusty	0.02
Tonkey	30	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Low strength	0.50
						Dusty	0.01
190814:							
Kalkaska	85	Slight		Slight		Moderately suited	
						Sandiness	0.50
190815:							
Kalkaska	85	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						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 map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
190816:							
Kalkaska	90	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
190817:							
Kalkaska	90	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
190818:							
Kalkaska	90	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
190819:							
Kalkaska	55	Slight		Slight		Well suited	
East Lake	35	Slight		Slight		Well suited	
190820:							
Kiva	65	Slight		Slight		Well suited	
Mancelona	30	Slight		Slight		Well suited	
190821:							
Kiva	50	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Dusty	0.01
Mancelona	30	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
190823:							
Kiva	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Mancelona	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
190824:							
Lake beaches	100	Not rated		Not rated		Not rated	
190825:							
Lake bluffs	100	Not rated		Not rated		Not rated	
190826:							
Leelanau	60	Slight		Slight		Well suited	
East Lake	30	Slight		Slight		Well suited	
190827:							
Leelanau	65	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
East Lake	25	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
190828:							
Leelanau	65	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
East Lake	25	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
190829:							
Leelanau	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
East Lake	35	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
190830:							
Leelanau	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
East Lake	35	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
190831:							
Lupton	60	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
Markey	30	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
190832:							
Mancelona	90	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
190833:							
Mancelona	90	Slight		Severe		Moderately suited	
				Slope/erodibility	0.95	Slope	0.50
190834:							
Mancelona	60	Slight		Slight		Well suited	
East Lake	30	Slight		Slight		Well suited	
190835:							
Mancelona	55	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
East Lake	35	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
190836:							
Mancelona	50	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
East Lake	30	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	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 map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
190837:							
Mancelona	45	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
East Lake	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
190838:							
Mancelona	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
East Lake	30	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
190839:							
Mancelona	70	Slight		Slight		Well suited	
Richter	25	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Wetness	0.50
						Dusty	0.01
190840:							
Nester	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Low strength	0.50
						Dusty	0.03
190841:							
Nester	90	Slight		Severe		Moderately suited	
				Slope/erodibility	0.95	Slope	0.50
						Low strength	0.50
						Dusty	0.03
190842:							
Nester	90	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Low strength	0.50
						Dusty	0.03
190843:							
Nester	90	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Low strength	0.50
						Dusty	0.03
190844:							
Nester	90	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Low strength	0.50
						Dusty	0.03
190846:							
Pits, gravel	100	Not rated		Not rated		Not rated	
190847:							
Richter	45	Slight		Slight		Moderately suited	
						Wetness	0.50
						Dusty	0.01
Alcona	40	Slight		Slight		Well suited	

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
190848:							
Richter	45	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Wetness	0.50
						Dusty	0.01
Alcona	40	Slight		Moderate		Well suited	
				Slope/erodibility	0.50		
190849:							
Roscommon	50	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Sandiness	0.50
Markey	30	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
190850:							
Sanilac	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Low strength	0.50
						Flooding	0.50
						Wetness	0.50
						Dusty	0.01
190851:							
Tonkey	40	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
Munuscong	25	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
Iosco	25	Slight		Slight		Moderately suited	
						Wetness	0.50
190852:							
Tonkey	35	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
Munuscong	30	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Dusty	0.01
Iosco	20	Slight		Slight		Moderately suited	
						Wetness	0.50
190853:							
Water	100	Not rated		Not rated		Not rated	

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
190854:							
Wallace	50	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Sandiness	0.50
						Slope	0.50
Kalkaska	45	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Sandiness	0.50
						Slope	0.50
190855:							
Wind eroded land	100	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Sandiness	0.50
						Slope	0.50
190856:							
Wind eroded land	100	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	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	0.50
Coloma	40	Slight		Slight		Moderately suited	
						Sandiness	0.50
193256:							
Spinks	50	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
Coloma	40	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
193257:							
Spinks	55	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
Coloma	35	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
193258:							
Spinks	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Coloma	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						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 map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
193260:							
Copemish	95	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Sandiness	0.50
						Slope	0.50
193262:							
Kaleva	95	Slight		Slight		Moderately suited	
						Sandiness	0.50
193263:							
Kaleva	95	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
193265:							
Grattan	95	Slight		Slight		Moderately suited	
						Sandiness	0.50
193266:							
Grattan	95	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
193267:							
Grattan	95	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
193269:							
Grattan	95	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193270:							
Covert	90	Slight		Slight		Moderately suited	
						Sandiness	0.50
193271:							
Pipestone	90	Slight		Slight		Moderately suited	
						Sandiness	0.50
						Wetness	0.50
193272:							
Dair	90	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
193277:							
Benona	90	Slight		Slight		Moderately suited	
						Sandiness	0.50
193278:							
Benona	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
193279:							
Benona	90	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						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 map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
193284:							
Udorthents	55	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Udipsamments	35	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193285:							
Lumley	55	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.03
Makinen	40	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.03
193286:							
Histosols	55	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.03
Aquents	45	Slight		Slight		Poorly suited	
						Ponding	1.00
						Wetness	1.00
						Sandiness	0.50
193287:							
Dune land	55	Not rated		Not rated		Not rated	
Quartzipsamments	40	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193288:							
Udipsamments	100	Slight		Slight		Moderately suited	
						Sandiness	0.50
193342:							
Gorvan	35	Slight		Slight		Poorly suited	
						Ponding	1.00
						Flooding	1.00
						Wetness	1.00
						Low strength	0.50
						Dusty	0.03
Houghton	30	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Flooding	1.00
						Wetness	1.00
						Dusty	0.03

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
193342:							
Glendora	20	Slight		Slight		Poorly suited	
						Ponding	1.00
						Flooding	1.00
						Wetness	1.00
						Sandiness	0.50
193349:							
Spinks	50	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Coloma	40	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193351:							
Benona	95	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193354:							
Dune land	50	Not rated		Not rated		Not rated	
Quartzipsamments	40	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
193357:							
Shavenaugh	85	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193359:							
Shavenaugh	85	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
193360:							
Shavenaugh	85	Slight		Slight		Moderately suited	
						Sandiness	0.50
193362:							
Benzonia	90	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193363:							
Benzonia	90	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
193364:							
Benzonia	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	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 map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
193371:							
Dair	50	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
Pipestone	40	Slight		Slight		Moderately suited	
						Sandiness	0.50
						Wetness	0.50
193372:							
Access Denied	100	Not rated		Not rated		Not rated	
193423:							
Benona	95	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193484:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
193494:							
Nordhouse	100	Very severe		Severe		Poorly suited	
		Slope/erodibility	0.95	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193496:							
Nordhouse	95	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	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	1.00
						Ponding	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		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
Shavenaugh	40	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						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 map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
193505:							
Spinks	50	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
Shavenaugh	40	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
193506:							
Spinks	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Shavenaugh	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193507:							
Spinks	50	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Shavenaugh	40	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193508:							
Madaus	90	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Dusty	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		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Dusty	0.01
Shavenaugh	40	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
193511:							
Boyer	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Shavenaugh	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
193513:							
Dair	50	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
193513:							
Adrian	45	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.03
193514:							
Platteriver	55	Slight		Slight		Moderately suited	
						Sandiness	0.50
Pipestone	40	Slight		Slight		Moderately suited	
						Sandiness	0.50
						Wetness	0.50
202010:							
Houghton	55	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.03
Adrian	40	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
						Wetness	1.00
						Dusty	0.03
202016:							
Spinks	50	Slight		Slight		Moderately suited	
						Sandiness	0.50
Tekenink, sandy substratum	40	Slight		Slight		Well suited	
631170:							
Fogg	50	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Benzonia	40	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
631171:							
Fogg	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Benzonia	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
631172:							
Fogg	50	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
Benzonia	40	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						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 map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
631173:							
Fogg	50	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
Benzonia	40	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	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		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
Spinks	40	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
680943:							
Milnichol	90	Slight		Slight		Moderately suited	
						Wetness	0.50
680945:							
Fern	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
680946:							
Fern	90	Slight		Slight		Moderately suited	
						Sandiness	0.50
680971:							
Nessen	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Kaleva	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
680972:							
Nessen	50	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
Kaleva	40	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
680973:							
Nessen	50	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						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 map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
680973:							
Kaleva	40	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	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		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Dusty	0.01
Shavenaugh	40	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
894062:							
Remus	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Spinks	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
894063:							
Remus	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
Spinks	40	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
894064:							
Fern	50	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Slope	0.50
						Sandiness	0.50
Remus	40	Slight		Severe		Moderately suited	
				Slope/erodibility	0.95	Slope	0.50
						Dusty	0.01
894065:							
Fern	50	Slight		Slight		Moderately suited	
						Sandiness	0.50
Remus	40	Slight		Moderate		Well suited	
				Slope/erodibility	0.50	Dusty	0.01
894104:							
Mollineaux	50	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Remus	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01

Table 6.—Land Management, Part II (Hazard of Erosion and Suitability for Roads)—Continued

Map unit symbol and soil name	Pct. of map unit	Hazard of erosion: Rating class and limiting features	Value	Hazard of erosion on roads and trails: Rating class and limiting features	Value	Suitability for roads (natural surface): Rating class and limiting features	Value
894105:							
Mollineaux	50	Moderate		Moderate		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.50	Slope	1.00
						Sandiness	0.50
Remus	40	Moderate		Severe		Poorly suited	
		Slope/erodibility	0.50	Slope/erodibility	0.95	Slope	1.00
						Dusty	0.01
894165:							
Spinks	50	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
Tekenink, sandy substratum	40	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
899682:							
Kaleva	90	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Sandiness	0.50
899722:							
Goodharbor	90	Slight		Moderate		Moderately suited	
				Slope/erodibility	0.50	Sandiness	0.50
						Slope	0.50
899731:							
Covert	50	Slight		Slight		Moderately suited	
						Sandiness	0.50
Pipestone	40	Slight		Slight		Moderately suited	
						Sandiness	0.50
						Wetness	0.50
899733:							
Covert	50	Slight		Slight		Moderately suited	
						Sandiness	0.50
Dair	45	Slight		Slight		Poorly suited	
						Low strength	1.00
						Ponding	1.00
899734:							
Benzonia	90	Severe		Severe		Poorly suited	
		Slope/erodibility	0.75	Slope/erodibility	0.95	Slope	1.00
						Sandiness	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)

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
190775:					
Adrian	55	Well suited		Well suited	
Houghton	45	Well suited		Well suited	
190777:					
Alcona	55	Well suited		Well suited	
Richter	30	Well suited		Well suited	
190778:					
Alcona	65	Well suited		Well suited	
Richter	25	Well suited		Well suited	
190779:					
Alpena	90	Well suited		Well suited	
190780:					
Au Gres	45	Well suited		Well suited	
Kalkaska	35	Well suited		Well suited	
190781:					
Bach	90	Well suited		Well suited	
190782:					
Deer Park	100	Well suited		Well suited	
190783:					
Deer Park	100	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190784:					
Deer Park	70	Well suited		Well suited	
Roscommon	25	Well suited		Well suited	
190786:					
Dune land	100	Not rated		Not rated	
190787:					
East Lake	90	Well suited		Well suited	
190788:					
East Lake	90	Well suited		Well suited	
190789:					
East Lake	90	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190790:					
East Lake	90	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
190791:					
Eastport	93	Well suited		Well suited	
190792:					
Edwards	70	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.75
Marl beds	20	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
190794:					
Emmet	60	Well suited		Well suited	
Leelanau	30	Well suited		Well suited	
190795:					
Emmet	60	Well suited		Well suited	
Leelanau	30	Well suited		Well suited	
190796:					
Emmet	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Leelanau	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190797:					
Emmet	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Leelanau	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190799:					
Emmet	45	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
Leelanau	30	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
190801:					
Emmet	70	Well suited		Well suited	
Mancelona	25	Well suited		Well suited	
190803:					
Emmet	60	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Mancelona	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190805:					
Emmet	50	Well suited		Well suited	
Omena	45	Well suited		Well suited	

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
190806:					
Emmet	50	Well suited		Well suited	
Omena	45	Well suited		Well suited	
190807:					
Emmet	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Omena	45	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190808:					
Emmet	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Omena	45	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190809:					
Emmet	50	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
Omena	45	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
190811:					
Hettinger	45	Well suited		Well suited	
Muck	30	Well suited		Well suited	
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	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190817:					
Kalkaska	90	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190818:					
Kalkaska	90	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190819:					
Kalkaska	55	Well suited		Well suited	
East Lake	35	Well suited		Well suited	

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
190820:					
Kiva----------------	65	Well suited		Well suited	
Mancelona-----------	30	Well suited		Well suited	
190821:					
Kiva----------------	50	Well suited		Well suited	
Mancelona-----------	30	Well suited		Well suited	
190823:					
Kiva----------------	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Mancelona-----------	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190824:					
Lake beaches--------	100	Not rated		Not rated	
190825:					
Lake bluffs---------	100	Not rated		Not rated	
190826:					
Leelanau------------	60	Well suited		Well suited	
East Lake-----------	30	Well suited		Well suited	
190827:					
Leelanau------------	65	Well suited		Well suited	
East Lake-----------	25	Well suited		Well suited	
190828:					
Leelanau------------	65	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
East Lake-----------	25	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190829:					
Leelanau------------	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
East Lake-----------	35	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190830:					
Leelanau------------	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
East Lake-----------	35	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190831:					
Lupton--------------	60	Well suited		Well suited	
Markey--------------	30	Well suited		Well suited	
190832:					
Mancelona-----------	90	Well suited		Well suited	

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
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		Poorly suited	
		Slope	0.50	Slope	0.50
East Lake-----------	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190837:					
Mancelona-----------	45	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
East Lake-----------	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190838:					
Mancelona-----------	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
East Lake-----------	30	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190839:					
Mancelona-----------	70	Well suited		Well suited	
Richter-------------	25	Well suited		Well suited	
190840:					
Nester--------------	90	Well suited		Well suited	
190841:					
Nester--------------	90	Well suited		Well suited	
190842:					
Nester--------------	90	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190843:					
Nester--------------	90	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
190844:					
Nester--------------	90	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
190846:					
Pits, gravel--------	100	Not rated		Not rated	

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
190847:					
Richter	45	Well suited		Well suited	
Alcona	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	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	
190852:					
Tonkey	35	Well suited		Well suited	
Munuscong	30	Well suited		Well suited	
Iosco	20	Well suited		Well suited	
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	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193236:					
Beaches	100	Not rated		Not rated	
193237:					
Thompsonville	50	Unsuited		Well suited	
		Wetness	1.00		
Milnichol	40	Unsuited		Well suited	
		Wetness	1.00		
193255:					
Spinks	50	Well suited		Well suited	
Coloma	40	Well suited		Well suited	

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
193256:					
Spinks	50	Well suited		Well suited	
Coloma	40	Well suited		Well suited	
193257:					
Spinks	55	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Coloma	35	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193258:					
Spinks	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Coloma	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193260:					
Copemish	95	Well suited		Well suited	
193262:					
Kaleva	95	Well suited		Well suited	
193263:					
Kaleva	95	Well suited		Well suited	
193265:					
Grattan	95	Well suited		Well suited	
193266:					
Grattan	95	Well suited		Well suited	
193267:					
Grattan	95	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193269:					
Grattan	95	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
193270:					
Covert	90	Well suited		Well suited	
193271:					
Pipestone	90	Unsuited		Well suited	
		Wetness	1.00		
193272:					
Dair	90	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
193277:					
Benona	90	Well suited		Well suited	
193278:					
Benona	90	Well suited		Well suited	
193279:					
Benona	90	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
193284:					
Udorthents	55	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
Udipsamments	35	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
193285:					
Lumley	55	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
Makinen	40	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
193286:					
Histosols	55	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.75
Aquents	45	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.75
193287:					
Dune land	55	Not rated		Not rated	
Quartzipsamments	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
193288:					
Udipsamments	100	Well suited		Well suited	
193342:					
Gorvan	35	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
Houghton	30	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
Glendora	20	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
193349:					
Spinks	50	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
Coloma	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
193351:					
Benona	95	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193354:					
Dune land	50	Not rated		Not rated	
Quartzipsamments	40	Well suited		Well suited	
193357:					
Shavenaugh	85	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
193359:					
Shavenaugh----------	85	Well suited		Well suited	
193360:					
Shavenaugh----------	85	Well suited		Well suited	
193362:					
Benzonia------------	90	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193363:					
Benzonia------------	90	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193364:					
Benzonia------------	90	Well suited		Well suited	
193365:					
Benzonia------------	90	Well suited		Well suited	
193371:					
Dair----------------	50	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
Pipestone-----------	40	Unsuited		Well suited	
		Wetness	1.00		
193372:					
Access Denied-------	100	Not rated		Not rated	
193423:					
Benona--------------	95	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
193484:					
Pits, sand and gravel-------------	100	Not rated		Not rated	
193494:					
Nordhouse-----------	100	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
193496:					
Nordhouse-----------	95	Well suited		Well suited	
193497:					
Nordhouse-----------	95	Well suited		Well suited	
193498:					
Nordhouse-----------	40	Well suited		Well suited	
Platteriver---------	35	Unsuited		Well suited	
		Wetness	1.00		
Dair----------------	25	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
193503:					
Spinks--------------	50	Well suited		Well suited	
Shavenaugh----------	40	Well suited		Well suited	

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
193504:					
Spinks	50	Well suited		Well suited	
Shavenaugh	40	Well suited		Well suited	
193505:					
Spinks	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Shavenaugh	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193506:					
Spinks	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Shavenaugh	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193507:					
Spinks	50	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
Shavenaugh	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
193508:					
Madaus	90	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
193509:					
Boyer	50	Well suited		Well suited	
Shavenaugh	40	Well suited		Well suited	
193510:					
Boyer	50	Well suited		Well suited	
Shavenaugh	40	Well suited		Well suited	
193511:					
Boyer	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Shavenaugh	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
193513:					
Dair	50	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
Adrian	45	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
193514:					
Platteriver	55	Unsuited		Well suited	
		Wetness	1.00		
Pipestone	40	Unsuited		Well suited	
		Wetness	1.00		

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
202010:					
Houghton	55	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
Adrian	40	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
202016:					
Spinks	50	Well suited		Well suited	
Tekenink, sandy substratum	40	Well suited		Well suited	
631170:					
Fogg	50	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
Benzonia	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
631171:					
Fogg	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Benzonia	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
631172:					
Fogg	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Benzonia	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
631173:					
Fogg	50	Well suited		Well suited	
Benzonia	40	Well suited		Well suited	
631174:					
Fogg	50	Well suited		Well suited	
Benzonia	40	Well suited		Well suited	
680939:					
Fern	50	Well suited		Well suited	
Spinks	40	Well suited		Well suited	
680943:					
Milnichol	90	Unsuited		Well suited	
		Wetness	1.00		
680945:					
Fern	90	Well suited		Well suited	
680946:					
Fern	90	Well suited		Well suited	

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
680971:					
Nessen	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Kaleva	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
680972:					
Nessen	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Kaleva	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
680973:					
Nessen	50	Well suited		Well suited	
Kaleva	40	Well suited		Well suited	
680974:					
Nessen	50	Well suited		Well suited	
Kaleva	40	Well suited		Well suited	
893251:					
Boyer	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Shavenaugh	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
894062:					
Remus	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Spinks	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
894063:					
Remus	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Spinks	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
894064:					
Fern	50	Well suited		Well suited	
Remus	40	Well suited		Well suited	
894065:					
Fern	50	Well suited		Well suited	
Remus	40	Well suited		Well suited	
894104:					
Mollineaux	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Remus	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50

Table 6.—Land Management, Part III (Site Preparation)—Continued

Map unit symbol and soil name	Pct. of map unit	Suitability for mechanical site preparation (deep): Rating class and limiting features	Value	Suitability for mechanical site preparation (surface): Rating class and limiting features	Value
894105:					
Mollineaux----------	50	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
Remus---------------	40	Poorly suited		Poorly suited	
		Slope	0.50	Slope	0.50
894165:					
Spinks--------------	50	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
Tekenink, sandy substratum---------	40	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
899682:					
Kaleva--------------	90	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00
899722:					
Goodharbor----------	90	Well suited		Well suited	
899731:					
Covert--------------	50	Well suited		Well suited	
Pipestone-----------	40	Unsuited		Well suited	
		Wetness	1.00		
899733:					
Covert--------------	50	Well suited		Well suited	
Dair----------------	45	Unsuited		Poorly suited	
		Wetness	1.00	Wetness	0.50
899734:					
Benzonia------------	90	Unsuited		Unsuited	
		Slope	1.00	Slope	1.00

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)

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
190775:					
Adrian	55	Moderate		High	
		Texture/rock fragments	0.50	Wetness	1.00
Houghton	45	Low		High	
				Wetness	1.00
190777:					
Alcona	55	Low		Low	
Richter	30	Low		High	
				Wetness	1.00
190778:					
Alcona	65	Low		Low	
Richter	25	Low		High	
				Wetness	1.00
190779:					
Alpena	90	Low		Moderate	
				Carbonate content	0.50
190780:					
Au Gres	45	Moderate		High	
		Texture/rock fragments	0.50	Wetness	1.00
Kalkaska	35	Moderate		Low	
		Texture/rock fragments	0.50		
190781:					
Bach	90	Low		High	
				Wetness	1.00
190782:					
Deer Park	100	High		Low	
		Texture/surface layer thickness/rock fragments	1.00		
190783:					
Deer Park	100	High		Low	
		Texture/slope/surface layer thickness	1.00		

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
190784:					
Deer Park	70	High		Low	
		Texture/surface layer thickness/rock fragments	1.00		
Roscommon	25	Moderate		High	
		Texture/rock fragments	0.50	Wetness	1.00
190786:					
Dune land	100	Not rated		Not rated	
190787:					
East Lake	90	High		Low	
		Texture/rock fragments	1.00		
190788:					
East Lake	90	High		Low	
		Texture/rock fragments	1.00		
190789:					
East Lake	90	High		Low	
		Texture/rock fragments	1.00		
190790:					
East Lake	90	High		Low	
		Texture/rock fragments	1.00		
190791:					
Eastport	93	High		Low	
		Texture/surface layer thickness/rock fragments	1.00		
190792:					
Edwards	70	Low		High	
				Wetness	1.00
Marl beds	20	Low		High	
				Wetness	1.00
				Carbonate content	1.00
190794:					
Emmet	60	Low		Low	
Leelanau	30	High		Low	
		Texture/rock fragments	1.00		
190795:					
Emmet	60	Low		Low	
Leelanau	30	High		Low	
		Texture/rock fragments	1.00		

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
190796:					
Emmet	50	Low		Low	
Leelanau	30	High		Low	
		Texture/rock fragments	1.00		
190797:					
Emmet	50	Low		Low	
Leelanau	30	High		Low	
		Texture/rock fragments	1.00		
190799:					
Emmet	45	Low		Low	
Leelanau	30	High		Low	
		Texture/slope/ rock fragments	1.00		
190801:					
Emmet	70	Low		Low	
Mancelona	25	Low		Low	
190803:					
Emmet	60	Low		Low	
Mancelona	30	Low		Low	
190805:					
Emmet	50	Low		Low	
Omena	45	Low		Low	
190806:					
Emmet	50	Low		Low	
Omena	45	Low		Low	
190807:					
Emmet	50	Low		Low	
Omena	45	Low		Low	
190808:					
Emmet	50	Low		Low	
Omena	45	Low		Low	
190809:					
Emmet	50	Low		Low	
Omena	45	Low		Low	
190811:					
Hettinger	45	Low		High	
				Wetness	1.00
Muck	30	Low		High	
				Wetness	1.00

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
190812:					
Hettinger	45	Low		High	
				Wetness	1.00
Tonkey	30	Low		High	
				Wetness	1.00
190814:					
Kalkaska	85	Moderate		Low	
		Texture/rock fragments	0.50		
190815:					
Kalkaska	85	Moderate		Low	
		Texture/rock fragments	0.50		
190816:					
Kalkaska	90	Moderate		Low	
		Texture/rock fragments	0.50		
190817:					
Kalkaska	90	Moderate		Low	
		Texture/rock fragments	0.50		
190818:					
Kalkaska	90	Low		Low	
190819:					
Kalkaska	55	High		Low	
		Texture/rock fragments	1.00		
East Lake	35	High		Low	
		Texture/rock fragments	1.00		
190820:					
Kiva	65	Low		Low	
Mancelona	30	Low		Low	
190821:					
Kiva	50	Low		Low	
Mancelona	30	Low		Low	
190823:					
Kiva	50	Low		Low	
Mancelona	30	Low		Low	
190824:					
Lake beaches	100	Not rated		Not rated	
190825:					
Lake bluffs	100	Not rated		Not rated	

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
190826:					
Leelanau	60	High		Low	
		Texture/rock fragments	1.00		
East Lake	30	High		Low	
		Texture/rock fragments	1.00		
190827:					
Leelanau	65	High		Low	
		Texture/rock fragments	1.00		
East Lake	25	High		Low	
		Texture/rock fragments	1.00		
190828:					
Leelanau	65	High		Low	
		Texture/rock fragments	1.00		
East Lake	25	High		Low	
		Texture/rock fragments	1.00		
190829:					
Leelanau	50	High		Low	
		Texture/rock fragments	1.00		
East Lake	35	High		Low	
		Texture/rock fragments	1.00		
190830:					
Leelanau	50	High		Low	
		Texture/slope/ rock fragments	1.00		
East Lake	35	High		Low	
		Texture/slope/ rock fragments	1.00		
190831:					
Lupton	60	Low		High	
				Wetness	1.00
Markey	30	Low		High	
				Wetness	1.00
190832:					
Mancelona	90	Low		Low	
190833:					
Mancelona	90	Low		Low	

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
190834:					
Mancelona	60	High		Low	
		Texture/rock fragments	1.00		
East Lake	30	High		Low	
		Texture/rock fragments	1.00		
190835:					
Mancelona	55	High		Low	
		Texture/rock fragments	1.00		
East Lake	35	High		Low	
		Texture/rock fragments	1.00		
190836:					
Mancelona	50	High		Low	
		Texture/rock fragments	1.00		
East Lake	30	High		Low	
		Texture/rock fragments	1.00		
190837:					
Mancelona	45	High		Low	
		Texture/rock fragments	1.00		
East Lake	30	High		Low	
		Texture/rock fragments	1.00		
190838:					
Mancelona	50	High		Low	
		Texture/slope/ rock fragments	1.00		
East Lake	30	High		Low	
		Texture/slope/ rock fragments	1.00		
190839:					
Mancelona	70	Low		Low	
Richter	25	Low		High	
				Wetness	1.00
190840:					
Nester	90	Low		Low	
190841:					
Nester	90	Low		Low	
190842:					
Nester	90	Low		Low	

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
190843:					
Nester	90	Low		Low	
190844:					
Nester	90	Low		Low	
190846:					
Pits, gravel	100	Not rated		Not rated	
190847:					
Richter	45	Low		High	
				Wetness	1.00
Alcona	40	Low		Low	
190848:					
Richter	45	Low		High	
				Wetness	1.00
Alcona	40	Low		Low	
190849:					
Roscommon	50	Moderate		High	
		Texture/rock fragments	0.50	Wetness	1.00
Markey	30	Low		High	
				Wetness	1.00
190850:					
Sanilac	90	Low		High	
				Wetness	1.00
190851:					
Tonkey	40	Low		High	
				Wetness	1.00
Munuscong	25	Low		High	
				Wetness	1.00
Iosco	25	Moderate		High	
		Texture/rock fragments	0.50	Wetness	1.00
190852:					
Tonkey	35	Low		High	
				Wetness	1.00
Munuscong	30	Low		High	
				Wetness	1.00
Iosco	20	Moderate		High	
		Texture/rock fragments	0.50	Wetness	1.00
190853:					
Water	100	Not rated		Not rated	

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
190854:					
Wallace	50	High		Low	
		Texture/rock fragments	1.00		
Kalkaska	45	Moderate		Low	
		Texture/rock fragments	0.50		
190855:					
Wind eroded land	100	High		Low	
		Texture/rock fragments	1.00		
190856:					
Wind eroded land	100	High		Low	
		Texture/rock fragments	1.00		
193236:					
Beaches	100	Not rated		Not rated	
193237:					
Thompsonville	50	Moderate		Low	
		Texture/rock fragments	0.50		
Milnichol	40	Low		High	
				Wetness	1.00
193255:					
Spinks	50	Moderate		Low	
		Texture/rock fragments	0.50		
Coloma	40	Low		Low	
193256:					
Spinks	50	Moderate		Low	
		Texture/rock fragments	0.50		
Coloma	40	Low		Low	
193257:					
Spinks	55	Moderate		Low	
		Texture/rock fragments	0.50		
Coloma	35	Low		Low	
193258:					
Spinks	50	Moderate		Low	
		Texture/rock fragments	0.50		
Coloma	40	Low		Low	
193260:					
Copemish	95	Low		Moderate	
				Soil reaction	0.50

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
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	High		Low	
		Texture/slope/ surface layer thickness	1.00		
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	High		Low	
		Texture/rock fragments	1.00		
193285:					
Lumley	55	Low		High	
				Wetness	1.00
				Soil reaction	0.50
Makinen	40	Low		High	
				Wetness	1.00

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
193286:					
Histosols	55	Low		High	
				Wetness	1.00
Aquents	45	High		High	
		Texture/rock fragments	1.00	Wetness	1.00
193287:					
Dune land	55	Not rated		Not rated	
Quartzipsamments	40	High		Low	
		Texture/rock fragments	1.00		
193288:					
Udipsamments	100	High		Low	
		Texture/rock fragments	1.00		
193342:					
Gorvan	35	Low		High	
				Wetness	1.00
Houghton	30	Low		High	
				Wetness	1.00
Glendora	20	Moderate		High	
		Texture/rock fragments	0.50	Wetness	1.00
193349:					
Spinks	50	Low		Low	
Coloma	40	High		Low	
		Texture/slope/ surface layer thickness	1.00		
193351:					
Benona	95	Low		Moderate	
				Soil reaction	0.50
193354:					
Dune land	50	Not rated		Not rated	
Quartzipsamments	40	High		Low	
		Texture/rock fragments	1.00		
193357:					
Shavenaugh	85	Moderate		Low	
		Texture/rock fragments	0.50		
193359:					
Shavenaugh	85	Moderate		Low	
		Texture/rock fragments	0.50		

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
193360:					
Shavenaugh	85	Moderate		Low	
		Texture/rock fragments	0.50		
193362:					
Benzonia	90	Moderate		Low	
		Texture/rock fragments	0.50		
193363:					
Benzonia	90	Moderate		Low	
		Texture/rock fragments	0.50		
193364:					
Benzonia	90	Moderate		Low	
		Texture/rock fragments	0.50		
193365:					
Benzonia	90	Moderate		Low	
		Texture/rock fragments	0.50		
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	High		Moderate	
		Texture/slope/ surface layer thickness	1.00	Soil reaction	0.50
193484:					
Pits, sand and gravel	100	Not rated		Not rated	
193494:					
Nordhouse	100	High		Moderate	
		Texture/slope/ surface layer thickness	1.00	Soil reaction	0.50
193496:					
Nordhouse	95	Low		Moderate	
				Soil reaction	0.50
193497:					
Nordhouse	95	Low		Moderate	
				Soil reaction	0.50

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
193498:					
Nordhouse	40	Low		Moderate	
				Soil reaction	0.50
Platteriver	35	Low		Moderate	
				Wetness	0.50
				Soil reaction	0.50
Dair	25	Low		High	
				Wetness	1.00
193503:					
Spinks	50	Moderate		Low	
		Texture/rock fragments	0.50		
Shavenaugh	40	Moderate		Low	
		Texture/rock fragments	0.50		
193504:					
Spinks	50	Moderate		Low	
		Texture/rock fragments	0.50		
Shavenaugh	40	Moderate		Low	
		Texture/rock fragments	0.50		
193505:					
Spinks	50	Moderate		Low	
		Texture/rock fragments	0.50		
Shavenaugh	40	Moderate		Low	
		Texture/rock fragments	0.50		
193506:					
Spinks	50	Moderate		Low	
		Texture/rock fragments	0.50		
Shavenaugh	40	Moderate		Low	
		Texture/rock fragments	0.50		
193507:					
Spinks	50	Low		Low	
Shavenaugh	40	Low		Low	
193508:					
Madaus	90	Low		High	
				Wetness	1.00
				Carbonate content	1.00

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
193509:					
Boyer	50	Low		Low	
Shavenaugh	40	Moderate		Low	
		Texture/rock fragments	0.50		
193510:					
Boyer	50	Low		Low	
Shavenaugh	40	Moderate		Low	
		Texture/rock fragments	0.50		
193511:					
Boyer	50	Low		Low	
Shavenaugh	40	Moderate		Low	
		Texture/rock fragments	0.50		
193513:					
Dair	50	Low		High	
				Wetness	1.00
Adrian	45	Moderate		High	
		Texture/rock fragments	0.50	Wetness	1.00
193514:					
Platteriver	55	Low		Moderate	
				Wetness	0.50
				Soil reaction	0.50
Pipestone	40	Low		High	
				Wetness	1.00
202010:					
Houghton	55	Low		High	
				Wetness	1.00
Adrian	40	Moderate		High	
		Texture/rock fragments	0.50	Wetness	1.00
202016:					
Spinks	50	Moderate		Low	
		Texture/rock fragments	0.50		
Tekenink, sandy substratum	40	Moderate		Low	
		Texture/rock fragments	0.50		

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
631170:					
Fogg	50	High		Low	
		Texture/slope/ surface layer thickness	1.00		
Benzonia	40	Low		Low	
631171:					
Fogg	50	Low		Low	
Benzonia	40	Moderate		Low	
		Texture/rock fragments	0.50		
631172:					
Fogg	50	Low		Low	
Benzonia	40	Moderate		Low	
		Texture/rock fragments	0.50		
631173:					
Fogg	50	Low		Low	
Benzonia	40	Moderate		Low	
		Texture/rock fragments	0.50		
631174:					
Fogg	50	Low		Low	
Benzonia	40	Moderate		Low	
		Texture/rock fragments	0.50		
680939:					
Fern	50	Moderate		Low	
		Texture/rock fragments	0.50		
Spinks	40	Moderate		Low	
		Texture/rock fragments	0.50		
680943:					
Milnichol	90	Low		High	
				Wetness	1.00
680945:					
Fern	90	Moderate		Low	
		Texture/rock fragments	0.50		
680946:					
Fern	90	Moderate		Low	
		Texture/rock fragments	0.50		

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire: Rating class and limiting features	Value	Potential for seedling mortality: Rating class and limiting features	Value
680971:					
Nessen	50	Low		Low	
Kaleva	40	Low		Low	
680972:					
Nessen	50	Low		Low	
Kaleva	40	Low		Low	
680973:					
Nessen	50	Low		Low	
Kaleva	40	Low		Low	
680974:					
Nessen	50	Low		Low	
Kaleva	40	Low		Low	
893251:					
Boyer	50	Low		Low	
Shavenaugh	40	Moderate		Low	
		Texture/rock fragments	0.50		
894062:					
Remus	50	Low		Low	
Spinks	40	Moderate		Low	
		Texture/rock fragments	0.50		
894063:					
Remus	50	Low		Low	
Spinks	40	Moderate		Low	
		Texture/rock fragments	0.50		
894064:					
Fern	50	Moderate		Low	
		Texture/rock fragments	0.50		
Remus	40	Low		Low	
894065:					
Fern	50	Moderate		Low	
		Texture/rock fragments	0.50		
Remus	40	Low		Low	
894104:					
Mollineaux	50	Moderate		Low	
		Texture/rock fragments	0.50		
Remus	40	Low		Low	

Table 6.—Land Management, Part IV (Site Restoration)—Continued

Map unit symbol and soil name	Pct. of map unit	Potential for damage to soil by fire		Potential for seedling mortality	
		Rating class and limiting features	Value	Rating class and limiting features	Value
894105:					
Mollineaux	50	Moderate		Low	
		Texture/rock fragments	0.50		
Remus	40	Low		Low	
894165:					
Spinks	50	Low		Low	
Tekenink, sandy substratum	40	Low		Low	
899682:					
Kaleva	90	High		Low	
		Texture/slope/ surface layer thickness	1.00		
899722:					
Goodharbor	90	Low		Low	
899731:					
Covert	50	Low		Low	
Pipestone	40	Low		High	
				Wetness	1.00
899733:					
Covert	50	Low		Low	
Dair	45	Low		High	
				Wetness	1.00
899734:					
Benzonia	90	Low		Low	

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	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
190775:					
Adrian	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.01	Dusty	0.01
Houghton	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.01	Dusty	0.01
190777:					
Alcona	55	Not limited		Not limited	
Richter	30	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
190778:					
Alcona	65	Not limited		Not limited	
Richter	25	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
190779:					
Alpena	90	Somewhat limited		Somewhat limited	
		Gravel content	0.36	Gravel content	0.36
190780:					
Au Gres	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Too sandy	1.00
		Too sandy	1.00	Depth to saturated zone	0.99
Kalkaska	35	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190781:					
Bach	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Slow water movement	0.26	Slow water movement	0.26
		Dusty	0.01	Dusty	0.01

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
190782:					
Deer Park	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.63	Slope	0.63
190783:					
Deer Park	100	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
190784:					
Deer Park	70	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Roscommon	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Too sandy	1.00
		Ponding	1.00	Ponding	1.00
		Too sandy	1.00	Depth to saturated zone	1.00
190786:					
Dune land	100	Not rated		Not rated	
190787:					
East Lake	90	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190788:					
East Lake	90	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
		Slope	0.04	Slope	0.04
190789:					
East Lake	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42
190790:					
East Lake	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42
190791:					
Eastport	93	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190792:					
Edwards	70	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Flooding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Organic matter content	1.00
		Organic matter content	1.00	Slow water movement	0.96
		Slow water movement	0.96	Flooding	0.40

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
190792:					
Marl beds	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.03	Dusty	0.03
190794:					
Emmet	60	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Leelanau	30	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72
190795:					
Emmet	60	Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04
		Dusty	0.01	Dusty	0.01
Leelanau	30	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72
		Slope	0.04	Slope	0.04
190796:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
Leelanau	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.72	Too sandy	0.72
190797:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
Leelanau	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.72	Too sandy	0.72
190799:					
Emmet	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
Leelanau	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.72	Too sandy	0.72
190801:					
Emmet	70	Somewhat limited		Somewhat limited	
		Gravel content	0.12	Gravel content	0.12
		Dusty	0.01	Dusty	0.01
Mancelona	25	Somewhat limited		Somewhat limited	
		Gravel content	0.26	Gravel content	0.26

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value
190803:					
Emmet	60	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Gravel content	0.12	Gravel content	0.12
		Dusty	0.01	Dusty	0.01
Mancelona	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Gravel content	0.26	Gravel content	0.26
190805:					
Emmet	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Omena	45	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
190806:					
Emmet	50	Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04
		Dusty	0.01	Dusty	0.01
Omena	45	Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04
		Dusty	0.01	Dusty	0.01
190807:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
Omena	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
190808:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
Omena	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
190809:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
Omena	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
190811:					
Hettinger	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.02	Dusty	0.02

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
190811:					
Muck	30	Not rated		Not rated	
190812:					
Hettinger	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.02	Dusty	0.02
Tonkey	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.01	Dusty	0.01
190814:					
Kalkaska	85	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190815:					
Kalkaska	85	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
190816:					
Kalkaska	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
190817:					
Kalkaska	90	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
190818:					
Kalkaska	90	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
190819:					
Kalkaska	55	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
East Lake	35	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190820:					
Kiva	65	Somewhat limited		Somewhat limited	
		Gravel content	0.11	Gravel content	0.11
		Dusty	0.01	Dusty	0.01
Mancelona	30	Somewhat limited		Somewhat limited	
		Gravel content	0.26	Gravel content	0.26

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
190821:					
Kiva	50	Somewhat limited		Somewhat limited	
		Gravel content	0.11	Gravel content	0.11
		Slope	0.04	Slope	0.04
		Dusty	0.01	Dusty	0.01
Mancelona	30	Somewhat limited		Somewhat limited	
		Gravel content	0.26	Gravel content	0.26
		Slope	0.04	Slope	0.04
190823:					
Kiva	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Gravel content	0.11	Gravel content	0.11
		Dusty	0.01	Dusty	0.01
Mancelona	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Gravel content	0.26	Gravel content	0.26
190824:					
Lake beaches	100	Not rated		Not rated	
190825:					
Lake bluffs	100	Not rated		Not rated	
190826:					
Leelanau	60	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72
East Lake	30	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190827:					
Leelanau	65	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72
		Slope	0.04	Slope	0.04
East Lake	25	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
		Slope	0.04	Slope	0.04
190828:					
Leelanau	65	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.72	Too sandy	0.72
East Lake	25	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42
190829:					
Leelanau	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.72	Too sandy	0.72
East Lake	35	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
190830:					
Leelanau------------	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.72	Too sandy	0.72
East Lake-----------	35	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42
190831:					
Lupton--------------	60	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.01	Dusty	0.01
Markey--------------	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Dusty	0.01	Dusty	0.01
190832:					
Mancelona-----------	90	Not limited		Not limited	
190833:					
Mancelona-----------	90	Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04
190834:					
Mancelona-----------	60	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
East Lake-----------	30	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190835:					
Mancelona-----------	55	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
		Slope	0.04	Slope	0.04
East Lake-----------	35	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
		Slope	0.04	Slope	0.04
190836:					
Mancelona-----------	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42
East Lake-----------	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42
190837:					
Mancelona-----------	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
190837:					
East Lake	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42
190838:					
Mancelona	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42
East Lake	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.42	Too sandy	0.42
190839:					
Mancelona	70	Somewhat limited		Somewhat limited	
		Gravel content	0.26	Gravel content	0.26
Richter	25	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
190840:					
Nester	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.03	Dusty	0.03
190841:					
Nester	90	Somewhat limited		Somewhat limited	
		Slow water movement	0.96	Slow water movement	0.96
		Slope	0.04	Slope	0.04
		Dusty	0.03	Dusty	0.03
190842:					
Nester	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.03	Dusty	0.03
190843:					
Nester	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.03	Dusty	0.03
190844:					
Nester	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.03	Dusty	0.03
190846:					
Pits, gravel	100	Not rated		Not rated	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
190847:					
Richter	45	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
Alcona	40	Not limited		Not limited	
190848:					
Richter	45	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
Alcona	40	Not limited		Not limited	
190849:					
Roscommon	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Too sandy	1.00
		Ponding	1.00	Ponding	1.00
		Too sandy	1.00	Depth to saturated zone	1.00
Markey	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Dusty	0.01	Dusty	0.01
190850:					
Sanilac	90	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.94
		Flooding	1.00	Slow water movement	0.26
		Slow water movement	0.26	Dusty	0.01
		Dusty	0.01		
190851:					
Tonkey	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.01	Dusty	0.01
Munuscong	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.01	Dusty	0.01
Iosco	25	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Too sandy	0.78	Too sandy	0.78
		Slow water movement	0.26	Slow water movement	0.26

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas		Picnic areas	
		Rating class and limiting features	Value	Rating class and limiting features	Value
190852:					
Tonkey	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.01	Dusty	0.01
Munuscong	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.01	Dusty	0.01
Iosco	20	Very limited		Somewhat limited	
		Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Too sandy	0.78	Too sandy	0.78
		Slow water movement	0.26	Slow water movement	0.26
190853:					
Water	100	Not rated		Not rated	
190854:					
Wallace	50	Very limited		Very limited	
		Depth to cemented pan	1.00	Too sandy	1.00
		Too sandy	1.00	Depth to cemented pan	1.00
Kalkaska	45	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190855:					
Wind eroded land	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190856:					
Wind eroded land	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
193236:					
Beaches	100	Not rated		Not rated	
193237:					
Thompsonville	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.98	Depth to saturated zone	0.75
Milnichol	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Too sandy	1.00
		Too sandy	1.00	Depth to saturated zone	1.00

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
193255:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Coloma	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193256:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
Coloma	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
193257:					
Spinks	55	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
Coloma	35	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
193258:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Coloma	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193260:					
Copemish	95	Very limited		Very limited	
		Depth to cemented pan	1.00	Too sandy	1.00
		Too sandy	1.00	Depth to cemented pan	1.00
193262:					
Kaleva	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193263:					
Kaleva	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
193265:					
Grattan	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193266:					
Grattan	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
193267:					
Grattan	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
193269:					
Grattan	95	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193270:					
Covert	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.39	Depth to saturated zone	0.19
193271:					
Pipestone	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	0.99	Too sandy	0.99
193272:					
Dair	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
193277:					
Benona	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193278:					
Benona	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
193279:					
Benona	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
193284:					
Udorthents	55	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.26	Slow water movement	0.26
		Dusty	0.01	Dusty	0.01
Udipsamments	35	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193285:					
Lumley	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.03	Dusty	0.03
Makinen	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.03	Dusty	0.03

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
193286:					
Histosols	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Dusty	0.03	Dusty	0.03
Aquents	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Too sandy	1.00
		Ponding	1.00	Ponding	1.00
		Too sandy	1.00	Depth to saturated zone	1.00
193287:					
Dune land	55	Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193288:					
Udipsamments	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193342:					
Gorvan	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Flooding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Flooding	0.40
		Slow water movement	0.26	Slow water movement	0.26
		Dusty	0.03	Dusty	0.03
Houghton	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Flooding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Organic matter content	1.00
		Organic matter content	1.00	Flooding	0.40
		Dusty	0.03	Dusty	0.03
Glendora	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Flooding	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Too sandy	0.50
		Too sandy	0.50	Flooding	0.40
193349:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Coloma	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value
193351:					
Benona	95	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193354:					
Dune land	50	Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.63	Slope	0.63
193357:					
Shavenaugh	85	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.96	Too sandy	0.96
193359:					
Shavenaugh	85	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
		Slope	0.04	Slope	0.04
193360:					
Shavenaugh	85	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
193362:					
Benzonia	90	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193363:					
Benzonia	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
193364:					
Benzonia	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
193365:					
Benzonia	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193371:					
Dair	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
Pipestone	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	0.99	Too sandy	0.99
193372:					
Access Denied	100	Not rated		Not rated	

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Value	Picnic areas: Rating class and limiting features	Value
193423:					
Benona	95	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193484:					
Pits, sand and gravel	100	Not rated		Not rated	
193494:					
Nordhouse	100	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193496:					
Nordhouse	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.63	Slope	0.63
193497:					
Nordhouse	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193498:					
Nordhouse	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Platteriver	35	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.98	Depth to saturated zone	0.75
Dair	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
193503:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
193504:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
		Slope	0.04	Slope	0.04
193505:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
Shavenaugh	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.96	Too sandy	0.96

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
193506:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Shavenaugh	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.96	Too sandy	0.96
193507:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Shavenaugh	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.96	Too sandy	0.96
193508:					
Madaus	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Slow water movement	0.96	Slow water movement	0.96
		Dusty	0.03	Dusty	0.03
193509:					
Boyer	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
193510:					
Boyer	50	Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04
		Dusty	0.01	Dusty	0.01
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
		Slope	0.04	Slope	0.04
193511:					
Boyer	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
Shavenaugh	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.96	Too sandy	0.96
193513:					
Dair	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
193513:					
Adrian	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.03	Dusty	0.03
193514:					
Platteriver	55	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.98	Depth to saturated zone	0.75
Pipestone	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	0.99	Too sandy	0.99
202010:					
Houghton	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Dusty	0.03	Dusty	0.03
Adrian	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturated zone	1.00
		Dusty	0.03	Dusty	0.03
202016:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Tekenink, sandy substratum	40	Somewhat limited		Somewhat limited	
		Too sandy	0.50	Too sandy	0.50
631170:					
Fogg	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Benzonia	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
631171:					
Fogg	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Benzonia	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
631172:					
Fogg	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
Benzonia	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
631173:					
Fogg	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
Benzonia	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
631174:					
Fogg	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Benzonia	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
680939:					
Fern	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.39	Slow water movement	0.26
		Slow water movement	0.26	Depth to saturated zone	0.19
Spinks	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
680943:					
Milnichol	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Too sandy	1.00
		Too sandy	1.00	Depth to saturated zone	1.00
680945:					
Fern	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.39	Slow water movement	0.26
		Slow water movement	0.26	Depth to saturated zone	0.19
		Slope	0.04	Slope	0.04
680946:					
Fern	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.39	Slow water movement	0.26
		Slow water movement	0.26	Depth to saturated zone	0.19

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
680971:					
Nessen	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Kaleva	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
680972:					
Nessen	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
Kaleva	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
680973:					
Nessen	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
Kaleva	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.04	Slope	0.04
680974:					
Nessen	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Kaleva	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
893251:					
Boyer	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
Shavenaugh	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.96	Too sandy	0.96
894062:					
Remus	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.01	Slow water movement	0.01
		Dusty	0.01	Dusty	0.01
Spinks	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
894063:					
Remus	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.01	Slow water movement	0.01
		Dusty	0.01	Dusty	0.01

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
894063:					
Spinks	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
894064:					
Fern	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.39	Slow water movement	0.26
		Slow water movement	0.26	Depth to saturated zone	0.19
		Slope	0.04	Slope	0.04
Remus	40	Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04
		Slow water movement	0.01	Slow water movement	0.01
		Dusty	0.01	Dusty	0.01
894065:					
Fern	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.39	Slow water movement	0.26
		Slow water movement	0.26	Depth to saturated zone	0.19
Remus	40	Somewhat limited		Somewhat limited	
		Slow water movement	0.01	Slow water movement	0.01
		Dusty	0.01	Dusty	0.01
894104:					
Mollineaux	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.88	Too sandy	0.88
		Slow water movement	0.26	Slow water movement	0.26
Remus	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.01	Slow water movement	0.01
		Dusty	0.01	Dusty	0.01
894105:					
Mollineaux	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.88	Too sandy	0.88
		Slow water movement	0.26	Slow water movement	0.26
Remus	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Slow water movement	0.01	Slow water movement	0.01
		Dusty	0.01	Dusty	0.01

Table 7.—Recreation, Part I (Camp and Picnic Areas)—Continued

Map unit symbol and soil name	Pct. of map unit	Camp areas: Rating class and limiting features	Camp areas: Value	Picnic areas: Rating class and limiting features	Picnic areas: Value
894165:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Tekenink, sandy substratum	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.50	Too sandy	0.50
899682:					
Kaleva	90	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
899722:					
Goodharbor	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
899731:					
Covert	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.39	Depth to saturated zone	0.19
Pipestone	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	0.99	Too sandy	0.99
899733:					
Covert	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.39	Depth to saturated zone	0.19
Dair	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Ponding	1.00
		Ponding	1.00	Depth to saturate zone	1.00
899734:					
Benzonia	90	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		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)

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
190775:					
Adrian	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
Houghton	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
190777:					
Alcona	55	Not limited		Not limited	
Richter	30	Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
190778:					
Alcona	65	Not limited		Not limited	
Richter	25	Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
190779:					
Alpena	90	Not limited		Not limited	
190780:					
Au Gres	45	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
Kalkaska	35	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190781:					
Bach	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
190782:					
Deer Park	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
190783:					
Deer Park-----------	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.44
190784:					
Deer Park-----------	70	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Roscommon-----------	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	1.00	Too sandy	1.00
		Ponding	1.00	Ponding	1.00
190786:					
Dune land-----------	100	Not rated		Not rated	
190787:					
East Lake-----------	90	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190788:					
East Lake-----------	90	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190789:					
East Lake-----------	90	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190790:					
East Lake-----------	90	Somewhat limited		Somewhat limited	
		Slope	0.82	Too sandy	0.42
		Too sandy	0.42		
190791:					
Eastport------------	93	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190792:					
Edwards-------------	70	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Ponding	1.00	Ponding	1.00
		Flooding	0.40	Flooding	0.40
		Dusty	0.01	Dusty	0.01
Marl beds-----------	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.03	Dusty	0.03
190794:					
Emmet---------------	60	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Leelanau------------	30	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
190795:					
Emmet	60	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Leelanau	30	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72
190796:					
Emmet	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Leelanau	30	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72
190797:					
Emmet	50	Somewhat limited		Somewhat limited	
		Slope	0.82	Dusty	0.01
		Dusty	0.01		
Leelanau	30	Somewhat limited		Somewhat limited	
		Slope	0.82	Too sandy	0.72
		Too sandy	0.72		
190799:					
Emmet	45	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.96
		Dusty	0.01	Dusty	0.01
Leelanau	30	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.96
		Too sandy	0.72	Too sandy	0.72
190801:					
Emmet	70	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Mancelona	25	Not limited		Not limited	
190803:					
Emmet	60	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.04
		Dusty	0.01	Dusty	0.01
Mancelona	30	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.04
190805:					
Emmet	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Omena	45	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
190806:					
Emmet	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Omena	45	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
190807:					
Emmet	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Omena	45	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
190808:					
Emmet	50	Somewhat limited		Somewhat limited	
		Slope	0.82	Dusty	0.01
		Dusty	0.01		
Omena	45	Somewhat limited		Somewhat limited	
		Slope	0.82	Dusty	0.01
		Dusty	0.01		
190809:					
Emmet	50	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.96
		Dusty	0.01	Dusty	0.01
Omena	45	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.96
		Dusty	0.01	Dusty	0.01
190811:					
Hettinger	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.02	Dusty	0.02
Muck	30	Not rated		Not rated	
190812:					
Hettinger	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.02	Dusty	0.02
Tonkey	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
190814:					
Kalkaska	85	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190815:					
Kalkaska	85	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190816:					
Kalkaska	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
190817:					
Kalkaska	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	0.82		
190818:					
Kalkaska	90	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	0.78
190819:					
Kalkaska	55	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
East Lake	35	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190820:					
Kiva	65	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Mancelona	30	Not limited		Not limited	
190821:					
Kiva	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Mancelona	30	Not limited		Not limited	
190823:					
Kiva	50	Somewhat limited		Somewhat limited	
		Slope	0.82	Dusty	0.01
		Dusty	0.01		
Mancelona	30	Somewhat limited		Not limited	
		Slope	0.82		
190824:					
Lake beaches	100	Not rated		Not rated	
190825:					
Lake bluffs	100	Not rated		Not rated	
190826:					
Leelanau	60	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72
East Lake	30	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190827:					
Leelanau	65	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72
East Lake	25	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
190828:					
Leelanau	65	Somewhat limited		Somewhat limited	
		Too sandy	0.72	Too sandy	0.72
East Lake	25	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190829:					
Leelanau	50	Somewhat limited		Somewhat limited	
		Slope	0.82	Too sandy	0.72
		Too sandy	0.72		
East Lake	35	Somewhat limited		Somewhat limited	
		Slope	0.82	Too sandy	0.42
		Too sandy	0.42		
190830:					
Leelanau	50	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
		Too sandy	0.72	Too sandy	0.72
East Lake	35	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
		Too sandy	0.42	Too sandy	0.42
190831:					
Lupton	60	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
Markey	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
190832:					
Mancelona	90	Not limited		Not limited	
190833:					
Mancelona	90	Not limited		Not limited	
190834:					
Mancelona	60	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
East Lake	30	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190835:					
Mancelona	55	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
East Lake	35	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
190836:					
Mancelona-----------	50	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
East Lake-----------	30	Somewhat limited		Somewhat limited	
		Too sandy	0.42	Too sandy	0.42
190837:					
Mancelona-----------	45	Somewhat limited		Somewhat limited	
		Slope	0.82	Too sandy	0.42
		Too sandy	0.42		
East Lake-----------	30	Somewhat limited		Somewhat limited	
		Slope	0.82	Too sandy	0.42
		Too sandy	0.42		
190838:					
Mancelona-----------	50	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
		Too sandy	0.42	Too sandy	0.42
East Lake-----------	30	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.78
		Too sandy	0.42	Too sandy	0.42
190839:					
Mancelona-----------	70	Not limited		Not limited	
Richter-------------	25	Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
190840:					
Nester--------------	90	Somewhat limited		Somewhat limited	
		Dusty	0.03	Dusty	0.03
190841:					
Nester--------------	90	Somewhat limited		Somewhat limited	
		Dusty	0.03	Dusty	0.03
190842:					
Nester--------------	90	Somewhat limited		Somewhat limited	
		Dusty	0.03	Dusty	0.03
190843:					
Nester--------------	90	Somewhat limited		Somewhat limited	
		Slope	0.82	Dusty	0.03
		Dusty	0.03		
190844:					
Nester--------------	90	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.96
		Dusty	0.03	Dusty	0.03
190846:					
Pits, gravel--------	100	Not rated		Not rated	

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
190847:					
Richter	45	Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
Alcona	40	Not limited		Not limited	
190848:					
Richter	45	Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Dusty	0.01	Dusty	0.01
Alcona	40	Not limited		Not limited	
190849:					
Roscommon	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	1.00	Too sandy	1.00
		Ponding	1.00	Ponding	1.00
Markey	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
190850:					
Sanilac	90	Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.86	Depth to saturated zone	0.86
		Dusty	0.01	Dusty	0.01
190851:					
Tonkey	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
Munuscong	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
Iosco	25	Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Too sandy	0.78	Too sandy	0.78
190852:					
Tonkey	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
190852:					
Munuscong	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.01	Dusty	0.01
Iosco	20	Somewhat limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	0.99
		Too sandy	0.78	Too sandy	0.78
190853:					
Water	100	Not rated		Not rated	
190854:					
Wallace	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Kalkaska	45	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190855:					
Wind eroded land	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
190856:					
Wind eroded land	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.14
193236:					
Beaches	100	Not rated		Not rated	
193237:					
Thompsonville	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.44
Milnichol	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	1.00	Too sandy	1.00
193255:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Coloma	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193256:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Coloma	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
193257:					
Spinks	55	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Coloma	35	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193258:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.04
Coloma	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.04
193260:					
Copemish	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193262:					
Kaleva	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193263:					
Kaleva	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193265:					
Grattan	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193266:					
Grattan	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193267:					
Grattan	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193269:					
Grattan	95	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193270:					
Covert	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193271:					
Pipestone	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	0.99	Too sandy	0.99
193272:					
Dair	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
193277:					
Benona	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193278:					
Benona	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193279:					
Benona	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193284:					
Udorthents	55	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Dusty	0.01	Dusty	0.01
Udipsamments	35	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193285:					
Lumley	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.03	Dusty	0.03
Makinen	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.03	Dusty	0.03
193286:					
Histosols	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.03	Dusty	0.03
Aquents	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	1.00	Too sandy	1.00
		Ponding	1.00	Ponding	1.00
193287:					
Dune land	55	Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193288:					
Udipsamments	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
193342:					
Gorvan	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Flooding	0.40	Flooding	0.40
		Dusty	0.03	Dusty	0.03
Houghton	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Ponding	1.00	Ponding	1.00
		Flooding	0.40	Flooding	0.40
		Dusty	0.03	Dusty	0.03
Glendora	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Too sandy	0.50	Too sandy	0.50
		Flooding	0.40	Flooding	0.40
193349:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Coloma	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193351:					
Benona	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.14
193354:					
Dune land	50	Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193357:					
Shavenaugh	85	Very limited		Somewhat limited	
		Slope	1.00	Too sandy	0.96
		Too sandy	0.96	Slope	0.01
193359:					
Shavenaugh	85	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
193360:					
Shavenaugh	85	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
193362:					
Benzonia	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.04

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
193363:					
Benzonia	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193364:					
Benzonia	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193365:					
Benzonia	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193371:					
Dair	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
Pipestone	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	0.99	Too sandy	0.99
193372:					
Access Denied	100	Not rated		Not rated	
193423:					
Benona	95	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
193484:					
Pits, sand and gravel	100	Not rated		Not rated	
193494:					
Nordhouse	100	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	1.00
193496:					
Nordhouse	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193497:					
Nordhouse	95	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
193498:					
Nordhouse	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Platteriver	35	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.44
Dair	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
193503:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
193504:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
193505:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
193506:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.04
Shavenaugh	40	Very limited		Somewhat limited	
		Slope	1.00	Too sandy	0.96
		Too sandy	0.96	Slope	0.04
193507:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Shavenaugh	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.96	Too sandy	0.96
193508:					
Madaus	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.03	Dusty	0.03
193509:					
Boyer	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
193510:					
Boyer	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
193511:					
Boyer	50	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.04
		Dusty	0.01	Dusty	0.01
Shavenaugh	40	Very limited		Somewhat limited	
		Slope	1.00	Too sandy	0.96
		Too sandy	0.96	Slope	0.04
193513:					
Dair	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
Adrian	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.03	Dusty	0.03
193514:					
Platteriver	55	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Depth to saturated zone	0.44	Depth to saturated zone	0.44
Pipestone	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	0.99	Too sandy	0.99
202010:					
Houghton	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.03	Dusty	0.03
Adrian	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
		Dusty	0.03	Dusty	0.03
202016:					
Spinks	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Tekenink, sandy substratum	40	Somewhat limited		Somewhat limited	
		Too sandy	0.50	Too sandy	0.50

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
631170:					
Fogg	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Benzonia	40	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
631171:					
Fogg	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.04
Benzonia	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.04
631172:					
Fogg	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Benzonia	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
631173:					
Fogg	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Benzonia	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
631174:					
Fogg	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Benzonia	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
680939:					
Fern	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Spinks	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
680943:					
Milnichol	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	1.00	Too sandy	1.00
680945:					
Fern	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
680946:					
Fern	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
680971:					
Nessen	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.04
Kaleva	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.04
680972:					
Nessen	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Kaleva	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
680973:					
Nessen	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Kaleva	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
680974:					
Nessen	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Kaleva	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
893251:					
Boyer	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Shavenaugh	40	Somewhat limited		Somewhat limited	
		Too sandy	0.96	Too sandy	0.96
894062:					
Remus	50	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.04
		Dusty	0.01	Dusty	0.01
Spinks	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
		Slope	1.00	Slope	0.04
894063:					
Remus	50	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
Spinks	40	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails: Rating class and limiting features	Value	Mountain bike and off-road vehicle trails: Rating class and limiting features	Value
894064:					
Fern	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Remus	40	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
894065:					
Fern	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Remus	40	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
894104:					
Mollineaux	50	Very limited		Somewhat limited	
		Slope	1.00	Too sandy	0.88
		Too sandy	0.88	Slope	0.04
Remus	40	Very limited		Somewhat limited	
		Slope	1.00	Slope	0.04
		Dusty	0.01	Dusty	0.01
894105:					
Mollineaux	50	Somewhat limited		Somewhat limited	
		Too sandy	0.88	Too sandy	0.88
Remus	40	Somewhat limited		Somewhat limited	
		Dusty	0.01	Dusty	0.01
894165:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
Tekenink, sandy substratum	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Too sandy	0.50	Too sandy	0.50
899682:					
Kaleva	90	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00
899722:					
Goodharbor	90	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
899731:					
Covert	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Pipestone	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Too sandy	0.99	Too sandy	0.99

Table 7.—Recreation, Part II (Trail Management)—Continued

Map unit symbol and soil name	Pct. of map unit	Foot traffic and equestrian trails		Mountain bike and off-road vehicle trails	
		Rating class and limiting features	Value	Rating class and limiting features	Value
899733:					
Covert	50	Very limited		Very limited	
		Too sandy	1.00	Too sandy	1.00
Dair	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Ponding	1.00	Ponding	1.00
899734:					
Benzonia	90	Very limited		Very limited	
		Slope	1.00	Too sandy	1.00
		Too sandy	1.00	Slope	1.00

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)

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
190775:							
Adrian	55	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Houghton	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00	Organic matter content	1.00
190777:							
Alcona	55	Not limited		Somewhat limited		Not limited	
				Depth to saturated zone	0.47		
Richter	30	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190778:							
Alcona	65	Not limited		Somewhat limited		Not limited	
				Depth to saturated zone	0.47		
Richter	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190779:							
Alpena	90	Not limited		Not limited		Somewhat limited	
						Slope	0.50
190780:							
Au Gres	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Kalkaska	35	Not limited		Not limited		Not limited	
190781:							
Bach	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190782:							
Deer Park	100	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
190783:							
Deer Park-----------	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190784:							
Deer Park-----------	70	Not limited		Not limited		Not limited	
Roscommon-----------	25	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190786:							
Dune land-----------	100	Not rated		Not rated		Not rated	
190787:							
East Lake-----------	90	Not limited		Not limited		Not limited	
190788:							
East Lake-----------	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
190789:							
East Lake-----------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190790:							
East Lake-----------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190791:							
Eastport------------	93	Not limited		Not limited		Not limited	
190792:							
Edwards-------------	70	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00			Organic matter content	1.00
Marl beds-----------	20	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190794:							
Emmet---------------	60	Not limited		Not limited		Not limited	
Leelanau------------	30	Not limited		Not limited		Not limited	
190795:							
Emmet---------------	60	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Leelanau------------	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
190796:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Leelanau	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190797:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Leelanau	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190799:							
Emmet	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Leelanau	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	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	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Mancelona	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190805:							
Emmet	50	Not limited		Not limited		Not limited	
Omena	45	Not limited		Not limited		Not limited	
190806:							
Emmet	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Omena	45	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
190807:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Omena	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190808:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Omena	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
190809:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Omena	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190811:							
Hettinger	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Muck	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190812:							
Hettinger	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Tonkey	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190814:							
Kalkaska	85	Not limited		Not limited		Not limited	
190815:							
Kalkaska	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
190816:							
Kalkaska	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190817:							
Kalkaska	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190818:							
Kalkaska	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190819:							
Kalkaska	55	Not limited		Not limited		Not limited	
East Lake	35	Not limited		Not limited		Not limited	
190820:							
Kiva	65	Not limited		Not limited		Not limited	
Mancelona	30	Not limited		Not limited		Not limited	

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
190821:							
Kiva	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Mancelona	30	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
190823:							
Kiva	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Mancelona	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190824:							
Lake beaches	100	Not rated		Not rated		Not rated	
190825:							
Lake bluffs	100	Not rated		Not rated		Not rated	
190826:							
Leelanau	60	Not limited		Not limited		Not limited	
East Lake	30	Not limited		Not limited		Not limited	
190827:							
Leelanau	65	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
East Lake	25	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
190828:							
Leelanau	65	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
East Lake	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190829:							
Leelanau	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
East Lake	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190830:							
Leelanau	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
East Lake	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190831:							
Lupton	60	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00	Organic matter content	1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
190831:							
Markey	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190832:							
Mancelona	90	Not limited		Not limited		Not limited	
190833:							
Mancelona	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
190834:							
Mancelona	60	Not limited		Not limited		Not limited	
East Lake	30	Not limited		Not limited		Not limited	
190835:							
Mancelona	55	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
East Lake	35	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
190836:							
Mancelona	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
East Lake	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190837:							
Mancelona	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
East Lake	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190838:							
Mancelona	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
East Lake	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
190839:							
Mancelona	70	Not limited		Not limited		Not limited	
Richter	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190840:							
Nester	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
190841:							
Nester	90	Somewhat limited		Somewhat limited		Very limited	
		Shrink-swell	0.50	Shrink-swell	0.50	Slope	1.00
		Slope	0.04	Slope	0.04	Shrink-swell	0.50

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
190842:							
Nester	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
190843:							
Nester	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
190844:							
Nester	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.50	Shrink-swell	0.50	Shrink-swell	0.50
190846:							
Pits, gravel	100	Not rated		Not rated		Not rated	
190847:							
Richter	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Alcona	40	Not limited		Not limited		Not limited	
190848:							
Richter	45	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Alcona	40	Not limited		Not limited		Not limited	
190849:							
Roscommon	50	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Markey	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190850:							
Sanilac	90	Very limited		Very limited		Very limited	
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
190851:							
Tonkey	40	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Munuscong	25	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.57	Shrink-swell	0.99	Shrink-swell	0.57

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
190851:							
Iosco	25	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Shrink-swell	0.05		
190852:							
Tonkey	35	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Munuscong	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Shrink-swell	0.57	Shrink-swell	0.99	Shrink-swell	0.57
Iosco	20	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
				Shrink-swell	0.05		
190853:							
Water	100	Not rated		Not rated		Not rated	
190854:							
Wallace	50	Not limited		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	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193236:							
Beaches	100	Not rated		Not rated		Not rated	
193237:							
Thompsonville	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.98	Depth to saturated zone	1.00	Depth to saturated zone	0.98
Milnichol	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
193255:							
Spinks	50	Not limited		Not limited		Not limited	
Coloma	40	Not limited		Not limited		Not limited	

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
193256:							
Spinks	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Coloma	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
193257:							
Spinks	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Coloma	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193258:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Coloma	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193260:							
Copemish	95	Not limited		Not limited		Very limited	
						Slope	1.00
193262:							
Kaleva	95	Not limited		Not limited		Not limited	
193263:							
Kaleva	95	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
193265:							
Grattan	95	Not limited		Not limited		Not limited	
193266:							
Grattan	95	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
193267:							
Grattan	95	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193269:							
Grattan	95	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193270:							
Covert	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.39	Depth to saturated zone	1.00	Depth to saturated zone	0.39
193271:							
Pipestone	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
193272:							
Dair	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
193277:							
Benona	90	Not limited		Not limited		Not limited	
193278:							
Benona	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
193279:							
Benona	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193284:							
Udorthents	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Udipsamments	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193285:							
Lumley	55	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00	Organic matter content	1.00
Makinen	40	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00			Organic matter content	1.00
193286:							
Histosols	55	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00			Organic matter content	1.00
Aquents	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
193287:							
Dune land	55	Not rated		Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193288:							
Udipsamments	100	Not limited		Not limited		Not limited	

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
193342:							
Gorvan	35	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Houghton	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00	Organic matter content	1.00
Glendora	20	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Flooding	1.00	Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
193349:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Coloma	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193351:							
Benona	95	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193354:							
Dune land	50	Not rated		Not rated		Not rated	
Quartzipsamments	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	Slope	1.00
193357:							
Shavenaugh	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193359:							
Shavenaugh	85	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
193360:							
Shavenaugh	85	Not limited		Not limited		Not limited	
193362:							
Benzonia	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193363:							
Benzonia	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193364:							
Benzonia	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements		Dwellings with basements		Small commercial buildings	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
193365:							
Benzonia	90	Not limited		Not limited		Not limited	
193371:							
Dair	50	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Pipestone	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
193372:							
Access Denied	100	Not rated		Not rated		Not rated	
193423:							
Benona	95	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193484:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
193494:							
Nordhouse	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193496:							
Nordhouse	95	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.63	Slope	0.63	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		Very limited		Somewhat limited	
		Depth to saturated zone	0.98	Depth to saturated zone	1.00	Depth to saturated zone	0.98
Dair	25	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
193503:							
Spinks	50	Not limited		Not limited		Not limited	
Shavenaugh	40	Not limited		Not limited		Not limited	
193504:							
Spinks	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Shavenaugh	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
193505:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193506:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193507:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193508:							
Madaus	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
193509:							
Boyer	50	Not limited		Not limited		Not limited	
Shavenaugh	40	Not limited		Not limited		Not limited	
193510:							
Boyer	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Shavenaugh	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
193511:							
Boyer	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
193513:							
Dair	50	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
Adrian	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00			Organic matter content	1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
193514:							
Platteriver	55	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.98	Depth to saturated zone	1.00	Depth to saturated zone	0.98
Pipestone	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
202010:							
Houghton	55	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00	Organic matter content	1.00	Organic matter content	1.00
Adrian	40	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Subsidence	1.00	Subsidence	1.00	Subsidence	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Organic matter content	1.00			Organic matter content	1.00
202016:							
Spinks	50	Not limited		Not limited		Not limited	
Tekenink, sandy substratum	40	Not limited		Not limited		Not limited	
631170:							
Fogg	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Benzonia	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
631171:							
Fogg	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Benzonia	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
631172:							
Fogg	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Benzonia	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
631173:							
Fogg	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Benzonia	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
631174:							
Fogg	50	Not limited		Not limited		Not limited	
Benzonia	40	Not limited		Not limited		Not limited	
680939:							
Fern	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.39	Depth to saturated zone	1.00	Slope	0.50
		Shrink-swell	0.01	Shrink-swell	0.01	Depth to saturated zone	0.39
						Shrink-swell	0.01
Spinks	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
680943:							
Milnichol	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
680945:							
Fern	90	Somewhat limited		Very limited		Very limited	
		Depth to saturated zone	0.39	Depth to saturated zone	1.00	Slope	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.39
		Shrink-swell	0.01	Shrink-swell	0.01	Shrink-swell	0.01
680946:							
Fern	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.39	Depth to saturated zone	1.00	Depth to saturated zone	0.39
		Shrink-swell	0.01	Shrink-swell	0.01	Shrink-swell	0.01
680971:							
Nessen	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Kaleva	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
680972:							
Nessen	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Kaleva	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
680973:							
Nessen	50	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
Kaleva	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Slope	0.04	Slope	1.00
680974:							
Nessen	50	Not limited		Not limited		Not limited	
Kaleva	40	Not limited		Not limited		Not limited	

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
893251:							
Boyer	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
894062:							
Remus	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.01	Shrink-swell	0.09	Shrink-swell	0.01
Spinks	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
894063:							
Remus	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.01	Shrink-swell	0.09	Shrink-swell	0.01
Spinks	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
894064:							
Fern	50	Somewhat limited		Very limited		Very limited	
		Depth to saturated zone	0.39	Depth to saturated zone	1.00	Slope	1.00
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.39
		Shrink-swell	0.01	Shrink-swell	0.01	Shrink-swell	0.01
Remus	40	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.04	Shrink-swell	0.09	Slope	1.00
		Shrink-swell	0.01	Slope	0.04	Shrink-swell	0.01
894065:							
Fern	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.39	Depth to saturated zone	1.00	Depth to saturated zone	0.39
		Shrink-swell	0.01	Shrink-swell	0.01	Shrink-swell	0.01
Remus	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Shrink-swell	0.01	Shrink-swell	0.09	Shrink-swell	0.01
894104:							
Mollineaux	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Remus	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.01	Shrink-swell	0.09	Shrink-swell	0.01
894105:							
Mollineaux	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Remus	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Shrink-swell	0.01	Shrink-swell	0.09	Shrink-swell	0.01

Table 8.—Dwellings and Small Commercial Buildings—Continued

Map unit symbol and soil name	Pct. of map unit	Dwellings without basements: Rating class and limiting features	Value	Dwellings with basements: Rating class and limiting features	Value	Small commercial buildings: Rating class and limiting features	Value
894165:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
Tekenink, sandy substratum	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
899682:							
Kaleva	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
899722:							
Goodharbor	90	Not limited		Not limited		Somewhat limited	
						Slope	0.50
899731:							
Covert	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.39	Depth to saturated zone	1.00	Depth to saturated zone	0.39
Pipestone	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
899733:							
Covert	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.39	Depth to saturated zone	1.00	Depth to saturated zone	0.39
Dair	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
899734:							
Benzonia	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	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)

Map unit symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
190775:							
Adrian	55	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Subsidence	1.00	Too clayey	1.00	Dusty	0.01
		Frost action	1.00	Dusty	0.01		
				Unstable excavation walls	0.01		
Houghton	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Subsidence	1.00	Organic matter content	1.00	Dusty	0.01
		Frost action	1.00				
		Low strength	1.00	Dusty	0.01		
				Unstable excavation walls	0.01		
190777:							
Alcona	55	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Depth to saturated zone	0.47		
				Unstable excavation walls	0.01		
Richter	30	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Depth to saturated zone	0.99	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
190778:							
Alcona	65	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Depth to saturated zone	0.47		
				Unstable excavation walls	0.01		
Richter	25	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Depth to saturated zone	0.99	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
190779:							
Alpena	90	Not limited		Very limited		Very limited	
				Unstable excavation walls	1.00	Droughty	1.00
						Gravel content	0.36

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190780:							
Au Gres	45	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Frost action	0.50	Unstable excavation walls	1.00	Droughty	0.51
						Too sandy	0.50
Kalkaska	35	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.80
						Too sandy	0.50
190781:							
Bach	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
190782:							
Deer Park	100	Somewhat limited		Very limited		Very limited	
		Slope	0.63	Unstable excavation walls	1.00	Droughty	1.00
				Slope	0.63	Slope	0.63
						Too sandy	0.50
190783:							
Deer Park	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	1.00
						Too sandy	0.50
190784:							
Deer Park	70	Not limited		Very limited		Very limited	
				Unstable excavation walls	1.00	Droughty	1.00
						Too sandy	0.50
Roscommon	25	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.37
190786:							
Dune land	100	Not rated		Not rated		Not rated	
190787:							
East Lake	90	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190788:							
East Lake	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	0.96	Droughty	0.44
				Slope	0.04	Slope	0.04
						Large stones content	0.03

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
190789:							
East Lake	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190790:							
East Lake	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190791:							
Eastport	93	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.85
						Too sandy	0.50
190792:							
Edwards	70	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Subsidence	1.00	Too clayey	1.00	Organic matter content	1.00
		Frost action	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Flooding	1.00	Dusty	0.01	Carbonate content	1.00
Marl beds	20	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Dusty	0.03	Carbonate content	1.00
		Low strength	1.00	Unstable excavation walls	0.01	Dusty	0.03
190794:							
Emmet	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Leelanau	30	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.01	Droughty	0.17
						Large stones content	0.03
190795:							
Emmet	60	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Slope	0.04	Slope	0.04
		Slope	0.04	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Leelanau	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04	Droughty	0.17
				Unstable excavation walls	0.01	Slope	0.04
						Large stones content	0.03

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190796:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Leelanau	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.01	Droughty	0.17
						Large stones content	0.03
190797:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Leelanau	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.01	Droughty	0.17
						Large stones content	0.03
190799:							
Emmet	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Leelanau	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.01	Droughty	0.17
						Large stones content	0.03
190801:							
Emmet	70	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Unstable excavation walls	0.01	Gravel content	0.12
				Dusty	0.01	Dusty	0.01
Mancelona	25	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.71	Droughty	0.34
						Gravel content	0.26
190803:							
Emmet	60	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Gravel content	0.12
				Dusty	0.01	Dusty	0.01
Mancelona	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.71	Droughty	0.34
						Gravel content	0.26

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190805:							
Emmet	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Omena	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
190806:							
Emmet	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Slope	0.04	Slope	0.04
		Slope	0.04	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Omena	45	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Slope	0.04	Slope	0.04
		Slope	0.04	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
190807:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Omena	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
190808:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Omena	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
190809:							
Emmet	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Omena	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190811:							
Hettinger	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Dusty	0.02	Dusty	0.02
		Low strength	1.00	Unstable excavation walls	0.01		
Muck	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Unstable excavation walls	0.01	Depth to saturated zone	1.00
		Frost action	1.00	Dusty	0.01	Dusty	0.01
190812:							
Hettinger	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Dusty	0.02	Dusty	0.02
		Low strength	1.00	Unstable excavation walls	0.01		
Tonkey	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
190814:							
Kalkaska	85	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.80
						Too sandy	0.50
190815:							
Kalkaska	85	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.80
						Too sandy	0.50
				Slope	0.04	Slope	0.04
190816:							
Kalkaska	90	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.80
				Slope	1.00	Too sandy	0.50
190817:							
Kalkaska	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.80
						Too sandy	0.50
190818:							
Kalkaska	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.80
						Too sandy	0.50

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190819:							
Kalkaska	55	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.58
						Large stones content	0.03
East Lake	35	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190820:							
Kiva	65	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.95	Droughty	0.21
						Gravel content	0.11
				Dusty	0.01	Dusty	0.01
Mancelona	30	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.71	Droughty	0.34
						Gravel content	0.26
190821:							
Kiva	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	0.95	Droughty	0.21
						Gravel content	0.11
				Slope	0.04	Slope	0.04
				Dusty	0.01	Dusty	0.01
Mancelona	30	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	0.71	Droughty	0.34
						Gravel content	0.26
				Slope	0.04	Slope	0.04
190823:							
Kiva	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.95	Droughty	0.21
						Gravel content	0.11
				Dusty	0.01	Dusty	0.01
Mancelona	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.71	Droughty	0.34
						Gravel content	0.26
190824:							
Lake beaches	100	Not rated		Not rated		Not rated	
190825:							
Lake bluffs	100	Not rated		Not rated		Not rated	
190826:							
Leelanau	60	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.01	Droughty	0.17
						Large stones content	0.03
East Lake	30	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190827:							
Leelanau	65	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Slope	0.04	Droughty	0.17
				Unstable excavation walls	0.01	Slope	0.04
						Large stones content	0.03
East Lake	25	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	0.96	Droughty	0.44
				Slope	0.04	Slope	0.04
						Large stones content	0.03
190828:							
Leelanau	65	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.01	Droughty	0.17
						Large stones content	0.03
East Lake	25	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190829:							
Leelanau	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.01	Droughty	0.17
						Large stones content	0.03
East Lake	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190830:							
Leelanau	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.01	Droughty	0.17
						Large stones content	0.03
East Lake	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190831:							
Lupton	60	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Subsidence	1.00	Organic matter content	1.00	Dusty	0.01
		Frost action	1.00	Dusty	0.01		
		Low strength	1.00	Unstable excavation walls	0.01		

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190831:							
Markey	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Organic matter content	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Too clayey	1.00	Dusty	0.01
				Unstable excavation walls	0.01		
190832:							
Mancelona	90	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.71	Droughty	0.22
190833:							
Mancelona	90	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	0.71	Droughty	0.22
				Slope	0.04	Slope	0.04
190834:							
Mancelona	60	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.71	Droughty	0.34
East Lake	30	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190835:							
Mancelona	55	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	0.71	Droughty	0.34
				Slope	0.04	Slope	0.04
East Lake	35	Somewhat limited		Somewhat limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	0.96	Droughty	0.44
				Slope	0.04	Slope	0.04
						Large stones	0.03
190836:							
Mancelona	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.71	Droughty	0.34
East Lake	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190837:							
Mancelona	45	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.71	Droughty	0.34

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190837:							
East Lake	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190838:							
Mancelona	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.71	Droughty	0.34
East Lake	30	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.96	Droughty	0.44
						Large stones content	0.03
190839:							
Mancelona	70	Not limited		Somewhat limited		Somewhat limited	
				Unstable excavation walls	0.71	Droughty	0.34
						Gravel content	0.26
Richter	25	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Depth to saturated zone	0.99	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
190840:							
Nester	90	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Dusty	0.03	Dusty	0.03
		Frost action	0.50	Unstable excavation walls	0.01		
		Shrink-swell	0.50				
190841:							
Nester	90	Very limited		Somewhat limited		Somewhat limited	
		Low strength	1.00	Slope	0.04	Slope	0.04
		Frost action	0.50	Dusty	0.03	Dusty	0.03
		Shrink-swell	0.50	Unstable excavation walls	0.01		
		Slope	0.04				
190842:							
Nester	90	Very limited		Very limited		Very limited	
		Low strength	1.00	Slope	1.00	Slope	1.00
		Slope	1.00	Dusty	0.03	Dusty	0.03
		Frost action	0.50	Unstable excavation walls	0.01		
		Shrink-swell	0.50				
190843:							
Nester	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Dusty	0.03	Dusty	0.03
		Frost action	0.50	Unstable excavation walls	0.01		
		Shrink-swell	0.50				

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190844:							
Nester--------------	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Dusty	0.03	Dusty	0.03
		Frost action	0.50	Unstable excavation walls	0.01		
		Shrink-swell	0.50				
190846:							
Pits, gravel--------	100	Not rated		Not rated		Not rated	
190847:							
Richter-------------	45	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Depth to saturated zone	0.99	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Alcona--------------	40	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Unstable excavation walls	0.01		
190848:							
Richter-------------	45	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Depth to saturated zone	0.99	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Alcona--------------	40	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Unstable excavation walls	0.01		
190849:							
Roscommon-----------	50	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.37
Markey--------------	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Organic matter content	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Too clayey	1.00	Dusty	0.01
				Unstable excavation walls	0.01		
190850:							
Sanilac-------------	90	Very limited		Very limited		Somewhat limited	
		Frost action	1.00	Depth to saturated zone	1.00	Depth to saturated zone	0.94
		Flooding	1.00	Flooding	0.60	Flooding	0.60
		Depth to saturated zone	0.94	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190851:							
Tonkey	40	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Munuscong	25	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Too clayey	0.92	Dusty	0.01
		Low strength	1.00	Unstable excavation walls	0.01		
		Shrink-swell	0.57	Dusty	0.01		
Iosco	25	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Frost action	0.50	Unstable excavation walls	0.01		
190852:							
Tonkey	35	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Munuscong	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Too clayey	0.92	Dusty	0.01
		Low strength	1.00	Unstable excavation walls	0.01		
		Shrink-swell	0.57	Dusty	0.01		
Iosco	20	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.99	Depth to saturated zone	1.00	Depth to saturated zone	0.99
		Frost action	0.50	Unstable excavation walls	0.01		
190853:							
Water	100	Not rated		Not rated		Not rated	
190854:							
Wallace	50	Not limited		Very limited		Very limited	
				Unstable excavation walls	1.00	Depth to cemented pan	1.00
				Dense layer	0.50	Droughty	1.00
						Too sandy	0.50
Kalkaska	45	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.80
						Too sandy	0.50

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
190855:							
Wind eroded land	100	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
190856:							
Wind eroded land	100	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.69
				Slope	1.00	Too sandy	0.50
193236:							
Beaches	100	Not rated		Not rated		Not rated	
193237:							
Thompsonville	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.75	Depth to saturated zone	1.00	Depth to saturated zone	0.75
				Unstable excavation walls	0.01	Droughty	0.34
Milnichol	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Droughty	0.43
193255:							
Spinks	50	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
Coloma	40	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Unstable excavation walls	1.00	Droughty	0.90
						Too sandy	0.50
193256:							
Spinks	50	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
				Slope	0.04	Slope	0.04
Coloma	40	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Unstable excavation walls	1.00	Droughty	0.90
		Slope	0.04			Too sandy	0.50
				Slope	0.04	Slope	0.04
193257:							
Spinks	55	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.69
				Slope	1.00	Too sandy	0.50
Coloma	35	Very limited		Very limited		Very limited	
		Low strength	1.00	Unstable excavation walls	1.00	Slope	1.00
		Slope	1.00			Droughty	0.90
				Slope	1.00	Too sandy	0.50

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
193258:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
Coloma	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Unstable excavation walls	1.00	Droughty	0.90
						Too sandy	0.50
193260:							
Copemish	95	Very limited		Very limited		Very limited	
		Low strength	1.00	Unstable excavation walls	1.00	Depth to cemented pan	1.00
				Dense layer	0.50	Droughty	1.00
						Too sandy	0.50
193262:							
Kaleva	95	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
193263:							
Kaleva	95	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
				Slope	0.04	Slope	0.04
193265:							
Grattan	95	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.79
						Too sandy	0.50
193266:							
Grattan	95	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.79
						Too sandy	0.50
				Slope	0.04	Slope	0.04
193267:							
Grattan	95	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.79
				Slope	1.00	Too sandy	0.50
193269:							
Grattan	95	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.79
						Too sandy	0.50
193270:							
Covert	90	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Droughty	0.79
		Depth to saturated zone	0.19			Too sandy	0.50
				Unstable excavation walls	1.00	Depth to saturated zone	0.19

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
193271:							
Pipestone	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00	Droughty	0.60
						Too sandy	0.50
193272:							
Dair	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00		
193277:							
Benona	90	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Unstable excavation walls	1.00	Droughty	0.68
						Too sandy	0.50
193278:							
Benona	90	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Unstable excavation walls	1.00	Droughty	0.68
		Slope	0.04			Too sandy	0.50
				Slope	0.04	Slope	0.04
193279:							
Benona	90	Very limited		Very limited		Very limited	
		Low strength	1.00	Unstable excavation walls	1.00	Slope	1.00
		Slope	1.00			Droughty	0.68
				Slope	1.00	Too sandy	0.50
193284:							
Udorthents	55	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Udipsamments	35	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
193285:							
Lumley	55	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Subsidence	1.00	Organic matter content	1.00	Dusty	0.03
		Frost action	1.00	Dusty	0.03		
				Unstable excavation walls	0.01		

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
193285:							
Makinen	40	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Subsidence	1.00	Organic matter content	1.00	Dusty	0.03
		Frost action	1.00	Too clayey	1.00		
				Dusty	0.03		
193286:							
Histosols	55	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Organic matter content	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Too clayey	1.00	Dusty	0.03
				Dusty	0.03		
Aquents	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Unstable excavation walls	1.00	Droughty	0.92
						Too sandy	0.50
193287:							
Dune land	55	Not rated		Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	1.00
						Too sandy	0.50
193288:							
Udipsamments	100	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
193342:							
Gorvan	35	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Frost action	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Flooding	1.00	Dusty	0.03	Dusty	0.03
				Unstable excavation walls	0.01		
Houghton	30	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Subsidence	1.00	Organic matter content	1.00	Organic matter content	1.00
		Frost action	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Flooding	1.00	Dusty	0.03	Dusty	0.03

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
193342:							
Glendora	20	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Flooding	1.00
		Flooding	1.00	Flooding	0.80	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	0.37	Droughty	0.45
193349:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
Coloma	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Unstable excavation walls	1.00	Droughty	0.90
						Too sandy	0.50
193351:							
Benona	95	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Unstable excavation walls	1.00	Droughty	0.68
						Too sandy	0.50
193354:							
Dune land	50	Not rated		Not rated		Not rated	
Quartzipsamments	40	Somewhat limited		Very limited		Very limited	
		Slope	0.63	Unstable excavation walls	1.00	Droughty	1.00
						Slope	0.63
				Slope	0.63	Too sandy	0.50
193357:							
Shavenaugh	85	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.13
193359:							
Shavenaugh	85	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.13
				Slope	0.04	Slope	0.04
193360:							
Shavenaugh	85	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.13
193362:							
Benzonia	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.65
						Too sandy	0.50
193363:							
Benzonia	90	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.65
				Slope	1.00	Too sandy	0.50

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
193364:							
Benzonia	90	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.65
						Too sandy	0.50
				Slope	0.04	Slope	0.04
193365:							
Benzonia	90	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.65
						Too sandy	0.50
193371:							
Dair	50	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00		
Pipestone	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00	Droughty	0.60
						Too sandy	0.50
193372:							
Access Denied	100	Not rated		Not rated		Not rated	
193423:							
Benona	95	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Low strength	1.00	Unstable excavation walls	1.00	Droughty	0.68
						Too sandy	0.50
193484:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
193494:							
Nordhouse	100	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.67
						Too sandy	0.50
193496:							
Nordhouse	95	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.63	Unstable excavation walls	1.00	Droughty	0.67
						Slope	0.63
				Slope	0.63	Too sandy	0.50
193497:							
Nordhouse	95	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.67
						Too sandy	0.50
193498:							
Nordhouse	40	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.67
						Too sandy	0.50

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
193498:							
Platteriver	35	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.75	Depth to saturated zone	1.00	Droughty	0.87
				Unstable excavation walls	0.01	Depth to saturated zone	0.75
Dair	25	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00		
193503:							
Spinks	50	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
Shavenaugh	40	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.13
193504:							
Spinks	50	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
				Slope	0.04	Slope	0.04
Shavenaugh	40	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.13
				Slope	0.04	Slope	0.04
193505:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.69
				Slope	1.00	Too sandy	0.50
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Too sandy	0.50
				Slope	1.00	Droughty	0.13
193506:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.13
193507:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
193507:							
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.13
193508:							
Madaus	90	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Organic matter content	1.00
		Frost action	1.00	Too clayey	0.88	Depth to saturated zone	1.00
				Dusty	0.03	Carbonate content	1.00
				Unstable excavation walls	0.01	Dusty	0.03
193509:							
Boyer	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Shavenaugh	40	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.13
193510:							
Boyer	50	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Slope	0.04	Slope	0.04
		Slope	0.04	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Shavenaugh	40	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Too sandy	0.50
				Slope	0.04	Droughty	0.13
						Slope	0.04
193511:							
Boyer	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.13
193513:							
Dair	50	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00		

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
193513:							
Adrian	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Subsidence	1.00	Organic matter content	1.00	Dusty	0.03
		Frost action	1.00	Too clayey	1.00		
				Dusty	0.03		
193514:							
Platteriver	55	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.75	Depth to saturated zone	1.00	Droughty	0.87
				Unstable excavation walls	0.01	Depth to saturated zone	0.75
Pipestone	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00	Droughty	0.60
						Too sandy	0.50
202010:							
Houghton	55	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Organic matter content	1.00	Depth to saturated zone	1.00
		Frost action	1.00	Dusty	0.03	Dusty	0.03
				Unstable excavation walls	0.01		
Adrian	40	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Subsidence	1.00	Organic matter content	1.00	Dusty	0.03
		Frost action	1.00	Too clayey	1.00		
				Dusty	0.03		
202016:							
Spinks	50	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
Tekenink, sandy substratum	40	Somewhat limited		Somewhat limited		Not limited	
		Frost action	0.50	Unstable excavation walls	0.01		
631170:							
Fogg	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.20

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
631170:							
Benzonia------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.65
						Too sandy	0.50
631171:							
Fogg----------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.20
Benzonia------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.65
						Too sandy	0.50
631172:							
Fogg----------------	50	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Too sandy	0.50
				Slope	1.00	Droughty	0.20
Benzonia------------	40	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.65
				Slope	1.00	Too sandy	0.50
631173:							
Fogg----------------	50	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.20
				Slope	0.04	Slope	0.04
Benzonia------------	40	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.65
						Too sandy	0.50
				Slope	0.04	Slope	0.04
631174:							
Fogg----------------	50	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Too sandy	0.50
						Droughty	0.20
Benzonia------------	40	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.65
						Too sandy	0.50
680939:							
Fern----------------	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.19	Depth to saturated zone	1.00	Too sandy	0.50
		Shrink-swell	0.01	Unstable excavation walls	0.01	Depth to saturated zone	0.19
Spinks--------------	40	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
				Slope	0.04	Slope	0.04

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
680943:							
Milnichol	90	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Droughty	0.43
680945:							
Fern	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.19	Depth to saturated zone	1.00	Too sandy	0.50
		Slope	0.04	Slope	0.04	Depth to saturated zone	0.19
		Shrink-swell	0.01	Unstable excavation walls	0.01	Slope	0.04
680946:							
Fern	90	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.19	Depth to saturated zone	1.00	Too sandy	0.50
		Shrink-swell	0.01	Unstable excavation walls	0.01	Depth to saturated zone	0.19
680971:							
Nessen	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.68
						Too sandy	0.50
Kaleva	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
680972:							
Nessen	50	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.68
				Slope	1.00	Too sandy	0.50
Kaleva	40	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.69
				Slope	1.00	Too sandy	0.50
680973:							
Nessen	50	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.68
						Too sandy	0.50
				Slope	0.04	Slope	0.04
Kaleva	40	Somewhat limited		Very limited		Somewhat limited	
		Slope	0.04	Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
				Slope	0.04	Slope	0.04
680974:							
Nessen	50	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.68
						Too sandy	0.50

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
680974:							
Kaleva	40	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
893251:							
Boyer	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
				Dusty	0.01		
Shavenaugh	40	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Too sandy	0.50
				Slope	1.00	Droughty	0.13
894062:							
Remus	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
		Shrink-swell	0.01				
				Dusty	0.01		
Spinks	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
894063:							
Remus	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
		Shrink-swell	0.01				
				Dusty	0.01		
Spinks	40	Very limited		Very limited		Very limited	
		Slope	1.00	Unstable excavation walls	1.00	Slope	1.00
						Droughty	0.69
				Slope	1.00	Too sandy	0.50
894064:							
Fern	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.19	Depth to saturated zone	1.00	Too sandy	0.50
						Depth to saturated zone	0.19
		Slope	0.04	Slope	0.04		
		Shrink-swell	0.01	Unstable excavation walls	0.01	Slope	0.04
Remus	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Slope	0.04	Slope	0.04
		Slope	0.04	Unstable excavation walls	0.01	Dusty	0.01
		Shrink-swell	0.01				
				Dusty	0.01		
894065:							
Fern	50	Somewhat limited		Very limited		Somewhat limited	
		Depth to saturated zone	0.19	Depth to saturated zone	1.00	Too sandy	0.50
						Depth to saturated zone	0.19
		Shrink-swell	0.01	Unstable excavation walls	0.01		

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets: Rating class and limiting features	Value	Shallow excavations: Rating class and limiting features	Value	Landscaping: Rating class and limiting features	Value
894065:							
Remus	40	Somewhat limited		Somewhat limited		Somewhat limited	
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
		Shrink-swell	0.01	Dusty	0.01		
894104:							
Mollineaux	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.01	Droughty	0.15
Remus	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
		Shrink-swell	0.01	Dusty	0.01		
894105:							
Mollineaux	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	0.01	Droughty	0.15
Remus	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01	Dusty	0.01
		Shrink-swell	0.01	Dusty	0.01		
894165:							
Spinks	50	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
Tekenink, sandy substratum	40	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
		Frost action	0.50	Unstable excavation walls	0.01		
899682:							
Kaleva	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.69
						Too sandy	0.50
899722:							
Goodharbor	90	Not limited		Very limited		Somewhat limited	
				Unstable excavation walls	1.00	Droughty	0.91
						Too sandy	0.50
899731:							
Covert	50	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Droughty	0.79
		Depth to saturated zone	0.19	Unstable excavation walls	1.00	Too sandy	0.50
						Depth to saturated zone	0.19

Table 9.—Roads and Streets, Shallow Excavations, and Landscaping—Continued

Map unit symbol and soil name	Pct. of map unit	Local roads and streets		Shallow excavations		Landscaping	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
899731:							
Pipestone	40	Very limited		Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00	Droughty	0.60
						Too sandy	0.50
899733:							
Covert	50	Very limited		Very limited		Somewhat limited	
		Low strength	1.00	Depth to saturated zone	1.00	Droughty	0.79
		Depth to saturated zone	0.19			Too sandy	0.50
				Unstable excavation walls	1.00	Depth to saturated zone	0.19
Dair	45	Very limited		Very limited		Very limited	
		Ponding	1.00	Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Frost action	0.50	Unstable excavation walls	1.00		
899734:							
Benzonia	90	Very limited		Very limited		Very limited	
		Slope	1.00	Slope	1.00	Slope	1.00
				Unstable excavation walls	1.00	Droughty	0.65
						Too sandy	0.50

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)

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190775:					
Adrian	55	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
Houghton	45	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Depth to saturated zone	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
190777:					
Alcona	55	Somewhat limited		Very limited	
		Depth to saturated zone	0.94	Seepage	1.00
		Slow water movement	0.50		
Richter	30	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.50	Seepage	0.50
190778:					
Alcona	65	Somewhat limited		Very limited	
		Depth to saturated zone	0.94	Seepage	1.00
				Slope	0.32
		Slow water movement	0.50		
Richter	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.50	Seepage	0.50
				Slope	0.32
190779:					
Alpena	90	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.92
		Seepage, bottom layer	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190780:					
Au Gres	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00		
Kalkaska	35	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
190781:					
Bach	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
190782:					
Deer Park	100	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.63		
190783:					
Deer Park	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
190784:					
Deer Park	70	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
Roscommon	25	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
		Filtering capacity	1.00		
190786:					
Dune land	100	Not rated		Not rated	

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190787:					
East Lake-----------	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
190788:					
East Lake-----------	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.04		
190789:					
East Lake-----------	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
		Filtering capacity	1.00		
190790:					
East Lake-----------	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
190791:					
Eastport------------	93	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
190792:					
Edwards-------------	70	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Subsidence	1.00	Seepage	1.00
Marl beds-----------	20	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
190794:					
Emmet---------------	60	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.32
		Slow water movement	0.50		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190794:					
Leelanau	30	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.32
190795:					
Emmet	60	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Slow water movement	0.50		
		Slope	0.04		
Leelanau	30	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Slope	0.04		
190796:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50		
Leelanau	30	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
190797:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50		
Leelanau	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
190799:					
Emmet	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50		
Leelanau	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190801:					
Emmet	70	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Slow water movement	0.50		
Mancelona	25	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
190803:					
Emmet	60	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50		
Mancelona	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
190805:					
Emmet	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.32
		Slow water movement	0.50		
Omena	45	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.32
190806:					
Emmet	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Slow water movement	0.50		
		Slope	0.04		
Omena	45	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Slope	0.04		
190807:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50		
Omena	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190808:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50		
Omena	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
190809:					
Emmet	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	0.50		
Omena	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
190811:					
Hettinger	45	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		
Muck	30	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Slow water movement	0.73	Depth to saturated zone	1.00
				Seepage	1.00
190812:					
Hettinger	45	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00		
Tonkey	30	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190814:					
Kalkaska	85	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
190815:					
Kalkaska	85	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.04		
190816:					
Kalkaska	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
		Filtering capacity	1.00		
190817:					
Kalkaska	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
190818:					
Kalkaska	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
190819:					
Kalkaska	55	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
East Lake	35	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
190820:					
Kiva	65	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
				Slope	0.32
		Seepage, bottom layer	1.00		
Mancelona	30	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.32

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190821:					
Kiva	50	Very limited		Very limited	
		Filtering capacity	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	0.04		
Mancelona	30	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Slope	0.04	Slope	1.00
190823:					
Kiva	50	Very limited		Very limited	
		Filtering capacity	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Seepage, bottom layer	1.00		
Mancelona	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
190824:					
Lake beaches	100	Not rated		Not rated	
190825:					
Lake bluffs	100	Not rated		Not rated	
190826:					
Leelanau	60	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
East Lake	30	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
190827:					
Leelanau	65	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Slope	0.04	Slope	1.00
East Lake	25	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
190828:					
Leelanau	65	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190828:					
East Lake	25	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		
190829:					
Leelanau	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
East Lake	35	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
190830:					
Leelanau	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
East Lake	35	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
190831:					
Lupton	60	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Depth to saturated zone	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Markey	30	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00		
190832:					
Mancelona	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190833:					
Mancelona-----------	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Slope	0.04		
190834:					
Mancelona-----------	60	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
East Lake-----------	30	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
190835:					
Mancelona-----------	55	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Slope	0.04		
East Lake-----------	35	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.04		
190836:					
Mancelona-----------	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
East Lake-----------	30	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
		Filtering capacity	1.00		
190837:					
Mancelona-----------	45	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
East Lake-----------	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
190838:					
Mancelona-----------	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190838:					
East Lake	30	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
190839:					
Mancelona	70	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
Richter	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.50	Seepage	0.50
				Slope	0.08
190840:					
Nester	90	Very limited		Somewhat limited	
		Slow water movement	1.00	Slope	0.32
190841:					
Nester	90	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	0.04		
190842:					
Nester	90	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	1.00		
190843:					
Nester	90	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	1.00		
190844:					
Nester	90	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	1.00		
190846:					
Pits, gravel	100	Not rated		Not rated	
190847:					
Richter	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.50	Seepage	0.50
Alcona	40	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190848:					
Richter	45	Very limited		Very limited	
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	0.50	Seepage	0.50
				Slope	0.32
Alcona	40	Somewhat limited		Very limited	
		Slow water movement	0.50	Seepage	1.00
				Slope	0.32
190849:					
Roscommon	50	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00		
Markey	30	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00		
190850:					
Sanilac	90	Very limited		Very limited	
		Flooding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Depth to saturated zone	1.00
		Slow water movement	1.00	Seepage	0.50
				Slope	0.08
190851:					
Tonkey	40	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
Munuscong	25	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
Iosco	25	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
190852:					
Tonkey	35	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
Munuscong	30	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
Iosco	20	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
				Slope	0.08
190853:					
Water	100	Not rated		Not rated	
190854:					
Wallace	50	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
Kalkaska	45	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
190855:					
Wind eroded land	100	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.92
190856:					
Wind eroded land	100	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		
193236:					
Beaches	100	Not rated		Not rated	

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193237:					
Thompsonville	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
Milnichol	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
193255:					
Spinks	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
Coloma	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
193256:					
Spinks	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
Coloma	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
193257:					
Spinks	55	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		
Coloma	35	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193258:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Coloma	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193260:					
Copemish	95	Very limited		Very limited	
		Depth to cemented pan	1.00	Depth to cemented pan	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
193262:					
Kaleva	95	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
193263:					
Kaleva	95	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.04		
193265:					
Grattan	95	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
193266:					
Grattan	95	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.04		
193267:					
Grattan	95	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
		Filtering capacity	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193269:					
Grattan	95	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193270:					
Covert	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00	Slope	0.08
193271:					
Pipestone	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00		
193272:					
Dair	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to saturated zone	1.00
193277:					
Benona	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
193278:					
Benona	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
193279:					
Benona	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193284:					
Udorthents	55	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
		Slope	1.00		
Udipsamments	35	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193285:					
Lumley	55	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Depth to saturated zone	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Makinen	40	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Subsidence	1.00	Depth to saturated zone	1.00
193286:					
Histosols	55	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Subsidence	1.00	Depth to saturated zone	1.00
Aquents	45	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00		
193287:					
Dune land	55	Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193288:					
Udipsamments	100	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
193342:					
Gorvan	35	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Slow water movement	1.00		
		Seepage, bottom layer	1.00		
Houghton	30	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
				Seepage	1.00
Glendora	20	Very limited		Very limited	
		Flooding	1.00	Ponding	1.00
		Ponding	1.00	Flooding	1.00
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
		Filtering capacity	1.00		
193349:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Coloma	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193351:					
Benona	95	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193354:					
Dune land	50	Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.63		
193357:					
Shavenaugh	85	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193359:					
Shavenaugh	85	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
193360:					
Shavenaugh	85	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
193362:					
Benzonia	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193363:					
Benzonia	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		
193364:					
Benzonia	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193365:					
Benzonia	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
193371:					
Dair	50	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Filtering capacity	1.00		
Pipestone	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
		Filtering capacity	1.00		
193372:					
Access Denied	100	Not rated		Not rated	
193423:					
Benona	95	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193484:					
Pits, sand and gravel	100	Not rated		Not rated	
193494:					
Nordhouse	100	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193496:					
Nordhouse	95	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.63		
193497:					
Nordhouse	95	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193498:					
Nordhouse	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
Platteriver	35	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
		Filtering capacity	1.00		
Dair	25	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Depth to saturated zone	1.00
193503:					
Spinks	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
Shavenaugh	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
193504:					
Spinks	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
Shavenaugh	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
193505:					
Spinks	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193505:					
Shavenaugh	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		
193506:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Shavenaugh	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193507:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Shavenaugh	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193508:					
Madaus	90	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Slow water movement	1.00	Seepage	1.00
				Depth to saturated zone	1.00
193509:					
Boyer	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
Shavenaugh	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
193510:					
Boyer	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Slope	0.04		
Shavenaugh	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	1.00
		Filtering capacity	1.00		
		Slope	0.04		
193511:					
Boyer	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Shavenaugh	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
193513:					
Dair	50	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Filtering capacity	1.00		
Adrian	45	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
193514:					
Platteriver	55	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
		Filtering capacity	1.00		
Pipestone	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
		Filtering capacity	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
202010:					
Houghton	55	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Depth to saturated zone	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Adrian	40	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Subsidence	1.00	Seepage	1.00
		Seepage, bottom layer	1.00	Depth to saturated zone	1.00
202016:					
Spinks	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
Tekenink, sandy substratum	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
631170:					
Fogg	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Benzonia	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
631171:					
Fogg	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
Benzonia	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
631172:					
Fogg	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
631172:					
Benzonia	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		
631173:					
Fogg	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Slope	0.04	Slope	1.00
Benzonia	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
631174:					
Fogg	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
Benzonia	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08
680939:					
Fern	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
				Slope	0.92
Spinks	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
680943:					
Milnichol	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
680945:					
Fern	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
		Slope	0.04	Slope	1.00

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
680946:					
Fern	90	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
				Slope	0.08
680971:					
Nessen	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Kaleva	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
680972:					
Nessen	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		
Kaleva	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
		Slope	1.00	Seepage	1.00
		Filtering capacity	1.00		
680973:					
Nessen	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
Kaleva	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	1.00
		Slope	0.04		
680974:					
Nessen	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00	Slope	0.08

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
680974:					
Kaleva	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.08
		Filtering capacity	1.00		
893251:					
Boyer	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
Shavenaugh	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
		Filtering capacity	1.00		
894062:					
Remus	50	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
				Seepage	0.27
		Slope	1.00		
Spinks	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
894063:					
Remus	50	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
				Seepage	0.27
		Slope	1.00		
Spinks	40	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
		Filtering capacity	1.00		
894064:					
Fern	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Slow water movement	1.00		
				Slope	1.00
		Slope	0.04		
Remus	40	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
				Seepage	0.27
		Slope	0.04		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
894065:					
Fern	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
		Slow water movement	1.00	Depth to saturated zone	1.00
				Slope	0.08
Remus	40	Very limited		Somewhat limited	
		Slow water movement	1.00	Seepage	0.27
				Slope	0.08
894104:					
Mollineaux	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Slow water movement	1.00		
Remus	40	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
				Seepage	0.27
		Slope	1.00		
894105:					
Mollineaux	50	Very limited		Very limited	
		Seepage, bottom layer	1.00	Slope	1.00
				Seepage	1.00
		Slope	1.00		
		Slow water movement	1.00		
Remus	40	Very limited		Very limited	
		Slow water movement	1.00	Slope	1.00
				Seepage	0.27
		Slope	1.00		
894165:					
Spinks	50	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		
Tekenink, sandy substratum	40	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
899682:					
Kaleva	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		

Table 10.—Sewage Disposal—Continued

Map unit symbol and soil name	Pct. of map unit	Septic tank absorption fields: Rating class and limiting features	Value	Sewage lagoons: Rating class and limiting features	Value
899722:					
Goodharbor	90	Very limited		Very limited	
		Seepage, bottom layer	1.00	Seepage	1.00
				Slope	0.92
		Filtering capacity	1.00		
899731:					
Covert	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
				Slope	0.08
		Filtering capacity	1.00		
Pipestone	40	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
		Filtering capacity	1.00		
899733:					
Covert	50	Very limited		Very limited	
		Depth to saturated zone	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Seepage, bottom layer	1.00		
				Slope	0.08
		Filtering capacity	1.00		
Dair	45	Very limited		Very limited	
		Ponding	1.00	Ponding	1.00
		Depth to saturated zone	1.00	Organic matter content	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
				Depth to saturated zone	1.00
		Filtering capacity	1.00		
899734:					
Benzonia	90	Very limited		Very limited	
		Slope	1.00	Slope	1.00
		Seepage, bottom layer	1.00	Seepage	1.00
		Filtering capacity	1.00		

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)

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
190775:					
Adrian	55	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.64
Houghton	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
		Organic matter content	0.00	Organic matter content	0.00
190777:					
Alcona	55	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.12
		Thickest layer	0.00	Thickest layer	0.24
Richter	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.00	Thickest layer	0.13
190778:					
Alcona	65	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.12
		Thickest layer	0.00	Thickest layer	0.24
Richter	25	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.00	Thickest layer	0.13
190779:					
Alpena	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.61
		Thickest layer	0.00	Thickest layer	0.72
190780:					
Au Gres	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.72
		Thickest layer	0.00	Thickest layer	0.99
Kalkaska	35	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.91
190781:					
Bach	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190782:					
Deer Park	100	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.99

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
190783:					
Deer Park-----------	100	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.99
190784:					
Deer Park-----------	70	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.99
Roscommon-----------	25	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.99
190786:					
Dune land-----------	100	Not rated		Not rated	
190787:					
East Lake-----------	90	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190788:					
East Lake-----------	90	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190789:					
East Lake-----------	90	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190790:					
East Lake-----------	90	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190791:					
Eastport------------	93	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.86
		Thickest layer	0.00		
190792:					
Edwards-------------	70	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Marl beds-----------	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190794:					
Emmet---------------	60	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Leelanau------------	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Value	Sand source: Rating class and limiting features	Value
190795:					
Emmet	60	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Leelanau	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23
190796:					
Emmet	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Leelanau	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23
190797:					
Emmet	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Leelanau	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23
190799:					
Emmet	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Leelanau	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23
190801:					
Emmet	70	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Mancelona	25	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.39
		Bottom layer	0.00	Bottom layer	0.61
190803:					
Emmet	60	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Mancelona	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.39
		Bottom layer	0.00	Bottom layer	0.61
190805:					
Emmet	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Omena	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
190806:					
Emmet	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Omena	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
190807:					
Emmet	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Omena	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
190808:					
Emmet	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Omena	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
190809:					
Emmet	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Omena	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
190811:					
Hettinger	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Muck	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190812:					
Hettinger	45	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Tonkey	30	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
190814:					
Kalkaska	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.91

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
190815:					
Kalkaska	85	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.91
190816:					
Kalkaska	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.91
190817:					
Kalkaska	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.91
190818:					
Kalkaska	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.91
190819:					
Kalkaska	55	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.90
East Lake	35	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190820:					
Kiva	65	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.20
		Thickest layer	0.00	Thickest layer	0.36
Mancelona	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.39
		Bottom layer	0.00	Bottom layer	0.61
190821:					
Kiva	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.20
		Thickest layer	0.00	Thickest layer	0.36
Mancelona	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.39
		Bottom layer	0.00	Bottom layer	0.61
190823:					
Kiva	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.20
		Thickest layer	0.00	Thickest layer	0.36
Mancelona	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.39
		Bottom layer	0.00	Bottom layer	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

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
190826:					
Leelanau	60	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23
East Lake	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190827:					
Leelanau	65	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23
East Lake	25	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190828:					
Leelanau	65	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23
East Lake	25	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190829:					
Leelanau	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23
East Lake	35	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190830:					
Leelanau	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.10
		Thickest layer	0.00	Thickest layer	0.23
East Lake	35	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190831:					
Lupton	60	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
		Organic matter content	0.00	Organic matter content	0.00
Markey	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.64
190832:					
Mancelona	90	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.39
		Bottom layer	0.00	Bottom layer	0.61

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Value	Sand source: Rating class and limiting features	Value
190833:					
Mancelona	90	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.39
		Bottom layer	0.00	Bottom layer	0.61
190834:					
Mancelona	60	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.51
		Bottom layer	0.00	Bottom layer	0.61
East Lake	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190835:					
Mancelona	55	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.51
		Bottom layer	0.00	Bottom layer	0.61
East Lake	35	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190836:					
Mancelona	50	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.51
		Bottom layer	0.00	Bottom layer	0.61
East Lake	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190837:					
Mancelona	45	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.51
		Bottom layer	0.00	Bottom layer	0.61
East Lake	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190838:					
Mancelona	50	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.51
		Bottom layer	0.00	Bottom layer	0.61
East Lake	30	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.58
		Bottom layer	0.00	Bottom layer	0.61
190839:					
Mancelona	70	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.39
		Bottom layer	0.00	Bottom layer	0.61
Richter	25	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.00	Thickest layer	0.13

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Value	Sand source: Rating class and limiting features	Value
190840:					
Nester	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190841:					
Nester	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190842:					
Nester	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190843:					
Nester	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190844:					
Nester	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190846:					
Pits, gravel	100	Not rated		Not rated	
190847:					
Richter	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.00	Thickest layer	0.13
Alcona	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.12
		Thickest layer	0.00	Thickest layer	0.24
190848:					
Richter	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.07
		Thickest layer	0.00	Thickest layer	0.13
Alcona	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.12
		Thickest layer	0.00	Thickest layer	0.24
190849:					
Roscommon	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.99
Markey	30	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.64
190850:					
Sanilac	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
190851:					
Tonkey	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Munuscong	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Iosco	25	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190852:					
Tonkey	35	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.03
		Thickest layer	0.00	Thickest layer	0.09
Munuscong	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
Iosco	20	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
190853:					
Water	100	Not rated		Not rated	
190854:					
Wallace	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.72
		Thickest layer	0.00	Thickest layer	0.99
Kalkaska	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.91
190855:					
Wind eroded land	100	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.99
190856:					
Wind eroded land	100	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.64
		Thickest layer	0.00	Thickest layer	0.99
193236:					
Beaches	100	Not rated		Not rated	
193237:					
Thompsonville	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.15
Milnichol	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.10

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
193255:					
Spinks	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Coloma	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.15
		Thickest layer	0.00	Thickest layer	0.99
193256:					
Spinks	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Coloma	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.15
		Thickest layer	0.00	Thickest layer	0.99
193257:					
Spinks	55	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Coloma	35	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.15
		Thickest layer	0.00	Thickest layer	0.99
193258:					
Spinks	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Coloma	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.15
		Thickest layer	0.00	Thickest layer	0.99
193260:					
Copemish	95	Poor		Good	
		Bottom layer	0.00	Thickest layer	0.99
		Thickest layer	0.00		
193262:					
Kaleva	95	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
193263:					
Kaleva	95	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
193265:					
Grattan	95	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.93
		Thickest layer	0.00		
193266:					
Grattan	95	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.93
		Thickest layer	0.00		

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
193267:					
Grattan	95	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.93
		Thickest layer	0.00		
193269:					
Grattan	95	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.93
		Thickest layer	0.00		
193270:					
Covert	90	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00		
193271:					
Pipestone	90	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
193272:					
Dair	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.99
193277:					
Benona	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.38
		Thickest layer	0.00	Thickest layer	0.99
193278:					
Benona	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.38
		Thickest layer	0.00	Thickest layer	0.99
193279:					
Benona	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.38
		Thickest layer	0.00	Thickest layer	0.99
193284:					
Udorthents	55	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.07
Udipsamments	35	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00		
193285:					
Lumley	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
		Organic matter content	0.00	Organic matter content	0.00
Makinen	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.67

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source		Sand source	
		Rating class and limiting features	Value	Rating class and limiting features	Value
193286:					
Histosols	55	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.75
Aquents	45	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00		
193287:					
Dune land	55	Not rated		Not rated	
Quartzipsamments	40	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00		
193288:					
Udipsamments	100	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00		
193342:					
Gorvan	35	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.09
		Thickest layer	0.00	Bottom layer	0.75
Houghton	30	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
		Organic matter content	0.00	Organic matter content	0.00
Glendora	20	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.51
		Thickest layer	0.00	Thickest layer	0.92
193349:					
Spinks	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Coloma	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.15
		Thickest layer	0.00	Thickest layer	0.99
193351:					
Benona	95	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.38
		Thickest layer	0.00	Thickest layer	0.99
193354:					
Dune land	50	Not rated		Not rated	
Quartzipsamments	40	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00		
193357:					
Shavenaugh	85	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
193359:					
Shavenaugh	85	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193360:					
Shavenaugh	85	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193362:					
Benzonia	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	0.93
193363:					
Benzonia	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	0.93
193364:					
Benzonia	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	0.93
193365:					
Benzonia	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	0.93
193371:					
Dair	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.99
Pipestone	40	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
193372:					
Access Denied	100	Not rated		Not rated	
193423:					
Benona	95	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.38
		Thickest layer	0.00	Thickest layer	0.99
193484:					
Pits, sand and gravel	100	Not rated		Not rated	
193494:					
Nordhouse	100	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
193496:					
Nordhouse	95	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source		Sand source	
		Rating class and limiting features	Value	Rating class and limiting features	Value
193497:					
Nordhouse-----------	95	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
193498:					
Nordhouse-----------	40	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
193498:					
Platteriver---------	35	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
Dair----------------	25	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.99
193503:					
Spinks--------------	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Shavenaugh----------	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193504:					
Spinks--------------	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Shavenaugh----------	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193505:					
Spinks--------------	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Shavenaugh----------	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193506:					
Spinks--------------	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Shavenaugh----------	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193507:					
Spinks--------------	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
193507:					
Shavenaugh	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193508:					
Madaus	90	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
193509:					
Boyer	50	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.23
		Bottom layer	0.00	Bottom layer	0.75
Shavenaugh	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193510:					
Boyer	50	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.23
		Bottom layer	0.00	Bottom layer	0.75
Shavenaugh	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193511:					
Boyer	50	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.23
		Bottom layer	0.00	Bottom layer	0.75
Shavenaugh	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
193513:					
Dair	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.99
Adrian	45	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.67
193514:					
Platteriver	55	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
Pipestone	40	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
202010:					
Houghton	55	Poor		Poor	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.00
		Organic matter content	0.00	Organic matter content	0.00

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Value	Sand source: Rating class and limiting features	Value
202010:					
Adrian	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.00
		Thickest layer	0.00	Bottom layer	0.67
202016:					
Spinks	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Tekenink, sandy substratum	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.14
		Thickest layer	0.00	Bottom layer	0.75
631170:					
Fogg	50	Poor		Good	
		Bottom layer	0.00	Thickest layer	0.88
		Thickest layer	0.00		
Benzonia	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	0.93
631171:					
Fogg	50	Poor		Good	
		Bottom layer	0.00	Thickest layer	0.88
		Thickest layer	0.00		
Benzonia	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	0.93
631172:					
Fogg	50	Poor		Good	
		Bottom layer	0.00	Thickest layer	0.88
		Thickest layer	0.00		
Benzonia	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	0.93
631173:					
Fogg	50	Poor		Good	
		Bottom layer	0.00	Thickest layer	0.88
		Thickest layer	0.00		
Benzonia	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	0.93
631174:					
Fogg	50	Poor		Good	
		Bottom layer	0.00	Thickest layer	0.88
		Thickest layer	0.00		
Benzonia	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	0.93

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Value	Sand source: Rating class and limiting features	Value
680939:					
Fern	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.04
Spinks	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
680943:					
Milnichol	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.10
680945:					
Fern	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.04
680946:					
Fern	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.04
680971:					
Nessen	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.38
		Thickest layer	0.00	Thickest layer	0.90
Kaleva	40	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
680972:					
Nessen	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.38
		Thickest layer	0.00	Thickest layer	0.90
Kaleva	40	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
680973:					
Nessen	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.38
		Thickest layer	0.00	Thickest layer	0.90
Kaleva	40	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
680974:					
Nessen	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.38
		Thickest layer	0.00	Thickest layer	0.90
Kaleva	40	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
893251:					
Boyer	50	Poor		Fair	
		Thickest layer	0.00	Thickest layer	0.23
		Bottom layer	0.00	Bottom layer	0.75
Shavenaugh	40	Fair		Fair	
		Thickest layer	0.00	Thickest layer	0.96
		Bottom layer	0.25	Bottom layer	0.97
894062:					
Remus	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.05
Spinks	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
894063:					
Remus	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.05
Spinks	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
894064:					
Fern	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.04
Remus	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.05
894065:					
Fern	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.04
Remus	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.05
894104:					
Mollineaux	50	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.09
		Thickest layer	0.00	Bottom layer	0.75
Remus	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.05
894105:					
Mollineaux	50	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.09
		Thickest layer	0.00	Bottom layer	0.75
Remus	40	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.00
		Thickest layer	0.00	Thickest layer	0.05

Table 11.—Source of Gravel and Sand—Continued

Map unit symbol and soil name	Pct. of map unit	Gravel source: Rating class and limiting features	Gravel source: Value	Sand source: Rating class and limiting features	Sand source: Value
894165:					
Spinks	50	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.95
Tekenink, sandy substratum	40	Poor		Fair	
		Bottom layer	0.00	Thickest layer	0.14
		Thickest layer	0.00	Bottom layer	0.75
899682:					
Kaleva	90	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
899722:					
Goodharbor	90	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00		
899731:					
Covert	50	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00		
Pipestone	40	Poor		Good	
		Bottom layer	0.00		
		Thickest layer	0.00		
899733:					
Covert	50	Poor		Good	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00		
Dair	45	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.75
		Thickest layer	0.00	Thickest layer	0.99
899734:					
Benzonia	90	Poor		Fair	
		Bottom layer	0.00	Bottom layer	0.11
		Thickest layer	0.00	Thickest layer	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 map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190775:							
Adrian	55	Poor		Poor		Poor	
		Wind erosion	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13	Dusty	0.80	Organic matter content high	0.00
		Too acid	0.97				
Houghton	45	Poor		Poor		Poor	
		Wind erosion	0.00	Wetness	0.00	Wetness	0.00
				Dusty	0.80	Organic matter content high	0.00
190777:							
Alcona	55	Fair		Good		Fair	
		Low content of organic matter	0.13			Too sandy	0.40
		Too sandy	0.40				
Richter	30	Fair		Fair		Fair	
		Low content of organic matter	0.13	Wetness	0.01	Wetness	0.01
		Too sandy	0.98			Too sandy	0.98
190778:							
Alcona	65	Fair		Good		Fair	
		Low content of organic matter	0.13			Too sandy	0.40
		Too sandy	0.40				
Richter	25	Fair		Fair		Fair	
		Low content of organic matter	0.13	Wetness	0.01	Wetness	0.01
		Too sandy	0.98			Too sandy	0.98
190779:							
Alpena	90	Poor		Good		Poor	
		Droughty	0.00			Too sandy	0.00
		Too sandy	0.00			Rock fragments	0.00
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.68
190780:							
Au Gres	45	Poor		Fair		Poor	
		Wind erosion	0.00	Wetness	0.01	Too sandy	0.00
		Too sandy	0.00			Wetness	0.01
		Low content of organic matter	0.13			Rock fragments	0.97
Kalkaska	35	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Droughty	0.11				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190781:							
Bach----------------	90	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
				Dusty	0.94		
		Water erosion	0.90				
190782:							
Deer Park-----------	100	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.37
		Droughty	0.00				
190783:							
Deer Park-----------	100	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Droughty	0.00				
190784:							
Deer Park-----------	70	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Droughty	0.00				
Roscommon-----------	25	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
190786:							
Dune land-----------	100	Not rated		Not rated		Not rated	
190787:							
East Lake-----------	90	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.03
		Too sandy	0.03			Hard to reclaim (rock fragments)	0.18
		Low content of organic matter	0.13			Rock fragments	0.26
190788:							
East Lake-----------	90	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.03
		Too sandy	0.03			Hard to reclaim (rock fragments)	0.18
		Low content of organic matter	0.13			Rock fragments	0.26
190789:							
East Lake-----------	90	Poor		Good		Poor	
		Wind erosion	0.00			Slope	0.00
		Too sandy	0.03			Too sandy	0.03
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18
190790:							
East Lake-----------	90	Poor		Fair		Poor	
		Wind erosion	0.00	Slope	0.18	Slope	0.00
		Too sandy	0.03			Too sandy	0.03
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190791:							
Eastport	93	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Rock fragments	0.97
		Droughty	0.08				
190792:							
Edwards	70	Poor		Poor		Poor	
		Wind erosion	0.00	Wetness	0.00	Wetness	0.00
		Carbonate content	0.00	Low strength	0.00	Organic matter content high	0.00
				Dusty	0.80	Carbonate content	0.97
Marl beds	20	Poor		Poor		Poor	
		Wind erosion	0.00	Wetness	0.00	Carbonate content	0.00
		Carbonate content	0.00	Low strength	0.00	Wetness	0.00
				Dusty	0.80		
190794:							
Emmet	60	Fair		Good		Good	
		Low content of organic matter	0.13				
		Carbonate content	0.92				
		Too acid	0.95				
Leelanau	30	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.30
		Low content of organic matter	0.13			Rock fragments	0.95
		Too sandy	0.30				
190795:							
Emmet	60	Fair		Good		Fair	
		Low content of organic matter	0.13			Slope	0.96
		Carbonate content	0.92				
		Too acid	0.95				
Leelanau	30	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.30
		Low content of organic matter	0.13			Rock fragments	0.95
						Slope	0.96
		Too sandy	0.30				
190796:							
Emmet	50	Fair		Good		Poor	
		Low content of organic matter	0.13			Slope	0.00
		Carbonate content	0.92				
		Too acid	0.95				
Leelanau	30	Poor		Good		Poor	
		Wind erosion	0.00			Slope	0.00
		Low content of organic matter	0.13			Too sandy	0.30
						Rock fragments	0.95
		Too sandy	0.30				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190797:							
Emmet	50	Fair		Fair		Poor	
		Low content of organic matter	0.13	Slope	0.18	Slope	0.00
		Carbonate content	0.92				
		Too acid	0.95				
Leelanau	30	Poor		Fair		Poor	
		Wind erosion	0.00	Slope	0.18	Slope	0.00
		Low content of organic matter	0.13			Too sandy	0.30
						Rock fragments	0.95
		Too sandy	0.30				
190799:							
Emmet	45	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Slope	0.00
		Carbonate content	0.92				
		Too acid	0.95				
Leelanau	30	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Low content of organic matter	0.13			Too sandy	0.30
						Rock fragments	0.95
		Too sandy	0.30				
190801:							
Emmet	70	Fair		Good		Fair	
		Low content of organic matter	0.13			Rock fragments	0.91
		Carbonate content	0.92				
		Too acid	0.95				
Mancelona	25	Fair		Good		Poor	
		Low content of organic matter	0.13			Rock fragments	0.00
						Hard to reclaim (rock fragments)	0.18
		Droughty	0.15				
		Too sandy	0.26			Too sandy	0.26
190803:							
Emmet	60	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Slope	0.00
						Rock fragments	0.91
		Carbonate content	0.92				
		Too acid	0.95				
Mancelona	30	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Slope	0.00
						Rock fragments	0.00
		Droughty	0.15			Hard to reclaim (rock fragments)	0.18
		Too sandy	0.26				
190805:							
Emmet	50	Fair		Good		Good	
		Low content of organic matter	0.13				
		Carbonate content	0.92				
		Too acid	0.95				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190805:							
Omena	45	Fair		Good		Fair	
		Low content of organic matter	0.13			Rock fragments	0.97
		Carbonate content	0.92				
190806:							
Emmet	50	Fair		Good		Fair	
		Low content of organic matter	0.13			Slope	0.96
		Carbonate content	0.92				
		Too acid	0.95				
Omena	45	Fair		Good		Fair	
		Low content of organic matter	0.13			Slope	0.96
						Rock fragments	0.97
		Carbonate content	0.92				
190807:							
Emmet	50	Fair		Good		Poor	
		Low content of organic matter	0.13			Slope	0.00
		Carbonate content	0.92				
		Too acid	0.95				
Omena	45	Fair		Good		Poor	
		Low content of organic matter	0.13			Slope	0.00
						Rock fragments	0.97
		Carbonate content	0.92				
190808:							
Emmet	50	Fair		Fair		Poor	
		Low content of organic matter	0.13	Slope	0.18	Slope	0.00
		Carbonate content	0.92				
		Too acid	0.95				
Omena	45	Fair		Fair		Poor	
		Low content of organic matter	0.13	Slope	0.18	Slope	0.00
						Rock fragments	0.97
		Carbonate content	0.92				
190809:							
Emmet	50	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Slope	0.00
		Carbonate content	0.92				
		Too acid	0.95				
Omena	45	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Slope	0.00
						Rock fragments	0.97
		Carbonate content	0.92				
190811:							
Hettinger	45	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Too clayey	0.85
		Carbonate content	0.68	Dusty	0.87		
		Water erosion	0.90				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190811:							
Muck	30	Poor		Poor		Poor	
		Wind erosion	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13	Dusty	0.80		
		Too acid	0.97				
190812:							
Hettinger	45	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
				Low strength	0.00	Too clayey	0.85
		Carbonate content	0.68	Dusty	0.87		
		Water erosion	0.90				
Tonkey	30	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
190814:							
Kalkaska	85	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Droughty	0.11				
190815:							
Kalkaska	85	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.96
		Droughty	0.11				
190816:							
Kalkaska	90	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.00
		Droughty	0.11				
190817:							
Kalkaska	90	Poor		Fair		Poor	
		Wind erosion	0.00	Slope	0.18	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Droughty	0.11				
190818:							
Kalkaska	90	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Droughty	0.11				
190819:							
Kalkaska	55	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Low content of organic matter	0.13				
East Lake	35	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.03
		Too sandy	0.03			Hard to reclaim (rock fragments)	0.18
		Low content of organic matter	0.13			Rock fragments	0.26

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190820:							
Kiva	65	Fair		Fair		Poor	
		Low content of organic matter	0.13	Cobble content	0.99	Hard to reclaim (rock fragments)	0.00
		Droughty	0.23			Rock fragments	0.01
		Too sandy	0.36			Too sandy	0.36
Mancelona	30	Fair		Good		Poor	
		Low content of organic matter	0.13			Rock fragments	0.00
						Hard to reclaim (rock fragments)	0.18
		Droughty	0.15				
		Too sandy	0.26			Too sandy	0.26
190821:							
Kiva	50	Fair		Fair		Poor	
		Low content of organic matter	0.13	Cobble content	0.99	Hard to reclaim (rock fragments)	0.00
		Droughty	0.23			Rock fragments	0.01
		Too sandy	0.36			Too sandy	0.36
Mancelona	30	Fair		Good		Poor	
		Low content of organic matter	0.13			Rock fragments	0.00
						Hard to reclaim (rock fragments)	0.18
		Droughty	0.15				
		Too sandy	0.26			Too sandy	0.26
190823:							
Kiva	50	Fair		Fair		Poor	
		Low content of organic matter	0.13	Slope	0.18	Slope	0.00
				Cobble content	0.99	Hard to reclaim (rock fragments)	0.00
		Droughty	0.23				
		Too sandy	0.36			Rock fragments	0.01
Mancelona	30	Fair		Fair		Poor	
		Low content of organic matter	0.13	Slope	0.18	Slope	0.00
						Rock fragments	0.00
		Droughty	0.15			Hard to reclaim (rock fragments)	0.18
		Too sandy	0.26				
190824:							
Lake beaches	100	Not rated		Not rated		Not rated	
190825:							
Lake bluffs	100	Not rated		Not rated		Not rated	
190826:							
Leelanau	60	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.30
		Low content of organic matter	0.13			Rock fragments	0.95
		Too sandy	0.30				
East Lake	30	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.03
		Too sandy	0.03			Hard to reclaim (rock fragments)	0.18
		Low content of organic matter	0.13			Rock fragments	0.26

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190827:							
Leelanau	65	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.30
		Low content of organic matter	0.13			Rock fragments	0.95
		Too sandy	0.30			Slope	0.96
East Lake	25	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.03
		Too sandy	0.03			Hard to reclaim (rock fragments)	0.18
		Low content of organic matter	0.13			Rock fragments	0.26
190828:							
Leelanau	65	Poor		Good		Poor	
		Wind erosion	0.00			Slope	0.00
		Low content of organic matter	0.13			Too sandy	0.30
		Too sandy	0.30			Rock fragments	0.95
East Lake	25	Poor		Good		Poor	
		Wind erosion	0.00			Slope	0.00
		Too sandy	0.03			Too sandy	0.03
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18
190829:							
Leelanau	50	Poor		Fair		Poor	
		Wind erosion	0.00	Slope	0.18	Slope	0.00
		Low content of organic matter	0.13			Too sandy	0.30
		Too sandy	0.30			Rock fragments	0.95
East Lake	35	Poor		Fair		Poor	
		Wind erosion	0.00	Slope	0.18	Slope	0.00
		Too sandy	0.03			Too sandy	0.03
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18
190830:							
Leelanau	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Low content of organic matter	0.13			Too sandy	0.30
		Too sandy	0.30			Rock fragments	0.95
East Lake	35	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.03			Too sandy	0.03
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18
190831:							
Lupton	60	Poor		Poor		Poor	
		Wind erosion	0.00	Wetness	0.00	Wetness	0.00
				Dusty	0.80	Organic matter content high	0.00
Markey	30	Poor		Poor		Poor	
		Wind erosion	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13	Dusty	0.80	Organic matter content high	0.00

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190832:							
Mancelona-----------	90	Fair		Good		Fair	
		Low content of organic matter	0.13			Rock fragments	0.04
						Hard to reclaim (rock fragments)	0.18
		Droughty	0.22				
		Too sandy	0.26			Too sandy	0.26
190833:							
Mancelona-----------	90	Fair		Good		Fair	
		Low content of organic matter	0.13			Rock fragments	0.04
						Hard to reclaim (rock fragments)	0.18
		Droughty	0.22				
		Too sandy	0.26			Too sandy	0.26
190834:							
Mancelona-----------	60	Poor		Good		Fair	
		Wind erosion	0.00			Rock fragments	0.04
		Too sandy	0.08			Too sandy	0.08
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18
East Lake-----------	30	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.03
		Too sandy	0.03			Hard to reclaim (rock fragments)	0.18
		Low content of organic matter	0.13				
						Rock fragments	0.26
190835:							
Mancelona-----------	55	Poor		Good		Fair	
		Wind erosion	0.00			Rock fragments	0.04
		Too sandy	0.08			Too sandy	0.08
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18
East Lake-----------	35	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.03
		Too sandy	0.03			Hard to reclaim (rock fragments)	0.18
		Low content of organic matter	0.13				
						Rock fragments	0.26
190836:							
Mancelona-----------	50	Poor		Good		Poor	
		Wind erosion	0.00			Slope	0.00
		Too sandy	0.08			Rock fragments	0.04
		Low content of organic matter	0.13			Too sandy	0.08
East Lake-----------	30	Poor		Good		Poor	
		Wind erosion	0.00			Slope	0.00
		Too sandy	0.03			Too sandy	0.03
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18
190837:							
Mancelona-----------	45	Poor		Fair		Poor	
		Wind erosion	0.00	Slope	0.18	Slope	0.00
		Too sandy	0.08			Rock fragments	0.04
		Low content of organic matter	0.13			Too sandy	0.08

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190837:							
East Lake-----------	30	Poor		Fair		Poor	
		Wind erosion	0.00	Slope	0.18	Slope	0.00
		Too sandy	0.03			Too sandy	0.03
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18
190838:							
Mancelona-----------	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.08			Rock fragments	0.04
		Low content of organic matter	0.13			Too sandy	0.08
East Lake-----------	30	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.03			Too sandy	0.03
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.18
190839:							
Mancelona-----------	70	Fair		Good		Poor	
		Low content of organic matter	0.13			Rock fragments	0.00
		Droughty	0.15			Hard to reclaim (rock fragments)	0.18
		Too sandy	0.26			Too sandy	0.26
Richter-------------	25	Fair		Fair		Fair	
		Low content of organic matter	0.13	Wetness	0.01	Wetness	0.01
		Too sandy	0.98			Too sandy	0.98
190840:							
Nester--------------	90	Fair		Poor		Fair	
		Low content of organic matter	0.13	Low strength	0.00	Too clayey	0.51
				Dusty	0.80		
		Carbonate content	0.68	Shrink-swell	0.87		
		Too clayey	0.78				
190841:							
Nester--------------	90	Fair		Poor		Fair	
		Low content of organic matter	0.13	Low strength	0.00	Too clayey	0.51
				Dusty	0.80	Slope	0.96
		Carbonate content	0.68	Shrink-swell	0.87		
		Too clayey	0.78				
190842:							
Nester--------------	90	Fair		Poor		Poor	
		Low content of organic matter	0.13	Low strength	0.00	Slope	0.00
				Dusty	0.80	Too clayey	0.51
		Carbonate content	0.68	Shrink-swell	0.87		
		Too clayey	0.78				
190843:							
Nester--------------	90	Fair		Poor		Poor	
		Low content of organic matter	0.13	Low strength	0.00	Slope	0.00
				Slope	0.18	Too clayey	0.51
		Carbonate content	0.68	Dusty	0.80		
		Too clayey	0.78				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190844:							
Nester	90	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Slope	0.00
		Carbonate content	0.68	Low strength	0.00	Too clayey	0.51
		Too clayey	0.78	Dusty	0.80		
190846:							
Pits, gravel	100	Not rated		Not rated		Not rated	
190847:							
Richter	45	Fair		Fair		Fair	
		Low content of organic matter	0.13	Wetness	0.01	Wetness	0.01
		Too sandy	0.98			Too sandy	0.98
Alcona	40	Fair		Good		Fair	
		Low content of organic matter	0.13			Too sandy	0.40
		Too sandy	0.40				
190848:							
Richter	45	Fair		Fair		Fair	
		Low content of organic matter	0.13	Wetness	0.01	Wetness	0.01
		Too sandy	0.98			Too sandy	0.98
Alcona	40	Fair		Good		Fair	
		Low content of organic matter	0.13			Too sandy	0.40
		Too sandy	0.40				
190849:							
Roscommon	50	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
Markey	30	Poor		Poor		Poor	
		Wind erosion	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13	Dusty	0.80	Organic matter content high	0.00
190850:							
Sanilac	90	Fair		Fair		Fair	
		Low content of organic matter	0.13	Wetness	0.04	Wetness	0.04
		Water erosion	0.90	Dusty	0.89		
190851:							
Tonkey	40	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
Munuscong	25	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
				Low strength	0.00		
		Carbonate content	0.92	Shrink-swell	0.57		

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
190851:							
Iosco	25	Poor		Poor		Fair	
		Wind erosion	0.00	Low strength	0.00	Wetness	0.01
		Low content of organic matter	0.13	Wetness	0.01	Rock fragments	0.99
		Carbonate content	0.80	Shrink-swell	0.99		
190852:							
Tonkey	35	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
Munuscong	30	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
				Low strength	0.00		
		Carbonate content	0.92	Shrink-swell	0.57		
Iosco	20	Poor		Poor		Fair	
		Wind erosion	0.00	Low strength	0.00	Wetness	0.01
		Low content of organic matter	0.13	Wetness	0.01	Rock fragments	0.99
		Carbonate content	0.80	Shrink-swell	0.99		
190853:							
Water	100	Not rated		Not rated		Not rated	
190854:							
Wallace	50	Poor		Poor		Poor	
		Too sandy	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Wind erosion	0.00				
		Droughty	0.00	High gypsum content	0.00	Too sandy	0.00
						Too acid	0.88
Kalkaska	45	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Droughty	0.11				
190855:							
Wind eroded land	100	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Rock fragments	0.97
		Droughty	0.35				
190856:							
Wind eroded land	100	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Droughty	0.35			Rock fragments	0.97
193236:							
Beaches	100	Not rated		Not rated		Not rated	
193237:							
Thompsonville	50	Poor		Fair		Poor	
		Too sandy	0.00	Wetness	0.14	Too sandy	0.00
		Wind erosion	0.00			Wetness	0.14
		Too acid	0.16			Too acid	0.98

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
193237:							
Milnichol	40	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Wind erosion	0.00	Low strength	0.00	Too sandy	0.00
		Low content of organic matter	0.13				
193255:							
Spinks	50	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Low content of organic matter	0.13				
Coloma	40	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Low content of organic matter	0.13				
193256:							
Spinks	50	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.96
		Low content of organic matter	0.13				
Coloma	40	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.96
		Low content of organic matter	0.13				
193257:							
Spinks	55	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.00
		Low content of organic matter	0.13				
Coloma	35	Poor		Good		Poor	
		Wind erosion	0.00			Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
193258:							
Spinks	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
Coloma	40	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
193260:							
Copemish	95	Poor		Poor		Poor	
		Too sandy	0.00	Depth to cemented pan	0.00	Depth to cemented pan	0.00
		Wind erosion	0.00			Too sandy	0.00
		Droughty	0.00			Too acid	0.02
193262:							
Kaleva	95	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Low content of organic matter	0.13				
193263:							
Kaleva	95	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.96
		Low content of organic matter	0.13				
193265:							
Grattan	95	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Too acid	0.99
		Low content of organic matter	0.13				
193266:							
Grattan	95	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.96
		Low content of organic matter	0.13			Too acid	0.99
193267:							
Grattan	95	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Low content of organic matter	0.13			Too acid	0.99
193269:							
Grattan	95	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.99
193270:							
Covert	90	Poor		Fair		Poor	
		Too sandy	0.00	Wetness	0.53	Too sandy	0.00
		Wind erosion	0.00			Wetness	0.53
		Low content of organic matter	0.13			Too acid	0.96
193271:							
Pipestone	90	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.97

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
193272:							
Dair	90	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13			Too sandy	0.00
		Too acid	0.84				
193277:							
Benona	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Too acid	0.96
		Too acid	0.00				
193278:							
Benona	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.96
		Too acid	0.00			Too acid	0.96
193279:							
Benona	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Too acid	0.00			Too acid	0.96
193284:							
Udorthents	55	Fair		Poor		Poor	
		Too acid	0.99	Slope	0.00	Slope	0.00
Udipsamments	35	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Too acid	0.84				
193285:							
Lumley	55	Fair		Poor		Poor	
		Too acid	0.50	Wetness	0.00	Wetness	0.00
				Dusty	0.80	Organic matter content high	0.00
Makinen	40	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
				Dusty	0.80	Organic matter content high	0.00
193286:							
Histosols	55	Fair		Poor		Poor	
		Too acid	0.97	Wetness	0.00	Wetness	0.00
				Dusty	0.80	Organic matter content high	0.00
Aquents	45	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13			Too sandy	0.00
		Droughty	0.72				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
193287:							
Dune land	55	Not rated		Not rated		Not rated	
Quartzipsamments	40	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.01				
193288:							
Udipsamments	100	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Too acid	0.84				
193342:							
Gorvan	35	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
				Dusty	0.80		
		Water erosion	0.90				
Houghton	30	Good		Poor		Poor	
				Wetness	0.00	Wetness	0.00
				Dusty	0.80	Organic matter content high	0.00
Glendora	20	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13			Too sandy	0.00
		Too acid	0.99				
193349:							
Spinks	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
Coloma	40	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
193351:							
Benona	95	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Too acid	0.00			Too acid	0.96
193354:							
Dune land	50	Not rated		Not rated		Not rated	
Quartzipsamments	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.37
		Low content of organic matter	0.01				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
193357:							
Shavenaugh	85	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.00
193359:							
Shavenaugh	85	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Hard to reclaim (rock fragments)	0.00
		Low content of organic matter	0.13			Slope	0.96
193360:							
Shavenaugh	85	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Hard to reclaim (rock fragments)	0.00
		Low content of organic matter	0.13				
193362:							
Benzonia	90	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.98
193363:							
Benzonia	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Low content of organic matter	0.13			Too acid	0.98
193364:							
Benzonia	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.96
		Low content of organic matter	0.13			Too acid	0.98
193365:							
Benzonia	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Too acid	0.98
		Low content of organic matter	0.13				
193371:							
Dair	50	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13			Too sandy	0.00
		Too acid	0.84				
Pipestone	40	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.97

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
193372:							
Access Denied-------	100	Not rated		Not rated		Not rated	
193423:							
Benona--------------	95	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Too acid	0.00			Too acid	0.96
193484:							
Pits, sand and gravel-------------	100	Not rated		Not rated		Not rated	
193494:							
Nordhouse-----------	100	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Too acid	0.00			Too acid	0.79
193496:							
Nordhouse-----------	95	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.37
		Too acid	0.00			Too acid	0.79
193497:							
Nordhouse-----------	95	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Too acid	0.79
		Too acid	0.00				
193498:							
Nordhouse-----------	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Too acid	0.79
		Too acid	0.00				
Platteriver---------	35	Poor		Fair		Poor	
		Too sandy	0.00	Wetness	0.14	Too sandy	0.00
		Wind erosion	0.00			Wetness	0.14
		Low content of organic matter	0.13			Too acid	0.52
Dair----------------	25	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13			Too sandy	0.00
		Too acid	0.84				
193503:							
Spinks--------------	50	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Low content of organic matter	0.13				
Shavenaugh----------	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Hard to reclaim (rock fragments)	0.00
		Low content of organic matter	0.13				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
193504:							
Spinks	50	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.96
		Low content of organic matter	0.13				
Shavenaugh	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Hard to reclaim (rock fragments)	0.00
		Low content of organic matter	0.13			Slope	0.96
193505:							
Spinks	50	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.00
		Low content of organic matter	0.13				
Shavenaugh	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.00
193506:							
Spinks	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
Shavenaugh	40	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.00
193507:							
Spinks	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
Shavenaugh	40	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.00
193508:							
Madaus	90	Poor		Poor		Poor	
		Carbonate content	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13	Dusty	0.80	Carbonate content	0.00
		Water erosion	0.90				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
193509:							
Boyer	50	Fair		Good		Poor	
		Low content of organic matter	0.13			Rock fragments	0.00
		Too acid	0.99			Hard to reclaim (rock fragments)	0.94
Shavenaugh	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Hard to reclaim (rock fragments)	0.00
		Low content of organic matter	0.13				
193510:							
Boyer	50	Fair		Good		Poor	
		Low content of organic matter	0.13			Rock fragments	0.00
		Too acid	0.99			Hard to reclaim (rock fragments)	0.94
						Slope	0.96
Shavenaugh	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Hard to reclaim (rock fragments)	0.00
		Low content of organic matter	0.13			Slope	0.96
193511:							
Boyer	50	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Slope	0.00
						Rock fragments	0.00
		Too acid	0.99			Hard to reclaim (rock fragments)	0.94
Shavenaugh	40	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.00
193513:							
Dair	50	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13			Too sandy	0.00
		Too acid	0.84				
Adrian	45	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
				Dusty	0.80	Organic matter content high	0.00
193514:							
Platteriver	55	Poor		Fair		Poor	
		Too sandy	0.00	Wetness	0.14	Too sandy	0.00
		Wind erosion	0.00			Wetness	0.14
		Low content of organic matter	0.13			Too acid	0.52
Pipestone	40	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.97

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
202010:							
Houghton	55	Fair		Poor		Poor	
		Too acid	0.97	Wetness	0.00	Wetness	0.00
				Dusty	0.80	Organic matter content high	0.00
Adrian	40	Fair		Poor		Poor	
		Low content of organic matter	0.13	Wetness	0.00	Wetness	0.00
				Dusty	0.80	Organic matter content high	0.00
202016:							
Spinks	50	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00				
		Low content of organic matter	0.13				
Tekenink, sandy substratum	40	Poor		Good		Fair	
		Wind erosion	0.00			Too sandy	0.41
		Too sandy	0.41				
		Too acid	0.84				
631170:							
Fogg	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.99
Benzonia	40	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.98
631171:							
Fogg	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.99
Benzonia	40	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.98
631172:							
Fogg	50	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.00
		Low content of organic matter	0.13			Too acid	0.99
Benzonia	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Low content of organic matter	0.13			Too acid	0.98

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
631173:							
Fogg----------------	50	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.96
		Low content of organic matter	0.13			Too acid	0.99
Benzonia------------	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.96
		Low content of organic matter	0.13			Too acid	0.98
631174:							
Fogg----------------	50	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Too acid	0.99
		Low content of organic matter	0.13				
Benzonia------------	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Too acid	0.98
		Low content of organic matter	0.13				
680939:							
Fern----------------	50	Poor		Fair		Fair	
		Wind erosion	0.00	Wetness	0.53	Wetness	0.53
		Low content of organic matter	0.13	Shrink-swell	0.98		
		Too acid	0.84				
Spinks--------------	40	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.96
		Low content of organic matter	0.13				
680943:							
Milnichol-----------	90	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Wind erosion	0.00	Low strength	0.00	Too sandy	0.00
		Low content of organic matter	0.13				
680945:							
Fern----------------	90	Poor		Fair		Fair	
		Wind erosion	0.00	Wetness	0.53	Wetness	0.53
		Low content of organic matter	0.13	Shrink-swell	0.98	Slope	0.96
		Too acid	0.84				
680946:							
Fern----------------	90	Poor		Fair		Fair	
		Wind erosion	0.00	Wetness	0.53	Wetness	0.53
		Low content of organic matter	0.13	Shrink-swell	0.98		
		Too acid	0.84				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
680971:							
Nessen	50	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.92
Kaleva	40	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
680972:							
Nessen	50	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.92
Kaleva	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Low content of organic matter	0.13				
680973:							
Nessen	50	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Hard to reclaim (rock fragments)	0.92
		Low content of organic matter	0.13			Slope	0.96
Kaleva	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.96
		Low content of organic matter	0.13				
680974:							
Nessen	50	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Hard to reclaim (rock fragments)	0.92
		Low content of organic matter	0.13				
Kaleva	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Low content of organic matter	0.13				
893251:							
Boyer	50	Fair		Good		Poor	
		Low content of organic matter	0.13			Slope	0.00
		Too acid	0.99			Rock fragments	0.00
						Hard to reclaim (rock fragments)	0.94

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
893251:							
Shavenaugh	40	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00			Slope	0.00
		Low content of organic matter	0.13			Hard to reclaim (rock fragments)	0.00
894062:							
Remus	50	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Slope	0.00
				Shrink-swell	0.98		
		Too acid	0.99				
		Water erosion	0.99				
Spinks	40	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
894063:							
Remus	50	Fair		Fair		Poor	
		Low content of organic matter	0.13	Shrink-swell	0.98	Slope	0.00
		Too acid	0.99				
		Water erosion	0.99				
Spinks	40	Poor		Good		Poor	
		Wind erosion	0.00			Too sandy	0.00
		Too sandy	0.00			Slope	0.00
		Low content of organic matter	0.13				
894064:							
Fern	50	Poor		Fair		Fair	
		Wind erosion	0.00	Wetness	0.53	Wetness	0.53
		Low content of organic matter	0.13	Shrink-swell	0.98	Slope	0.96
		Too acid	0.84				
Remus	40	Fair		Fair		Fair	
		Low content of organic matter	0.13	Shrink-swell	0.98	Slope	0.96
		Too acid	0.99				
		Water erosion	0.99				
894065:							
Fern	50	Poor		Fair		Fair	
		Wind erosion	0.00	Wetness	0.53	Wetness	0.53
		Low content of organic matter	0.13	Shrink-swell	0.98		
		Too acid	0.84				
Remus	40	Fair		Fair		Good	
		Low content of organic matter	0.13	Shrink-swell	0.98		
		Too acid	0.99				
		Water erosion	0.99				

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
894104:							
Mollineaux----------	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.02	Low strength	0.22	Too sandy	0.02
		Low content of organic matter	0.13				
Remus---------------	40	Fair		Poor		Poor	
		Low content of organic matter	0.13	Slope	0.00	Slope	0.00
				Shrink-swell	0.98		
		Too acid	0.99				
		Water erosion	0.99				
894105:							
Mollineaux----------	50	Poor		Fair		Poor	
		Wind erosion	0.00	Low strength	0.22	Slope	0.00
		Too sandy	0.02			Too sandy	0.02
		Low content of organic matter	0.13				
Remus---------------	40	Fair		Fair		Poor	
		Low content of organic matter	0.13	Shrink-swell	0.98	Slope	0.00
		Too acid	0.99				
		Water erosion	0.99				
894165:							
Spinks--------------	50	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
Tekenink, sandy substratum---------	40	Poor		Poor		Poor	
		Wind erosion	0.00	Slope	0.00	Slope	0.00
		Too sandy	0.41			Too sandy	0.41
		Too acid	0.84				
899682:							
Kaleva--------------	90	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13				
899722:							
Goodharbor----------	90	Poor		Good		Poor	
		Too sandy	0.00			Too sandy	0.00
		Wind erosion	0.00				
		Low content of organic matter	0.13				
899731:							
Covert--------------	50	Poor		Fair		Poor	
		Too sandy	0.00	Wetness	0.53	Too sandy	0.00
		Wind erosion	0.00			Wetness	0.53
		Low content of organic matter	0.13			Too acid	0.96

Table 12.—Source of Reclamation Material, Roadfill, and Topsoil—Continued

Map unit symbol and soil name	Pct. of map unit	Source of reclamation material: Rating class and limiting features	Value	Roadfill source: Rating class and limiting features	Value	Topsoil source: Rating class and limiting features	Value
899731:							
Pipestone-----------	40	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.97
899733:							
Covert--------------	50	Poor		Fair		Poor	
		Too sandy	0.00	Wetness	0.53	Too sandy	0.00
		Wind erosion	0.00			Wetness	0.53
		Low content of organic matter	0.13			Too acid	0.96
Dair----------------	45	Poor		Poor		Poor	
		Too sandy	0.00	Wetness	0.00	Wetness	0.00
		Low content of organic matter	0.13			Too sandy	0.00
		Too acid	0.84				
899734:							
Benzonia------------	90	Poor		Poor		Poor	
		Too sandy	0.00	Slope	0.00	Slope	0.00
		Wind erosion	0.00			Too sandy	0.00
		Low content of organic matter	0.13			Too acid	0.98

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)

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
190775:							
Adrian	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
				Dusty	0.01		
Houghton	45	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Organic matter content	1.00	Unstable excavation walls	0.10
				Ponding	1.00		
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
190777:							
Alcona	55	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
Richter	30	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Dusty	0.01	Slow refill	0.30
190778:							
Alcona	65	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.08				
Richter	25	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Depth to saturated zone	1.00	Unstable excavation walls	1.00
		Slope	0.08	Dusty	0.01	Slow refill	0.30
190779:							
Alpena	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.68				
190780:							
Au Gres	45	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	1.00		
Kalkaska	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
190781:							
Bach	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.03	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00	Slow refill	0.30
				Piping	0.98		
				Dusty	0.01		
190782:							
Deer Park	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190783:							
Deer Park	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190784:							
Deer Park	70	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Roscommon	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
190786:							
Dune land	100	Not rated		Not rated		Not rated	
190787:							
East Lake	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
190788:							
East Lake	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190789:							
East Lake	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190790:							
East Lake	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190791:							
Eastport	93	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
190792:							
Edwards	70	Very limited		Very limited		Somewhat limited	
		Carbonate content	1.00	Ponding	1.00	Unstable excavation walls	0.10
		Seepage	1.00	Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
				Dusty	0.01		

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
190792:							
Marl beds	20	Very limited		Very limited		Somewhat limited	
		Carbonate content	1.00	Ponding	1.00	Unstable excavation walls	0.10
				Depth to saturated zone	1.00		
				Hard to pack	1.00		
				Dusty	0.03		
190794:							
Emmet	60	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	0.08				
Leelanau	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
		Slope	0.08				
190795:							
Emmet	60	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Leelanau	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
		Slope	1.00				
190796:							
Emmet	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Leelanau	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
		Slope	1.00				
190797:							
Emmet	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Leelanau	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
		Slope	1.00				
190799:							
Emmet	45	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Leelanau	30	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
		Slope	1.00				
190801:							
Emmet	70	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Mancelona	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
190803:							
Emmet	60	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Mancelona	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190805:							
Emmet	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	0.08				
Omena	45	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	0.08				
190806:							
Emmet	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Omena	45	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
190807:							
Emmet	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Omena	45	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
190808:							
Emmet	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Omena	45	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
190809:							
Emmet	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
Omena	45	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Dusty	0.01	Depth to water	1.00
		Slope	1.00				
190811:							
Hettinger	45	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.03	Ponding	1.00	Slow refill	0.30
				Depth to saturated zone	1.00	Unstable excavation walls	0.10
				Dusty	0.02		
				Piping	0.01		

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
190811:							
Muck	30	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	0.50
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
				Dusty	0.01		
190812:							
Hettinger	45	Somewhat limited		Very limited		Somewhat limited	
		Seepage	0.03	Ponding	1.00	Slow refill	0.30
				Depth to saturated zone	1.00	Unstable excavation walls	0.10
				Dusty	0.02		
				Piping	0.01		
Tonkey	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Dusty	0.01		
190814:							
Kalkaska	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
190815:							
Kalkaska	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190816:							
Kalkaska	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190817:							
Kalkaska	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190818:							
Kalkaska	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190819:							
Kalkaska	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
East Lake	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
190820:							
Kiva	65	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.08	Dusty	0.01		
Mancelona	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.08				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
190821:							
Kiva	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Dusty	0.01		
Mancelona	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190823:							
Kiva	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Dusty	0.01		
Mancelona	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190824:							
Lake beaches	100	Not rated		Not rated		Not rated	
190825:							
Lake bluffs	100	Not rated		Not rated		Not rated	
190826:							
Leelanau	60	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
East Lake	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
190827:							
Leelanau	65	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
		Slope	1.00				
East Lake	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190828:							
Leelanau	65	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
		Slope	1.00				
East Lake	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190829:							
Leelanau	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
		Slope	1.00				
East Lake	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
190830:							
Leelanau	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Seepage	0.93	Depth to water	1.00
		Slope	1.00				
East Lake	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190831:							
Lupton	60	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Organic matter content	1.00	Unstable excavation walls	0.10
				Ponding	1.00		
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
Markey	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
				Dusty	0.01		
190832:							
Mancelona	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
190833:							
Mancelona	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190834:							
Mancelona	60	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
East Lake	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
190835:							
Mancelona	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
East Lake	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190836:							
Mancelona	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
East Lake	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
190837:							
Mancelona-----------	45	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
East Lake-----------	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190838:							
Mancelona-----------	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
East Lake-----------	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
190839:							
Mancelona-----------	70	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Richter-------------	25	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Dusty	0.01	Slow refill	0.30
190840:							
Nester--------------	90	Somewhat limited		Somewhat limited		Very limited	
		Slope	0.08	Dusty	0.03	Depth to water	1.00
190841:							
Nester--------------	90	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Dusty	0.03	Depth to water	1.00
190842:							
Nester--------------	90	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Dusty	0.03	Depth to water	1.00
190843:							
Nester--------------	90	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Dusty	0.03	Depth to water	1.00
190844:							
Nester--------------	90	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Dusty	0.03	Depth to water	1.00
190846:							
Pits, gravel--------	100	Not rated		Not rated		Not rated	
190847:							
Richter-------------	45	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Dusty	0.01	Slow refill	0.30
Alcona--------------	40	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
190848:							
Richter	45	Somewhat limited		Very limited		Very limited	
		Seepage	0.70	Depth to saturated zone	1.00	Unstable excavation walls	1.00
		Slope	0.08	Dusty	0.01	Slow refill	0.30
Alcona	40	Somewhat limited		Not limited		Very limited	
		Seepage	0.70			Depth to water	1.00
		Slope	0.08				
190849:							
Roscommon	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
Markey	30	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
				Dusty	0.01		
190850:							
Sanilac	90	Somewhat limited		Very limited		Very limited	
		Seepage	0.03	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Piping	1.00	Slow refill	0.30
				Dusty	0.01		
190851:							
Tonkey	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Dusty	0.01		
Munuscong	25	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	0.10
				Depth to saturated zone	1.00		
				Dusty	0.01		
Iosco	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
190852:							
Tonkey	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Dusty	0.01		
Munuscong	30	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	0.10
				Depth to saturated zone	1.00		
				Dusty	0.01		

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
190852:							
Iosco	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
190853:							
Water	100	Not rated		Not rated		Not rated	
190854:							
Wallace	50	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Seepage	1.00	Depth to water	1.00
		Seepage	1.00	Thin layer	1.00		
		Slope	0.92				
Kalkaska	45	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.92				
190855:							
Wind eroded land	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.68				
190856:							
Wind eroded land	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193236:							
Beaches	100	Not rated		Not rated		Not rated	
193237:							
Thompsonville	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	1.00		
Milnichol	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	1.00		
193255:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Coloma	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193256:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Coloma	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
193257:							
Spinks	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Coloma	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193258:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Coloma	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193260:							
Copemish	95	Very limited		Very limited		Very limited	
		Depth to cemented pan	1.00	Seepage	1.00	Depth to water	1.00
				Thin layer	1.00		
		Seepage	1.00				
		Slope	1.00				
193262:							
Kaleva	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193263:							
Kaleva	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193265:							
Grattan	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193266:							
Grattan	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193267:							
Grattan	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193269:							
Grattan	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193270:							
Covert	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	0.99		

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
193271:							
Pipestone	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	1.00		
193272:							
Dair	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
193277:							
Benona	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193278:							
Benona	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193279:							
Benona	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193284:							
Udorthents	55	Very limited		Somewhat limited		Very limited	
		Slope	1.00	Dusty	0.01	Depth to water	1.00
		Seepage	0.03				
Udipsamments	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193285:							
Lumley	55	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Organic matter content	1.00	Unstable excavation walls	0.10
				Ponding	1.00		
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
Makinen	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
				Dusty	0.03		

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
193286:							
Histosols	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Organic matter content	1.00	Unstable excavation walls	1.00
				Ponding	1.00		
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
Aquents	45	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
193287:							
Dune land	55	Not rated		Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193288:							
Udipsamments	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193342:							
Gorvan	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Dusty	0.03		
Houghton	30	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Organic matter content	1.00	Unstable excavation walls	0.10
				Ponding	1.00		
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
Glendora	20	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
193349:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Coloma	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
193351:							
Benona	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193354:							
Dune land	50	Not rated		Not rated		Not rated	
Quartzipsamments	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193357:							
Shavenaugh	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193359:							
Shavenaugh	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193360:							
Shavenaugh	85	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193362:							
Benzonia	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193363:							
Benzonia	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193364:							
Benzonia	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193365:							
Benzonia	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193371:							
Dair	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
Pipestone	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	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. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
193423:							
Benona	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193484:							
Pits, sand and gravel	100	Not rated		Not rated		Not rated	
193494:							
Nordhouse	100	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193496:							
Nordhouse	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193497:							
Nordhouse	95	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193498:							
Nordhouse	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Platteriver	35	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	1.00		
Dair	25	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavated walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
193503:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Shavenaugh	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193504:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Shavenaugh	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193505:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Shavenaugh	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
193506:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Shavenaugh	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193507:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Shavenaugh	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193508:							
Madaus	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
		Carbonate content	1.00	Depth to saturated zone	1.00		
				Hard to pack	1.00		
				Dusty	0.03		
193509:							
Boyer	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
				Dusty	0.01		
Shavenaugh	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
193510:							
Boyer	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Dusty	0.01		
Shavenaugh	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193511:							
Boyer	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Dusty	0.01		
Shavenaugh	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
193513:							
Dair	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
193513:							
Adrian	45	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
				Dusty	0.03		
193514:							
Platteriver	55	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	1.00		
Pipestone	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	1.00		
202010:							
Houghton	55	Very limited		Very limited		Somewhat limited	
		Seepage	1.00	Organic matter content	1.00	Unstable excavation walls	0.10
				Ponding	1.00		
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
Adrian	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
				Hard to pack	1.00		
				Dusty	0.03		
202016:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Tekenink, sandy substratum	40	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
631170:							
Fogg	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Benzonia	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
631171:							
Fogg	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas		Embankments, dikes, and levees		Aquifer-fed excavated ponds	
		Rating class and limiting features	Value	Rating class and limiting features	Value	Rating class and limiting features	Value
631171:							
Benzonia	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
631172:							
Fogg	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Benzonia	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
631173:							
Fogg	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Benzonia	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
631174:							
Fogg	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Benzonia	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
680939:							
Fern	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Depth to saturated zone	0.99	Unstable excavation walls	1.00
		Slope	0.68			Slow refill	0.97
Spinks	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
680943:							
Milnichol	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	1.00		
680945:							
Fern	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Depth to saturated zone	0.99	Unstable excavation walls	1.00
		Slope	1.00			Slow refill	0.97
680946:							
Fern	90	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Depth to saturated zone	0.99	Unstable excavation walls	1.00
						Slow refill	0.97

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
680971:							
Nessen	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Kaleva	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
680972:							
Nessen	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Kaleva	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
680973:							
Nessen	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Kaleva	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
680974:							
Nessen	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
Kaleva	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
893251:							
Boyer	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00	Dusty	0.01		
Shavenaugh	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
894062:							
Remus	50	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.53	Dusty	0.01		
Spinks	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
894063:							
Remus	50	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.53	Dusty	0.01		
Spinks	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
894064:							
Fern	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Depth to saturated zone	0.99	Unstable excavation walls	1.00
		Slope	1.00			Slow refill	0.97
Remus	40	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.53	Dusty	0.01		
894065:							
Fern	50	Very limited		Somewhat limited		Very limited	
		Seepage	1.00	Depth to saturated zone	0.99	Unstable excavation walls	1.00
						Slow refill	0.97
Remus	40	Somewhat limited		Very limited		Very limited	
		Seepage	0.53	Piping	1.00	Depth to water	1.00
				Dusty	0.01		
894104:							
Mollineaux	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Remus	40	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.53	Dusty	0.01		
894105:							
Mollineaux	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Remus	40	Very limited		Very limited		Very limited	
		Slope	1.00	Piping	1.00	Depth to water	1.00
		Seepage	0.53	Dusty	0.01		
894165:							
Spinks	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
Tekenink, sandy substratum	40	Very limited		Not limited		Very limited	
		Seepage	1.00			Depth to water	1.00
		Slope	1.00				
899682:							
Kaleva	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				
899722:							
Goodharbor	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	0.68				

Table 13.—Ponds and Embankments—Continued

Map unit symbol and soil name	Pct. of map unit	Pond reservoir areas: Rating class and limiting features	Value	Embankments, dikes, and levees: Rating class and limiting features	Value	Aquifer-fed excavated ponds: Rating class and limiting features	Value
899731:							
Covert	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	0.99		
Pipestone	40	Very limited		Very limited		Very limited	
		Seepage	1.00	Depth to saturated zone	1.00	Unstable excavation walls	1.00
				Seepage	1.00		
899733:							
Covert	50	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	0.99		
Dair	45	Very limited		Very limited		Very limited	
		Seepage	1.00	Ponding	1.00	Unstable excavation walls	1.00
				Depth to saturated zone	1.00		
				Seepage	1.00		
899734:							
Benzonia	90	Very limited		Very limited		Very limited	
		Seepage	1.00	Seepage	1.00	Depth to water	1.00
		Slope	1.00				

Table 14.—Engineering Properties

(Absence of an entry indicates that data were not estimated)

Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 in	3-10 in	4	10	40	200		
	In				Pct	Pct					Pct	
190775:												
Adrian----------	0-8	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	8-24	Muck	PT	A-8	0	0	100	100	90-100	40-100	---	NP
	24-60	Sand	SP-SM, SP, SM	A-3, A-4, A-1-b, A-2-4	0	0	80-100	60-100	30-80	0-40	0-14	NP
Houghton--------	0-10	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	10-60	Muck	PT	A-8	0	0	100	100	90-100	40-100	---	NP
190777:												
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	90-100	75-100	35-75	10-30	15-25	NP-5
	18-24	Sandy loam	SC-SM	A-4, A-2	0	0-8	95-100	90-100	55-85	25-70	20-30	4-10
	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
Richter---------	0-8	Sandy loam	SM, SC-SM	A-4, A-2	0	0	100	90-100	55-80	25-50	15-25	2-7
	8-27	Fine sandy loam	SC, SM, SC-SM	A-4, A-6, A-1, A-2-4	0	0	100	90-100	45-90	15-45	10-30	NP-16
	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
190778:												
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	90-100	75-100	35-75	10-30	15-25	NP-5
	18-24	Sandy loam	SC-SM	A-4, A-2	0	0-8	95-100	90-100	55-85	25-70	20-30	4-10
	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
Richter---------	0-8	Sandy loam	SM, SC-SM	A-4, A-2	0	0	100	90-100	55-80	25-50	15-25	2-7
	8-27	Fine sandy loam	SC, SM, SC-SM	A-4, A-6, A-1, A-2-4	0	0	100	90-100	45-90	15-45	10-30	NP-16
	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 in	Fragments 3-10 in	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190779:												
Alpena	0-4	Gravelly sandy loam	SP-SM, SM, SC-SM	A-3, A-2-4, A-1-b	0	0-10	75-90	50-75	10-55	5-35	15-25	NP-7
	4-60	Cobbly coarse sand, gravelly loamy sand	SP-SM, SM	A-2, A-1-b	0	0-20	65-85	55-75	30-60	5-25	0-14	NP
190780:												
Au Gres	0-12	Sand	SP-SM, SP, SM	A-3, A-2-4, A-1-b	0	0	95-100	75-100	35-70	0-15	0-14	NP
	12-24	Sand	SP, SP-SM, SC-SM, SM	A-3, A-2-4, A-1-b	0	0	95-100	75-100	35-75	0-30	15-25	NP-7
	24-60	Sand	SP-SM, SP, SM	A-3, A-2-4, A-1-b	0	0	95-100	75-100	35-70	0-15	0-14	NP
Kalkaska	0-7	Sand	SM	A-3, A-2-4, A-1-b	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	SM	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	45-70	0-15	0-14	NP
190781:												
Bach	0-8	Loam	ML, CL-ML, CL	A-4	0	0	100	100	85-90	55-80	15-30	NP-10
	8-19	Silt loam, loam, very fine sandy loam	ML, CL-ML, CL	A-4	0	0	100	100	85-100	50-80	20-35	2-10
	19-60	Stratified fine sand to silt	SC, CL	A-6, A-4	0	0	100	100	70-95	40-85	25-40	8-16
190782:												
Deer Park	0-1	Sand	SM	A-3, A-2	0	0	100	100	50-70	5-15	0-14	NP
	1-4	Sand	SP-SM, SM	A-3, A-2-4	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
190783:												
Deer Park	0-1	Sand	SM	A-3, A-2	0	0	100	100	50-70	5-15	0-14	NP
	1-4	Sand	SP-SM, SM	A-3, A-2-4	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
190784:												
Deer Park	0-1	Sand	SM	A-3, A-2	0	0	100	100	50-70	5-15	0-14	NP
	1-4	Sand	SP-SM, SM	A-3, A-2-4	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190784:												
Roscommon-------	0-6	Sand	SM, SP-SM	A-1, A-3, A-2-4	0	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
190787:												
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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190788:												
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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190789:												
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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190790:												
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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190791:												
Eastport--------	0-3	Sand	SP-SM, SP, SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	35-70	0-15	0-14	NP
	3-26	Sand	SP-SM, SP, SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	35-70	0-15	0-14	NP
	26-60	Sand	SP-SM, SP, SM	A-3, A-2-4, A-1-b	0	0	90-100	75-100	35-70	0-15	0-14	NP
190792:												
Edwards---------	0-30	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	30-60	Marly material	OH, MH	A-8, A-7, A-5	0	0	100	100	90-100	70-90	50-90	NP-20

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190794:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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	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
190795:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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	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
190796:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190796:												
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:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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	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
190799:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 in	Fragments 3-10 in	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190801:												
Emmet-----------	0-8	Gravelly sandy loam	SM, SC-SM, SC	A-2, A-1-b	0	0-8	80-95	60-75	35-60	10-35	15-25	NP-10
	8-26	Sandy loam, loamy sand, sandy clay loam	SC, CL	A-6, A-4, A-2-6	0	0-8	95-100	85-100	40-90	10-55	25-35	7-15
	26-32	Sandy loam, sandy clay loam	SC, SC-SM, CL, CL-ML	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
Mancelona-------	0-8	Gravelly sandy loam	SM, SC-SM	A-1-b	0	0-5	70-80	55-75	35-55	15-35	15-25	NP-7
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-5	80-100	55-95	30-75	5-30	0-14	NP
	25-30	Sandy loam, gravelly sandy clay loam, gravelly sandy 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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	A-2, A-1-b, A-3	0	0-10	40-90	30-85	20-60	0-15	0-14	NP
190803:												
Emmet-----------	0-8	Gravelly sandy loam	SM, SC-SM, SC	A-2, A-1-b	0	0-8	80-95	60-75	35-60	10-35	15-25	NP-10
	8-26	Sandy loam, loamy sand, sandy clay loam	SC, CL	A-6, A-4, A-2-6	0	0-8	95-100	85-100	40-90	10-55	25-35	7-15
	26-32	Sandy loam, sandy clay loam	SC, SC-SM, CL, CL-ML	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
Mancelona-------	0-8	Gravelly sandy loam	SM, SC-SM	A-1-b	0	0-5	70-80	55-75	35-55	15-35	15-25	NP-7
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-5	80-100	55-95	30-75	5-30	0-14	NP
	25-30	Sandy loam, gravelly sandy clay loam, gravelly sandy 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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	A-2, A-1-b, A-3	0	0-10	40-90	30-85	20-60	0-15	0-14	NP
190805:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190805:												
Omena	0-8	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
	8-14	Loam, sandy loam	SC, SM, CL, ML	A-4, A-2-4	0	0-15	90-100	75-100	50-95	25-75	15-20	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
190806:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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
Omena	0-8	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
	8-14	Loam, sandy loam	SC, SM, CL, ML	A-4, A-2-4	0	0-15	90-100	75-100	50-95	25-75	15-20	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
190807:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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
Omena	0-8	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
	8-14	Loam, sandy loam	SC, SM, CL, ML	A-4, A-2-4	0	0-15	90-100	75-100	50-95	25-75	15-20	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
190808:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190808:												
Omena-----------	0-8	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
	8-14	Loam, sandy loam	SC, SM, CL, ML	A-4, A-2-4	0	0-15	90-100	75-100	50-95	25-75	15-20	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
190809:												
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	SC, CL	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	SC, SC-SM, CL, CL-ML	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
Omena-----------	0-8	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
	8-14	Loam, sandy loam	SC, SM, CL, ML	A-4, A-2-4	0	0-15	90-100	75-100	50-95	25-75	15-20	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
190811:												
Hettinger-------	0-8	Loam	ML, CL-ML, CL	A-4	0	0	100	100	85-100	60-90	20-30	2-10
	8-23	Silty clay loam, clay loam	CL	A-6	0	0	100	100	90-100	75-95	25-40	10-25
	23-60	Stratified clay loam to silty clay loam	MH, ML, CH, CL	A-7-6, A-6, A-4	0	0	100	100	85-100	70-95	30-60	5-35
190812:												
Hettinger-------	0-8	Loam	ML, CL-ML, CL	A-4	0	0	100	100	85-100	60-90	20-30	2-10
	8-23	Silty clay loam, clay loam	CL	A-6	0	0	100	100	90-100	75-95	25-40	10-25
	23-60	Stratified clay loam to silty clay loam	MH, ML, CH, CL	A-7-6, A-6, A-4	0	0	100	100	85-100	70-95	30-60	5-35
Tonkey----------	0-8	Loam	CL-ML, CL	A-6, A-4	0	0	100	100	85-95	60-90	20-30	4-11
	8-20	Fine sandy loam, loamy sand	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	SM, SP-SM, ML, SC-SM	A-3, A-4, A-1, A-2-4	0	0-2	95-100	85-100	40-80	5-65	15-30	NP-11

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190814:												
Kalkaska--------	0-7	Sand	SM	A-3, A-2-4, A-1-b	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	SM	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	45-70	0-15	0-14	NP
190815:												
Kalkaska--------	0-7	Sand	SM	A-3, A-2-4, A-1-b	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	SM	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	45-70	0-15	0-14	NP
190816:												
Kalkaska--------	0-7	Sand	SM	A-3, A-2-4, A-1-b	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	SM	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	45-70	0-15	0-14	NP
190817:												
Kalkaska--------	0-7	Sand	SM	A-3, A-2-4, A-1-b	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	SM	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	45-70	0-15	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190818:												
Kalkaska--------	0-7	Sand	SM	A-3, A-2-4, A-1-b	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	SM	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	45-70	0-15	0-14	NP
190819:												
Kalkaska--------	0-7	Loamy sand	SP-SM, SM	A-2-4, A-1	0	0-15	95-100	85-100	40-75	10-30	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	SM	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	45-70	0-15	0-14	NP
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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190820:												
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	SC, SC-SM, CL, CL-ML	A-4, A-2-4, A-1-b	0	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
Mancelona-------	0-8	Gravelly sandy loam	SM, SC-SM	A-1-b	0	0-5	70-80	55-75	35-55	15-35	15-25	NP-7
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-5	80-100	55-95	30-75	5-30	0-14	NP
	25-30	Sandy loam, gravelly sandy clay loam, gravelly sandy 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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	A-2, A-1-b, A-3	0	0-10	40-90	30-85	20-60	0-15	0-14	NP
190821:												
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	SC, SC-SM, CL, CL-ML	A-4, A-2-4, A-1-b	0	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

Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 in	3-10 in	4	10	40	200		
	In				Pct	Pct					Pct	
190821:												
Mancelona-------	0-8	Gravelly sandy loam	SM, SC-SM	A-1-b	0	0-5	70-80	55-75	35-55	15-35	15-25	NP-7
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-5	80-100	55-95	30-75	5-30	0-14	NP
	25-30	Sandy loam, gravelly sandy clay loam, gravelly sandy 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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	A-2, A-1-b, A-3	0	0-10	40-90	30-85	20-60	0-15	0-14	NP
190823:												
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	SC, SC-SM, CL, CL-ML	A-4, A-2-4, A-1-b	0	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
Mancelona-------	0-8	Gravelly sandy loam	SM, SC-SM	A-1-b	0	0-5	70-80	55-75	35-55	15-35	15-25	NP-7
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-5	80-100	55-95	30-75	5-30	0-14	NP
	25-30	Sandy loam, gravelly sandy clay loam, gravelly sandy 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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	A-2, A-1-b, A-3	0	0-10	40-90	30-85	20-60	0-15	0-14	NP
190826:												
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
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, GP, GP-GM	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 and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190827:												
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
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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190828:												
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
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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190829:												
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
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, GP, GP-GM	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 and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190830:												
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
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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190831:												
Lupton----------	0-10	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	10-60	Muck	PT	A-8	0	0	100	100	90-100	40-100	---	NP
Markey----------	0-20	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	20-60	Sand	SP-SM, SP, SM	A-3, A-2, A-1	0	0	95-100	60-100	30-75	0-30	---	NP
190832:												
Mancelona-------	0-8	Sandy loam	SM, SC-SM	A-4, A-2-4, A-1-b	0	0-8	90-100	75-95	45-70	20-40	15-25	NP-7
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	25-30	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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	A-3, A-2, A-1-b	0	0-15	40-90	30-85	20-60	0-15	0-14	NP
190833:												
Mancelona-------	0-8	Sandy loam	SM, SC-SM	A-4, A-2-4, A-1-b	0	0-8	90-100	75-95	45-70	20-40	15-25	NP-7
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	25-30	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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	A-3, A-2, A-1-b	0	0-15	40-90	30-85	20-60	0-15	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190834:												
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
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	25-30	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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	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	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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190835:												
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
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	25-30	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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	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	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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190836:												
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
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	25-30	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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	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	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, GP, GP-GM	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 and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190837:												
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
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	25-30	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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	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	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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190838:												
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
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-15	80-100	55-95	30-75	5-30	0-14	NP
	25-30	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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	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	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, GP, GP-GM	A-3, A-2-4, A-1-b	0	0-15	40-95	30-85	20-60	0-10	0-14	NP
190839:												
Mancelona-------	0-8	Gravelly sandy loam	SM, SC-SM	A-1-b	0	0-5	70-80	55-75	35-55	15-35	15-25	NP-7
	8-25	Loamy sand, sand, gravelly loamy sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0-5	80-100	55-95	30-75	5-30	0-14	NP
	25-30	Sandy loam, gravelly sandy clay loam, gravelly sandy 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
	30-60	Very gravelly coarse sand, sand	SP-SM, SW, GP, GW	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	0	0	100	90-100	55-80	25-50	15-25	2-7
	8-27	Fine sandy loam	SC, SM, SC-SM	A-4, A-6, A-1, A-2-4	0	0	100	90-100	45-90	15-45	10-30	NP-16
	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
190840:												
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
	6-8	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
	8-28	Silty clay loam	CL	A-7, A-6	0	0-5	95-100	95-100	90-100	80-95	30-45	15-25
	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
190841:												
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
	6-8	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
	8-28	Silty clay loam	CL	A-7, A-6	0	0-5	95-100	95-100	90-100	80-95	30-45	15-25
	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:												
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
	6-8	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
	8-28	Silty clay loam	CL	A-7, A-6	0	0-5	95-100	95-100	90-100	80-95	30-45	15-25
	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:												
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
	6-8	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
	8-28	Silty clay loam	CL	A-7, A-6	0	0-5	95-100	95-100	90-100	80-95	30-45	15-25
	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:												
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
	6-8	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
	8-28	Silty clay loam	CL	A-7, A-6	0	0-5	95-100	95-100	90-100	80-95	30-45	15-25
	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:												
Richter---------	0-8	Sandy loam	SM, SC-SM	A-4, A-2	0	0	100	90-100	55-80	25-50	15-25	2-7
	8-27	Fine sandy loam	SC, SM, SC-SM	A-4, A-6, A-1, A-2-4	0	0	100	90-100	45-90	15-45	10-30	NP-16
	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	90-100	75-100	35-75	10-30	15-25	NP-5
	18-24	Sandy loam	SC-SM	A-4, A-2	0	0-8	95-100	90-100	55-85	25-70	20-30	4-10
	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190848:												
Richter---------	0-8	Sandy loam	SM, SC-SM	A-4, A-2	0	0	100	90-100	55-80	25-50	15-25	2-7
	8-27	Fine sandy loam	SC, SM, SC-SM	A-4, A-6, A-1, A-2-4	0	0	100	90-100	45-90	15-45	10-30	NP-16
	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	90-100	75-100	35-75	10-30	15-25	NP-5
	18-24	Sandy loam	SC-SM	A-4, A-2	0	0-8	95-100	90-100	55-85	25-70	20-30	4-10
	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:												
Roscommon-------	0-6	Sand	SM, SP-SM	A-1, A-3, A-2-4	0	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	0	0	100	100	100	90-100	---	NP
	20-60	Sand	SP-SM, SP, SM	A-3, A-2, A-1	0	0	95-100	60-100	30-75	0-30	---	NP
190850:												
Sanilac---------	0-6	Silt loam	ML, CL-ML, CL	A-6, A-4	0	0	100	100	85-95	60-90	20-30	3-11
	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
	24-60	Stratified very fine sand to silt loam	SC, SM, CL, ML	A-6, A-4	0	0	100	100	70-95	40-90	20-40	3-18
190851:												
Tonkey----------	0-8	Sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	0	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	SM, SP-SM, ML, SC-SM	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	0	0	100	90-100	60-85	30-50	15-25	2-8
	10-24	Sandy loam, fine sandy loam	SM, SC-SM, SC	A-4, A-2	0	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
190851:												
Iosco-----------	0-8	Loamy sand	SP-SM, SM	A-2-4, A-1-b	0	0-8	90-100	75-100	35-85	10-35	0-14	NP
	8-27	Loamy sand, sand, loamy fine sand	SP-SM, SM, SC-SM	A-3, A-2-4, A-1-b	0	0-8	90-100	75-100	35-85	5-35	15-25	NP-7
	27-34	Silty clay loam, loam, sandy clay loam	SC, SC-SM, CL, CL-ML	A-6, A-7, A-2, A-4	0	0-8	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
190852:												
Tonkey----------	0-8	Sandy loam	SM, SC-SM, SC	A-4, A-2-4	0	0	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	SM, SP-SM, ML, SC-SM	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	0	0	100	90-100	60-85	30-50	15-25	2-8
	10-24	Sandy loam, fine sandy loam	SM, SC-SM, SC	A-4, A-2	0	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-----------	0-8	Loamy sand	SP-SM, SM	A-2-4, A-1-b	0	0-8	90-100	75-100	35-85	10-35	0-14	NP
	8-27	Loamy sand, sand, loamy fine sand	SP-SM, SM, SC-SM	A-3, A-2-4, A-1-b	0	0-8	90-100	75-100	35-85	5-35	15-25	NP-7
	27-34	Silty clay loam, loam, sandy clay loam	SC, SC-SM, CL, CL-ML	A-6, A-7, A-2, A-4	0	0-8	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:												
Wallace---------	0-8	Sand	SP-SM, SP	A-3, A-2-4, A-1-b	0	0	95-100	95-100	45-70	0-10	---	NP
	8-24	Sand	SP-SM, SM	A-3, A-2-4, A-1-b	0	0	95-100	90-100	45-95	5-30	---	NP
	24-60	Sand	SP-SM, SP, SM	A-3, A-2-4, A-1-b	0	0	95-100	90-100	45-95	0-30	---	NP
Kalkaska--------	0-7	Sand	SM	A-3, A-2-4, A-1-b	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	SM	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	45-70	0-15	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193237:												
Thompsonville---	0-5	Fine sand	SP-SM, SP	A-3, A-2	0	0	80-100	80-100	40-95	0-35	0-14	NP
	5-15	Fine sand, sand	SP, SP-SM	A-3, A-2	0	0	80-100	80-100	40-95	0-35	0-14	NP
	15-29	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0	80-100	80-100	40-95	0-35	0-14	NP
	29-37	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0	80-100	80-100	40-95	0-35	0-14	NP
	37-55	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0	80-100	80-100	40-95	0-35	0-14	NP
	55-72	Silty clay loam	CL	A-7, A-6	0	0	90-100	90-100	80-100	65-95	20-50	20-35
	72-80	Stratified very fine sandy loam to silty clay loam	CL, CL-ML	A-7, A-6, A-4	0	0	90-100	90-100	80-100	65-95	10-50	3-35
Milnichol-------	0-2	Fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	2-12	Fine sand, sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	12-15	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	15-25	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	25-33	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	33-47	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	47-50	Stratified loamy fine sand to fine sandy loam	SC, SC-SM	A-4	0	0-5	90-100	90-100	65-90	40-50	0-25	NP-10
	50-68	Clay loam, silty clay loam	CL	A-4, A-7, A-6	0	0-5	90-100	90-100	85-100	65-95	30-50	5-30
	68-80	Silt loam, clay loam, silty clay loam	CL	A-7, A-6, A-4	0	0-5	90-100	90-100	75-100	75-95	30-50	5-30
193255:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
Coloma----------	0-3	Sand	SP-SM, SM	A-3, A-2	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 sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	8-15	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	15-25	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	25-40	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	40-80	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 in	Fragments 3-10 in	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193256:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
Coloma----------	0-3	Sand	SP-SM, SM	A-3, A-2	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 sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	8-15	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	15-25	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	25-40	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	40-80	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
193257:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
Coloma----------	0-3	Sand	SP-SM, SM	A-3, A-2	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 sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	8-15	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	15-25	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	25-40	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	40-80	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193258:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
Coloma----------	0-3	Sand	SP-SM, SM	A-3, A-2	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 sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	8-15	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	15-25	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	25-40	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	40-80	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
193260:												
Copemish--------	0-2	Sand	SP-SM, SP	A-3, A-2	0	0	100	100	50-90	0-15	0-14	NP
	2-7	Sand	SP-SM, SP	A-3, A-2	0	0	100	100	50-90	0-15	0-14	NP
	7-11	Sand	SP-SM, SP	A-3, A-2	0	0	100	100	50-90	0-15	0-14	NP
	11-28	Sand	SP-SM, SP	A-3, A-2	0	0	100	100	50-90	0-15	0-14	NP
	28-36	Sand	SP-SM, SP	A-3, A-2	0	0	100	100	50-90	0-15	0-14	NP
	36-80	Sand	SP-SM, SP	A-3, A-2	0	0	100	100	50-90	0-15	0-14	NP
193262:												
Kaleva----------	0-3	Sand	SP-SM, SP	A-3	0	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	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	0	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 in	Fragments 3-10 in	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193263:												
Kaleva----------	0-3	Sand	SP-SM, SP	A-3	0	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	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	0	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
193265:												
Grattan---------	0-4	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	4-13	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	13-18	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	18-25	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	25-53	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	53-80	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
193266:												
Grattan---------	0-4	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	4-13	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	13-18	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	18-25	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	25-53	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	53-80	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
193267:												
Grattan---------	0-4	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	4-13	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	13-18	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	18-25	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	25-53	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	53-80	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
193269:												
Grattan---------	0-4	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	4-13	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	13-18	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	18-25	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	25-53	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	53-80	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193270:												
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
193271:												
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
	24-32	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
193272:												
Dair------------	0-4	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	4-7	Mucky loam, loam, mucky sandy loam	SC-SM	A-2	0	0	100	100	60-90	30-75	15-20	NP-10
	7-11	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	11-21	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	21-50	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	50-80	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
193277:												
Benona----------	0-2	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-30	0-14	NP
	2-6	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	6-9	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	9-17	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	17-28	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	28-46	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	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
193278:												
Benona----------	0-2	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-30	0-14	NP
	2-6	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	6-9	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	9-17	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	17-28	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	28-46	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 in	3-10 in	4	10	40	200		
	In				Pct	Pct					Pct	
193279:												
Benona----------	0-2	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-30	0-14	NP
	2-6	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	6-9	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	9-17	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	17-28	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	28-46	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	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
193284:												
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
Udipsamments----	0-80	Sand	SP-SM, SP, SM	A-3, A-2, A-1	0	0	90-100	90-100	40-85	0-15	0-14	NP
193285:												
Lumley----------	0-3	Peat	PT	A-8	0	0	100	100	100	90-100	0-0	NP
	3-6	Peat	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	6-8	Muck	PT	A-8	0	0	100	100	100	90-100	0-0	NP
	8-20	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	20-45	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	45-53	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	53-80	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
Makinen---------	0-4	Muck	PT	A-8	0	0	100	100	100	90-100	0-0	NP
	4-14	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	14-22	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	22-31	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	31-80	Sand	SP-SM, SP	A-3	0	0	100	100	50-70	0-15	0-14	NP
193286:												
Histosols-------	0-45	Muck	PT	A-8	0	0	100	100	100	90-100	0-0	NP
	45-80	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
Aquents---------	0-80	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
193287:												
Quartzipsamments	0-80	Sand	SP-SM, SP	A-3, A-2	0	0	100	100	50-85	0-15	0-14	NP
193288:												
Udipsamments----	0-80	Sand	SP-SM, SP, SM	A-3, A-2, A-1	0	0	90-100	90-100	40-85	0-15	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193342:												
Gorvan----------	0-4	Silt loam	CL-ML, ML	A-4, A-6	0	0	100	100	85-100	60-90	15-40	2-15
	4-11	Loam, mucky silt loam, silt loam	CL-ML, ML	A-4, A-6	0	0	100	100	85-100	60-90	15-40	2-15
	11-27	Loam, silty clay loam, silt loam, clay loam	CL-ML, ML	A-4, A-6	0	0-5	90-100	90-100	85-100	60-90	15-40	2-25
	27-80	Sand	SP, SP-SM	A-3	0	0-14	80-100	80-100	35-70	0-15	0-14	NP
Houghton--------	0-12	Muck	PT	A-8	0	0	100	100	100	90-100	0-0	NP
	12-26	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	26-80	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
Glendora--------	0-6	Mucky loamy sand	SP-SM	A-2	0	0	95-100	95-100	50-90	5-15	0-14	NP
	6-9	Loamy sand, sand, fine sand	SP-SM, SM	A-2, A-3	0	0	95-100	95-100	50-90	5-15	0-14	NP
	9-30	Sand, loamy sand, fine sand	SP-SM, SM	A-2, A-3	0	0	95-100	95-100	50-90	5-15	0-14	NP
	30-80	Sand, loamy sand, fine sand	SP-SM, SM	A-1, A-2, A-3	0	0	95-100	95-100	50-90	5-15	0-14	NP
193349:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
Coloma----------	0-3	Sand	SP-SM, SM	A-3, A-2	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 sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	8-15	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	15-25	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	25-40	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	40-90	5-30	0-14	NP
	40-80	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193351:												
Benona----------	0-2	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-30	0-14	NP
	2-6	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	6-9	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	9-17	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	17-28	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	28-46	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	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
193354:												
Quartzipsamments	0-80	Sand	SP-SM, SP	A-3, A-2	0	0	100	100	50-85	0-15	0-14	NP
193357:												
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
193359:												
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193360:												
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
193362:												
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
193363:												
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
193364:												
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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193365:												
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
193371:												
Dair------------	0-4	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	4-7	Mucky loam, loam, mucky sandy loam	SC-SM	A-2	0	0	100	100	60-90	30-75	15-20	NP-10
	7-11	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	11-21	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	21-50	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	50-80	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
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
	24-32	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
193423:												
Benona----------	0-2	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-30	0-14	NP
	2-6	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	6-9	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	9-17	Sand	SP, SP-SM	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	17-28	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	28-46	Sand	SP-SM, SP	A-3, A-2	0	0	85-100	85-100	40-90	0-15	0-14	NP
	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
193494:												
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	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	0	100	100	50-90	0-15	0-14	NP
193496:												
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	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	0	100	100	50-90	0-15	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 in	Fragments 3-10 in	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193497:												
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	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	0	100	100	50-90	0-15	0-14	NP
193498:												
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	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	0	100	100	50-90	0-15	0-14	NP
Platteriver-----	0-1	Highly decomposed plant material	PT		0	0	100	100	100	90-100	---	NP
	1-3	Sand	SP-SM, SP	A-3	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	A-3	0	0	90-100	90-100	50-90	0-15	0-14	NP
	20-29	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	50-90	0-15	0-14	NP
	29-80	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	50-90	0-15	0-14	NP
Dair------------	0-4	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	4-7	Mucky loam, loam, mucky sandy loam	SC-SM	A-2	0	0	100	100	60-90	30-75	15-20	NP-10
	7-11	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	11-21	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	21-50	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	50-80	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
193503:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193503:												
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
193504:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
193505:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193505:												
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
193506:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
193507:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193507:												
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
193508:												
Madaus----------	0-12	Muck	PT	A-8	0	0	100	100	100	90-100	0-0	NP
	12-34	Marly silt loam	ML	A-4	0	0	100	100	90-100	70-90	25-35	NP-10
	34-38	Marly silt loam	ML	A-4	0	0	100	100	90-100	70-90	25-35	NP-10
	38-62	Sand	SP, SP-SM	A-3	0	0	100	100	50-90	0-15	0-14	NP
	62-80	Clay	CL, CH	A-6, A-7	0	0	100	100	90-100	80-100	40-55	20-35
193509:												
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, gravelly sandy loam	SC-SM, SM	A-2, A-4	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	4-14	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	14-30	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	30-45	Very gravelly sand, sand, gravelly sand, gravelly loamy sand	SP, SP-SM, GP, GP-GM	A-3, A-2, A-1	0	0	30-85	30-85	0-75	0-35	0-14	NP
	45-80	Stratified gravelly sand to sand, very gravelly sand, gravelly loamy sand	SP, SP-SM, GP, GP-GM	A-3, A-2, A-1	0	0	30-85	30-85	0-75	0-35	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193509:												
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
193510:												
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, gravelly sandy loam	SC-SM, SM	A-2, A-4	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	4-14	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	14-30	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	30-45	Very gravelly sand, sand, gravelly sand, gravelly loamy sand	SP, SP-SM, GP, GP-GM	A-3, A-2, A-1	0	0	30-85	30-85	0-75	0-35	0-14	NP
	45-80	Stratified gravelly sand to sand, very gravelly sand, gravelly loamy sand	SP, SP-SM, GP, GP-GM	A-3, A-2, A-1	0	0	30-85	30-85	0-75	0-35	0-14	NP
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
193511:												
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, gravelly sandy loam	SC-SM, SM	A-2, A-4	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	4-14	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	14-30	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	30-45	Very gravelly sand, sand, gravelly sand, gravelly loamy sand	SP, SP-SM, GP, GP-GM	A-3, A-2, A-1	0	0	30-85	30-85	0-75	0-35	0-14	NP
	45-80	Stratified gravelly sand to sand, very gravelly sand, gravelly loamy sand	SP, SP-SM, GP, GP-GM	A-3, A-2, A-1	0	0	30-85	30-85	0-75	0-35	0-14	NP
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
193513:												
Dair------------	0-4	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	4-7	Mucky loam, loam, mucky sandy loam	SC-SM	A-2	0	0	100	100	60-90	30-75	15-20	NP-10
	7-11	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	11-21	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	21-50	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	50-80	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
Adrian----------	0-7	Muck	PT	A-8	0	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO	>10 in	3-10 in	4	10	40	200		
	In				Pct	Pct					Pct	
193514:												
Platteriver-----	0-1	Highly decomposed plant material	PT		0	0	100	100	100	90-100	---	NP
	1-3	Sand	SP-SM, SP	A-3	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	A-3	0	0	90-100	90-100	50-90	0-15	0-14	NP
	20-29	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	50-90	0-15	0-14	NP
	29-80	Sand	SP-SM, SP	A-3	0	0	90-100	90-100	50-90	0-15	0-14	NP
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
	24-32	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
202010:												
Houghton--------	0-12	Muck	PT	A-8	0	0	100	100	100	90-100	0-0	NP
	12-26	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
	26-80	Muck	PT	A-8	0	0	100	100	90-100	40-100	0-0	NP
Adrian----------	0-7	Muck	PT	A-8	0	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
202016:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
Tekenink, sandy 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 sand	SM, SC-SM	A-2, A-4	0	0	90-100	90-100	45-95	15-50	0-14	NP
	16-21	Sandy loam	SM, SC-SM	A-2, A-4	0	0	90-100	90-100	55-90	15-40	10-25	3-10
	21-49	Sandy loam, loamy sand, loamy fine sand	SM, SC-SM	A-2, A-4	0	0	90-100	90-100	45-95	10-50	0-25	NP-10
	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification		Fragments		Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO	>10 in	3-10 in	4	10	40	200		
	In				Pct	Pct					Pct	
631170:												
Fogg------------	0-2	Sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	2-7	Loamy sand, sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	7-13	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	13-21	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	21-34	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	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
	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
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
631171:												
Fogg------------	0-2	Sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	2-7	Loamy sand, sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	7-13	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	13-21	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	21-34	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	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
	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
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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
631172:												
Fogg------------	0-2	Sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	2-7	Loamy sand, sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	7-13	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	13-21	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	21-34	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	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
	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
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
631173:												
Fogg------------	0-2	Sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	2-7	Loamy sand, sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	7-13	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	13-21	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	21-34	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	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
	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
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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
631174:												
Fogg------------	0-2	Sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	2-7	Loamy sand, sand	SP-SM, SM	A-2, A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	7-13	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	13-21	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	0-14	NP
	21-34	Sand	SP-SM, SP	A-3	0	0-3	75-100	75-100	35-90	0-30	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
	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
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
680939:												
Fern------------	0-9	Sand	SP-SM, SM	A-3, A-2	0	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	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
	29-42	Loam, clay loam	CL	A-6, A-7	0	0	85-100	85-100	70-95	50-80	15-45	10-30
	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	0	85-100	85-100	70-95	50-80	15-45	10-30
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
680943:												
Milnichol-------	0-2	Fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	2-12	Fine sand, sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	12-15	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	15-25	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	25-33	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	33-47	Sand, fine sand	SP-SM, SP	A-3, A-2	0	0-5	90-100	90-100	45-80	0-35	0-14	NP
	47-50	Stratified loamy fine sand to fine sandy loam	SC, SC-SM	A-4	0	0-5	90-100	90-100	65-90	40-50	0-25	NP-10
	50-68	Clay loam, silty clay loam	CL	A-4, A-7, A-6	0	0-5	90-100	90-100	85-100	65-95	30-50	5-30
	68-80	Silt loam, clay loam, silty clay loam	CL	A-7, A-6, A-4	0	0-5	90-100	90-100	75-100	75-95	30-50	5-30
680945:												
Fern------------	0-9	Sand	SP-SM, SM	A-3, A-2	0	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	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
	29-42	Loam, clay loam	CL	A-6, A-7	0	0	85-100	85-100	70-95	50-80	15-45	10-30
	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	0	85-100	85-100	70-95	50-80	15-45	10-30
680946:												
Fern------------	0-9	Sand	SP-SM, SM	A-3, A-2	0	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	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
	29-42	Loam, clay loam	CL	A-6, A-7	0	0	85-100	85-100	70-95	50-80	15-45	10-30
	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	0	85-100	85-100	70-95	50-80	15-45	10-30

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
680971:												
Nessen----------	0-4	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	4-11	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	11-15	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	15-24	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	24-39	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	39-44	Gravelly sand, stratified sand to gravelly sand, gravelly loamy sand, sand	GP-GM, SP-SM, SP	A-3, A-1	0	0	50-85	50-85	50-80	0-30	0-14	NP
	44-80	Stratified sand to gravelly sand, sand, gravelly sand	GP-GM, SP-SM, SP	A-3, A-1	0	0	50-85	50-85	50-85	0-15	0-14	NP
Kaleva----------	0-3	Sand	SP-SM, SP	A-3	0	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	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	0	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
680972:												
Nessen----------	0-4	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	4-11	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	11-15	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	15-24	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	24-39	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	39-44	Gravelly sand, stratified sand to gravelly sand, gravelly loamy sand, sand	GP-GM, SP-SM, SP	A-3, A-1	0	0	50-85	50-85	50-80	0-30	0-14	NP
	44-80	Stratified sand to gravelly sand, sand, gravelly sand	GP-GM, SP-SM, SP	A-3, A-1	0	0	50-85	50-85	50-85	0-15	0-14	NP
Kaleva----------	0-3	Sand	SP-SM, SP	A-3	0	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	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	0	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
680973:												
Nessen----------	0-4	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	4-11	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	11-15	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	15-24	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	24-39	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	39-44	Gravelly sand, stratified sand to gravelly sand, gravelly loamy sand, sand	GP-GM, SP-SM, SP	A-3, A-1	0	0	50-85	50-85	50-80	0-30	0-14	NP
	44-80	Stratified sand to gravelly sand, sand, gravelly sand	GP-GM, SP-SM, SP	A-3, A-1	0	0	50-85	50-85	50-85	0-15	0-14	NP
Kaleva----------	0-3	Sand	SP-SM, SP	A-3	0	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	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	0	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
680974:												
Nessen----------	0-4	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	4-11	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	11-15	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	15-24	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	24-39	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	50-85	0-15	0-14	NP
	39-44	Gravelly sand, stratified sand to gravelly sand, gravelly loamy sand, sand	GP-GM, SP-SM, SP	A-3, A-1	0	0	50-85	50-85	50-80	0-30	0-14	NP
	44-80	Stratified sand to gravelly sand, sand, gravelly sand	GP-GM, SP-SM, SP	A-3, A-1	0	0	50-85	50-85	50-85	0-15	0-14	NP
Kaleva----------	0-3	Sand	SP-SM, SP	A-3	0	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	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	0	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 in	Fragments 3-10 in	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plas-ticity index
	In				Pct	Pct					Pct	
893251:												
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, gravelly sandy loam	SC-SM, SM	A-2, A-4	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	4-14	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	14-30	Gravelly sandy loam, sandy clay loam	SC-SM, SC, CL-ML	A-4, A-2	0	0	55-99	55-99	35-70	15-55	10-40	NP-20
	30-45	Very gravelly sand, sand, gravelly sand, gravelly loamy sand	SP, SP-SM, GP, GP-GM	A-3, A-2, A-1	0	0	30-85	30-85	0-75	0-35	0-14	NP
	45-80	Stratified gravelly sand to sand, very gravelly sand, gravelly loamy sand	SP, SP-SM, GP, GP-GM	A-3, A-2, A-1	0	0	30-85	30-85	0-75	0-35	0-14	NP
Shavenaugh------	0-5	Sand	SP-SM, SP	A-3	0	0	85-95	85-95	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
	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 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 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
894062:												
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 sandy loam	SC-SM, SC	A-2, A-4	0	0	80-100	80-100	50-95	30-75	0-30	NP-15
	15-24	Sandy loam, loam, sandy clay loam, fine sandy loam, loamy sand	SM, SC, CL-ML	A-2, A-4	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	24-35	Sandy clay loam, sandy loam, loam, loamy sand, fine sandy loam	SC, CL-ML	A-2, A-4, A-6	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	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, sandy loam	SC, CL-ML	A-4, A-6	0	0	80-100	80-100	60-95	25-75	15-40	1-20

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
894062:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
894063:												
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 sandy loam	SC-SM, SC	A-2, A-4	0	0	80-100	80-100	50-95	30-75	0-30	NP-15
	15-24	Sandy loam, loam, sandy clay loam, fine sandy loam, loamy sand	SM, SC, CL-ML	A-2, A-4	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	24-35	Sandy clay loam, sandy loam, loam, loamy sand, fine sandy loam	SC, CL-ML	A-2, A-4, A-6	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	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, sandy loam	SC, CL-ML	A-4, A-6	0	0	80-100	80-100	60-95	25-75	15-40	1-20
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
894064:												
Fern------------	0-9	Sand	SP-SM, SM	A-3, A-2	0	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	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
	29-42	Loam, clay loam	CL	A-6, A-7	0	0	85-100	85-100	70-95	50-80	15-45	10-30
	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	0	85-100	85-100	70-95	50-80	15-45	10-30

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments >10 in	Fragments 3-10 in	Percentage passing sieve number-- 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
894064:												
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 sandy loam	SC-SM, SC	A-2, A-4	0	0	80-100	80-100	50-95	30-75	0-30	NP-15
	15-24	Sandy loam, loam, sandy clay loam, fine sandy loam, loamy sand	SM, SC, CL-ML	A-2, A-4	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	24-35	Sandy clay loam, sandy loam, loam, loamy sand, fine sandy loam	SC, CL-ML	A-2, A-4, A-6	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	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, sandy loam	SC, CL-ML	A-4, A-6	0	0	80-100	80-100	60-95	25-75	15-40	1-20
894065:												
Fern------------	0-9	Sand	SP-SM, SM	A-3, A-2	0	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	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
	29-42	Loam, clay loam	CL	A-6, A-7	0	0	85-100	85-100	70-95	50-80	15-45	10-30
	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	0	85-100	85-100	70-95	50-80	15-45	10-30
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 sandy loam	SC-SM, SC	A-2, A-4	0	0	80-100	80-100	50-95	30-75	0-30	NP-15
	15-24	Sandy loam, loam, sandy clay loam, fine sandy loam, loamy sand	SM, SC, CL-ML	A-2, A-4	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	24-35	Sandy clay loam, sandy loam, loam, loamy sand, fine sandy loam	SC, CL-ML	A-2, A-4, A-6	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	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, sandy loam	SC, CL-ML	A-4, A-6	0	0	80-100	80-100	60-95	25-75	15-40	1-20

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
894104:												
Mollineaux------	0-6	Loamy sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	6-9	Loamy sand, loamy fine sand, sand, fine sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	9-15	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	15-27	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	27-38	Loamy sand, sand, fine sand, loamy fine sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	38-64	Loam, clay loam	CL	A-7, A-6, A-4	0	0	85-100	85-100	70-95	50-70	30-45	5-25
	64-80	Loamy fine sand, loamy sand, sand, fine sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
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 sandy loam	SC-SM, SC	A-2, A-4	0	0	80-100	80-100	50-95	30-75	0-30	NP-15
	15-24	Sandy loam, loam, sandy clay loam, fine sandy loam, loamy sand	SM, SC, CL-ML	A-2, A-4	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	24-35	Sandy clay loam, sandy loam, loam, loamy sand, fine sandy loam	SC, CL-ML	A-2, A-4, A-6	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	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, sandy loam	SC, CL-ML	A-4, A-6	0	0	80-100	80-100	60-95	25-75	15-40	1-20
894105:												
Mollineaux------	0-6	Loamy sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	6-9	Loamy sand, loamy fine sand, sand, fine sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	9-15	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	15-27	Loamy sand, loamy fine sand, fine sand, sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	27-38	Loamy sand, sand, fine sand, loamy fine sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP
	38-64	Loam, clay loam	CL	A-7, A-6, A-4	0	0	85-100	85-100	70-95	50-70	30-45	5-25
	64-80	Loamy fine sand, loamy sand, sand, fine sand	SP-SM, SM	A-3, A-2	0	0	85-100	85-100	45-90	5-35	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	Percentage passing sieve number--: 10	Percentage passing sieve number--: 40	Percentage passing sieve number--: 200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
894105:												
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 sandy loam	SC-SM, SC	A-2, A-4	0	0	80-100	80-100	50-95	30-75	0-30	NP-15
	15-24	Sandy loam, loam, sandy clay loam, fine sandy loam, loamy sand	SM, SC, CL-ML	A-2, A-4	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	24-35	Sandy clay loam, sandy loam, loam, loamy sand, fine sandy loam	SC, CL-ML	A-2, A-4, A-6	0	0	80-100	80-100	50-95	10-75	0-40	NP-20
	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, sandy loam	SC, CL-ML	A-4, A-6	0	0	80-100	80-100	60-95	25-75	15-40	1-20
894165:												
Spinks----------	0-5	Sand	SP-SM, SP	A-3	0	0	85-100	85-100	40-85	0-15	0-14	NP
	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	0	0	85-100	85-100	40-85	0-35	0-14	NP
	17-62	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
	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	0	0	75-100	75-100	35-85	0-35	0-14	NP
Tekenink, sandy 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 sand	SM, SC-SM	A-2, A-4	0	0	90-100	90-100	45-95	15-50	0-14	NP
	16-21	Sandy loam	SM, SC-SM	A-2, A-4	0	0	90-100	90-100	55-90	15-40	10-25	3-10
	21-49	Sandy loam, loamy sand, loamy fine sand	SM, SC-SM	A-2, A-4	0	0	90-100	90-100	45-95	10-50	0-25	NP-10
	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
899682:												
Kaleva----------	0-3	Sand	SP-SM, SP	A-3	0	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	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	0	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

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plasticity index
	In				Pct	Pct					Pct	
899722:												
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	40-90	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
899731:												
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
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
	24-32	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
899733:												
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
Dair------------	0-4	Muck	PT	A-8	0	0	100	100	100	90-100	---	NP
	4-7	Mucky loam, loam, mucky sandy loam	SC-SM	A-2	0	0	100	100	60-90	30-75	15-20	NP-10
	7-11	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	11-21	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	21-50	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP
	50-80	Sand	SP, SP-SM	A-2, A-3	0	0	90-100	90-100	45-90	0-15	0-14	NP

Table 14.—Engineering Properties—Continued

Map unit symbol and soil name	Depth	USDA texture	Classification: Unified	Classification: AASHTO	Fragments: >10 in	Fragments: 3-10 in	Percentage passing sieve number--: 4	10	40	200	Liquid limit	Plas- ticity index
	In				Pct	Pct					Pct	
899734:												
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

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 and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190775:									
Adrian----------	0-8	10	50	40	0.30-0.55	0.2-5.9	0.35-0.45	---	75-90
	8-24	10	65	25	0.30-0.55	0.2-5.9	0.24-0.45	---	80-95
	24-60	94	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	0.2-5.9	0.35-0.45	---	75-90
	10-60	10	65	25	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	86	4	5-15	1.35-1.70	0.6-5.9	0.08-0.17	0.0-2.9	0.0-0.5
	18-24	66	19	10-20	1.35-1.70	0.6-2.0	0.13-0.20	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:									
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	86	4	5-15	1.35-1.70	0.6-5.9	0.08-0.17	0.0-2.9	0.0-0.5
	18-24	66	19	10-20	1.35-1.70	0.6-2.0	0.13-0.20	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
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	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	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	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	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	0.06-0.08	0.0-2.9	1.0-3.0
	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	94	1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190781:									
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	8-22	1.30-1.60	0.6-2.0	0.16-0.24	0.0-2.9	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
190782:									
Deer Park-------	0-1	94	1	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	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	0-10	1.40-1.55	5.9-20.0	0.03-0.05	0.0-2.9	0.0-0.5
190783:									
Deer Park-------	0-1	94	1	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	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	0-10	1.40-1.55	5.9-20.0	0.03-0.05	0.0-2.9	0.0-0.5
190784:									
Deer Park-------	0-1	94	1	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	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	0-10	1.40-1.55	5.9-20.0	0.03-0.05	0.0-2.9	0.0-0.5
Roscommon-------	0-6	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
190787:									
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:									
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
190789:									
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
190790:									
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
190791:									
Eastport--------	0-3	94	1	0-10	1.40-1.60	5.9-20.0	0.07-0.09	0.0-2.9	1.0-2.0
	3-26	94	1	0-10	1.40-1.60	5.9-20.0	0.06-0.08	0.0-2.9	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:									
Edwards---------	0-30	10	50	40	0.10-0.35	0.2-5.9	0.35-0.45	---	75-90
	30-60	6	70	5-26	0.05-0.20	0.1-0.2	0.20-0.22	0.0-3.0	1.0-24

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190794:									
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
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
190795:									
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
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
190796:									
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
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
190797:									
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
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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190799:									
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
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	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
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
190803:									
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
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:									
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-----------	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190806:									
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-----------	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
190807:									
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-----------	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
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-----------	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
190809:									
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-----------	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	20	49	27-35	1.35-1.55	0.2-0.6	0.18-0.20	0.0-2.9	0.0-0.5
	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
190812:									
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	20	49	27-35	1.35-1.55	0.2-0.6	0.18-0.20	0.0-2.9	0.0-0.5
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190812:									
Tonkey----------	0-8	44	41	10-20	1.10-1.50	2.0-5.9	0.20-0.24	0.0-2.9	4.0-7.0
	8-20	83	4	8-18	1.30-1.80	2.0-5.9	0.10-0.15	0.0-2.9	0.0-0.5
	20-60	67	23	0-20	1.60-1.80	2.0-20.0	0.05-0.19	0.0-2.9	0.0-0.5
190814:									
Kalkaska--------	0-7	94	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	0.06-0.08	0.0-2.9	1.0-3.0
	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	94	1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
190815:									
Kalkaska--------	0-7	94	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	0.06-0.08	0.0-2.9	1.0-3.0
	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	94	1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
190816:									
Kalkaska--------	0-7	94	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	0.06-0.08	0.0-2.9	1.0-3.0
	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	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:									
Kalkaska--------	0-7	94	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	0.06-0.08	0.0-2.9	1.0-3.0
	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	94	1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
190818:									
Kalkaska--------	0-7	94	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	0.06-0.08	0.0-2.9	1.0-3.0
	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	94	1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
190819:									
Kalkaska--------	0-7	79	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	91	2	0-15	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	1.0-3.0
	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	94	1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
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
190820:									
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	67	19	10-18	1.30-1.60	0.6-2.0	0.09-0.19	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-------	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190821:									
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	67	19	10-18	1.30-1.60	0.6-2.0	0.09-0.19	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-------	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
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	67	19	10-18	1.30-1.60	0.6-2.0	0.09-0.19	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-------	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
190826:									
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	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
190827:									
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	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
190828:									
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	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190829:									
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	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
190830:									
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	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
190831:									
Lupton----------	0-10	10	50	40	0.10-0.35	0.2-5.9	0.35-0.45	---	75-90
	10-60	10	65	25	0.10-0.35	0.2-5.9	0.35-0.45	---	80-95
Markey----------	0-20	10	50	40	0.10-0.35	0.2-5.9	0.35-0.45	---	75-90
	20-60	94	1	0-10	1.40-1.65	5.9-20.0	0.03-0.08	0.0-2.9	0.0-0.5
190832:									
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	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
190833:									
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	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
190834:									
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
	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
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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190835:									
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
	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
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
190836:									
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
	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
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
190837:									
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
	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
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
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
	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
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
190839:									
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
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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190840:									
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
	6-8	30	55	5-25	1.40-1.60	0.6-2.0	0.15-0.22	0.0-2.9	0.0-0.5
	8-28	8	55	35-40	1.40-1.65	0.1-0.2	0.08-0.17	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
190841:									
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
	6-8	30	55	5-25	1.40-1.60	0.6-2.0	0.15-0.22	0.0-2.9	0.0-0.5
	8-28	8	55	35-40	1.40-1.65	0.1-0.2	0.08-0.17	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
190842:									
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
	6-8	30	55	5-25	1.40-1.60	0.6-2.0	0.15-0.22	0.0-2.9	0.0-0.5
	8-28	8	55	35-40	1.40-1.65	0.1-0.2	0.08-0.17	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	7-27	1.25-1.60	0.6-2.0	0.20-0.24	0.0-2.9	1.0-3.0
	6-8	30	55	5-25	1.40-1.60	0.6-2.0	0.15-0.22	0.0-2.9	0.0-0.5
	8-28	8	55	35-40	1.40-1.65	0.1-0.2	0.08-0.17	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
190844:									
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
	6-8	30	55	5-25	1.40-1.60	0.6-2.0	0.15-0.22	0.0-2.9	0.0-0.5
	8-28	8	55	35-40	1.40-1.65	0.1-0.2	0.08-0.17	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
190847:									
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
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	86	4	5-15	1.35-1.70	0.6-5.9	0.08-0.17	0.0-2.9	0.0-0.5
	18-24	66	19	10-20	1.35-1.70	0.6-2.0	0.13-0.20	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
190848:									
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
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	86	4	5-15	1.35-1.70	0.6-5.9	0.08-0.17	0.0-2.9	0.0-0.5
	18-24	66	19	10-20	1.35-1.70	0.6-2.0	0.13-0.20	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190849:									
Roscommon--------	0-6	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	10	50	40	0.10-0.35	0.2-5.9	0.35-0.45	---	75-90
	20-60	94	1	0-10	1.40-1.65	5.9-20.0	0.03-0.08	0.0-2.9	0.0-0.5
190850:									
Sanilac----------	0-6	30	55	10-20	1.35-1.50	0.6-2.0	0.20-0.24	0.0-2.9	1.0-3.0
	6-16	30	55	10-20	1.45-1.70	0.6-2.0	0.16-0.24	0.0-2.9	0.0-0.5
	16-24	30	56	10-18	1.45-1.70	0.2-0.6	0.17-0.22	0.0-2.9	0.0-0.5
	24-60	27	54	10-27	1.45-1.70	0.2-0.6	0.10-0.22	0.0-2.9	0.0-0.5
190851:									
Tonkey-----------	0-8	67	20	8-18	1.10-1.60	2.0-5.9	0.13-0.15	0.0-2.9	4.0-7.0
	8-20	67	20	8-18	1.30-1.80	2.0-5.9	0.10-0.15	0.0-2.9	0.0-0.5
	20-60	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	2.0-5.9	0.13-0.15	0.0-2.9	2.0-3.0
	10-24	67	20	8-18	1.30-1.70	2.0-5.9	0.12-0.17	0.0-2.9	0.0-0.5
	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	4	10-15	1.25-1.40	5.9-20.0	0.10-0.12	0.0-2.9	1.0-4.0
	8-27	91	2	0-15	1.35-1.60	5.9-20.0	0.06-0.11	0.0-2.9	0.0-1.0
	27-34	18	52	18-35	1.50-1.70	0.2-0.6	0.16-0.20	3.0-5.9	0.0-0.5
	34-60	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:									
Tonkey-----------	0-8	67	20	8-18	1.10-1.60	2.0-5.9	0.13-0.15	0.0-2.9	4.0-7.0
	8-20	67	20	8-18	1.30-1.80	2.0-5.9	0.10-0.15	0.0-2.9	0.0-0.5
	20-60	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	2.0-5.9	0.13-0.15	0.0-2.9	2.0-3.0
	10-24	67	20	8-18	1.30-1.70	2.0-5.9	0.12-0.17	0.0-2.9	0.0-0.5
	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	4	10-15	1.25-1.40	5.9-20.0	0.10-0.12	0.0-2.9	1.0-4.0
	8-27	91	2	0-15	1.35-1.60	5.9-20.0	0.06-0.11	0.0-2.9	0.0-1.0
	27-34	18	52	18-35	1.50-1.70	0.2-0.6	0.16-0.20	3.0-5.9	0.0-0.5
	34-60	18	52	15-35	1.50-1.70	0.2-0.6	0.17-0.20	3.0-5.9	0.0-0.5
190854:									
Wallace----------	0-8	95	1	0-8	1.35-1.45	5.9-20.0	0.07-0.09	0.0-2.9	0.5-2.0
	8-24	92	2	2-10	1.75-2.05	0.6-5.9	0.01-0.04	0.0-2.9	0.5-2.0
	24-60	95	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

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
190854:									
Kalkaska	0-7	94	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	0.06-0.08	0.0-2.9	1.0-3.0
	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	94	1	0-10	1.35-1.50	5.9-20.0	0.04-0.06	0.0-2.9	0.0-0.5
193237:									
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
	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
	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
	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
	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
	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
	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
Milnichol	0-2	86-100	0-10	0-9	1.30-1.50	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	2-12	86-100	0-10	0-9	1.30-1.65	5.9-20.0	0.06-0.08	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	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
	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	0-45	15-70	27-35	1.50-1.70	0.2-0.6	0.14-0.17	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
193255:									
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
	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
	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
	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
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	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.5-1.0
	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
	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
	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
	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
193256:									
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
	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
	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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193256:									
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	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.5-1.0
	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
	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
	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
	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	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	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	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
	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
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	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.5-1.0
	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
	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
	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
	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
193258:									
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
	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
	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
	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
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	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.5-1.0
	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
	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
	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
	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
193260:									
Copemish	0-2	86-100	0-10	0-9	1.30-1.45	5.9-20.0	0.07-0.09	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	0.06-0.08	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193262:									
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:									
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
193265:									
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:									
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:									
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:									
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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193270:									
Covert----------	0-1	86-100	0-10	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	0-10	0-9	1.30-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	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	0-10	0-9	1.45-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	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
	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
193271:									
Pipestone-------	0-2	86-100	0-10	0-9	1.30-1.50	5.9-20.0	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	0.06-0.08	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
193272:									
Dair------------	0-4	10	50	40	0.30-0.50	0.2-5.9	0.35-0.45	---	60-100
	4-7	23-85	5-45	7-26	1.35-1.50	0.6-2.0	0.13-0.15	0.0-2.9	10-20
	7-11	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
	11-21	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
	21-50	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
	50-80	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
193277:									
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
	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
	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
	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
	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
	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
	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
193278:									
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
	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
	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
	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
	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
	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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193279:									
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
	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
	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
	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
	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
	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
	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
193284:									
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
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
193285:									
Lumley----------	0-3	6	57	37	0.05-0.14	0.2-5.9	0.55-0.65	0.0-0.0	70-100
	3-6	6	57	37	0.05-0.14	0.2-5.9	0.55-0.65	0.0-0.0	70-100
	6-8	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	8-20	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	20-45	10	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
Makinen---------	0-4	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	4-14	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	14-22	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	22-31	10	65	25	0.13-0.23	0.2-5.9	0.35-0.45	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-------	0-45	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	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
Aquents---------	0-80	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
193287:									
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
193288:									
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
193342:									
Gorvan----------	0-4	5-50	50-80	7-26	1.10-1.60	0.2-0.6	0.20-0.24	0.0-2.9	2.0-20
	4-11	5-50	30-80	7-26	1.48-1.80	0.2-0.6	0.17-0.22	0.0-2.9	2.0-5.0
	11-27	5-50	30-80	7-35	1.48-1.80	0.2-0.6	0.15-0.22	0.0-5.9	0.0-0.5
	27-80	86-100	0-10	0-9	1.46-1.80	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193342:									
Houghton--------	0-12	10	50	40	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	12-26	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	26-80	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
Glendora--------	0-6	71-90	3-15	0-14	1.00-1.35	5.9-20.0	0.10-0.12	0.0-2.9	10-20
	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
	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
	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:									
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
	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
	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
	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
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	0-14	1.50-1.65	5.9-20.0	0.05-0.10	0.0-2.9	0.5-1.0
	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
	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
	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
	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
	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
	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
	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
	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
	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
	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:									
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:									
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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193359:									
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
	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
193360:									
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
	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
193362:									
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	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
	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
	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
	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
	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
193363:									
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	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
	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
	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
	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
	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
193364:									
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	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
	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
	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
	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
	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
193365:									
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	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
	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
	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
	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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193371:									
Dair	0-4	10	50	40	0.30-0.50	0.2-5.9	0.35-0.45	---	60-100
	4-7	23-85	5-45	7-26	1.35-1.50	0.6-2.0	0.13-0.15	0.0-2.9	10-20
	7-11	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
	11-21	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
	21-50	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
	50-80	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
Pipestone	0-2	86-100	0-10	0-9	1.30-1.50	5.9-20.0	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	0.06-0.08	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
193423:									
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
	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
	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
	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
	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
	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
	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
193494:									
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	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	11-40	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
	40-60	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	60-80	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
193496:									
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	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	11-40	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
	40-60	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	60-80	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
193497:									
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	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	11-40	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
	40-60	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	60-80	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
193498:									
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	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	11-40	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
	40-60	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	60-80	86-100	0-10	0-5	1.40-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193498:									
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
	20-29	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
	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------------	0-4	10	50	40	0.30-0.50	0.2-5.9	0.35-0.45	---	60-100
	4-7	23-85	5-45	7-26	1.35-1.50	0.6-2.0	0.13-0.15	0.0-2.9	10-20
	7-11	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
	11-21	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
	21-50	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
	50-80	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
193503:									
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
	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
	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
	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
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
	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
193504:									
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
	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
	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
	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
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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193505:									
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
	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
	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
	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
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
	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
193506:									
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
	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
	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
	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
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
	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
193507:									
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
	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
	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
	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
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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193508:									
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
193509:									
Boyer-----------	0-3	45-85	5-45	7-19	1.35-1.60	0.6-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	3-4	45-85	5-45	7-34	1.30-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.5-2.0
	4-14	45-85	5-45	7-34	1.35-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.0-0.5
	14-30	45-85	5-45	7-34	1.35-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.0-0.5
	30-45	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
	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
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
	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
193510:									
Boyer-----------	0-3	45-85	5-45	7-19	1.35-1.60	0.6-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	3-4	45-85	5-45	7-34	1.30-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.5-2.0
	4-14	45-85	5-45	7-34	1.35-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.0-0.5
	14-30	45-85	5-45	7-34	1.35-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.0-0.5
	30-45	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
	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
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
	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
193511:									
Boyer-----------	0-3	45-85	5-45	7-19	1.35-1.60	0.6-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	3-4	45-85	5-45	7-34	1.30-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.5-2.0
	4-14	45-85	5-45	7-34	1.35-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.0-0.5
	14-30	45-85	5-45	7-34	1.35-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.0-0.5
	30-45	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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
193511:									
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
	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
193513:									
Dair------------	0-4	10	50	40	0.30-0.50	0.2-5.9	0.35-0.45	---	60-100
	4-7	23-85	5-45	7-26	1.35-1.50	0.6-2.0	0.13-0.15	0.0-2.9	10-20
	7-11	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
	11-21	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
	21-50	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
	50-80	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
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
	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:									
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
	20-29	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
	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
Pipestone-------	0-2	86-100	0-10	0-9	1.30-1.50	5.9-20.0	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	0.06-0.08	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:									
Houghton--------	0-12	10	50	40	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	12-26	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
	26-80	10	65	25	0.30-0.55	0.2-5.9	0.35-0.45	0.0-0.0	55-100
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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
202016:									
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
	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
	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
	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
Tekenink, sandy 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
	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
	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
	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
	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
631170:									
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	0-9	1.40-1.65	5.9-20.0	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
	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
	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
	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	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	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
	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
	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
	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
	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
631171:									
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	0-9	1.40-1.65	5.9-20.0	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
	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
	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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
631171:									
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	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
	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
	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
	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
	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
631172:									
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	0-9	1.40-1.65	5.9-20.0	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
	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
	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
	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	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	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
	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
	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
	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
	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
631173:									
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	0-9	1.40-1.65	5.9-20.0	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
	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
	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
	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	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	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
	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
	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
	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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
631174:									
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	0-9	1.40-1.65	5.9-20.0	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
	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
	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
	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	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	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
	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
	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
	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
	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:									
Fern	0-9	71-100	0-15	0-14	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
	9-10	71-100	0-15	0-14	1.30-1.60	5.9-20.0	0.06-0.11	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
	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
	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
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
	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
	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
	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
680943:									
Milnichol	0-2	86-100	0-10	0-9	1.30-1.50	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	2-12	86-100	0-10	0-9	1.30-1.65	5.9-20.0	0.06-0.08	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	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
	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	0-45	15-70	27-35	1.50-1.70	0.2-0.6	0.14-0.17	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
680945:									
Fern------------	0-9	71-100	0-15	0-14	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
	9-10	71-100	0-15	0-14	1.30-1.60	5.9-20.0	0.06-0.11	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
	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
	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
680946:									
Fern------------	0-9	71-100	0-15	0-14	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
	9-10	71-100	0-15	0-14	1.30-1.60	5.9-20.0	0.06-0.11	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
	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
	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
680971:									
Nessen----------	0-4	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	4-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.0-2.0
	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
	15-24	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	24-39	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	39-44	71-100	0-15	0-14	1.30-1.50	2.0-20.0	0.03-0.11	0.0-2.9	0.0-0.5
	44-80	86-100	0-10	0-9	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
	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
680972:									
Nessen----------	0-4	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	4-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.0-2.0
	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
	15-24	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	24-39	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	39-44	71-100	0-15	0-14	1.30-1.50	2.0-20.0	0.03-0.11	0.0-2.9	0.0-0.5
	44-80	86-100	0-10	0-9	1.25-1.50	5.9-20.0	0.02-0.07	0.0-2.9	0.0-0.5

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
680972:									
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
680973:									
Nessen----------	0-4	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	4-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.0-2.0
	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
	15-24	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	24-39	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	39-44	71-100	0-15	0-14	1.30-1.50	2.0-20.0	0.03-0.11	0.0-2.9	0.0-0.5
	44-80	86-100	0-10	0-9	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
	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
680974:									
Nessen----------	0-4	86-100	0-10	0-9	1.25-1.45	5.9-20.0	0.07-0.09	0.0-2.9	2.0-5.0
	4-11	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.0-2.0
	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
	15-24	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	24-39	86-100	0-10	0-9	1.35-1.45	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	39-44	71-100	0-15	0-14	1.30-1.50	2.0-20.0	0.03-0.11	0.0-2.9	0.0-0.5
	44-80	86-100	0-10	0-9	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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
893251:									
Boyer-----------	0-3	45-85	5-45	7-19	1.35-1.60	0.6-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	3-4	45-85	5-45	7-34	1.30-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.5-2.0
	4-14	45-85	5-45	7-34	1.35-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.0-0.5
	14-30	45-85	5-45	7-34	1.35-1.60	2.0-5.9	0.15-0.18	0.0-5.9	0.0-0.5
	30-45	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
	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
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
	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
894062:									
Remus-----------	0-9	45-85	10-45	7-19	1.50-1.65	0.2-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	9-15	23-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-2.9	0.5-1.0
	15-24	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	24-35	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	35-66	23-80	10-45	7-34	1.50-1.75	0.2-0.6	0.16-0.19	0.0-5.9	0.0-0.5
	66-80	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	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	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	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
	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
894063:									
Remus-----------	0-9	45-85	10-45	7-19	1.50-1.65	0.2-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	9-15	23-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-2.9	0.5-1.0
	15-24	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	24-35	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	35-66	23-80	10-45	7-34	1.50-1.75	0.2-0.6	0.16-0.19	0.0-5.9	0.0-0.5
	66-80	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	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	1.40-1.70	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	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
	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
894064:									
Fern------------	0-9	71-100	0-15	0-14	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
	9-10	71-100	0-15	0-14	1.30-1.60	5.9-20.0	0.06-0.11	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
	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
	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	45-85	10-45	7-19	1.50-1.65	0.2-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	9-15	23-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-2.9	0.5-1.0
	15-24	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	24-35	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	35-66	23-80	10-45	7-34	1.50-1.75	0.2-0.6	0.16-0.19	0.0-5.9	0.0-0.5
	66-80	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
894065:									
Fern------------	0-9	71-100	0-15	0-14	1.30-1.55	5.9-20.0	0.07-0.12	0.0-2.9	2.0-5.0
	9-10	71-100	0-15	0-14	1.30-1.60	5.9-20.0	0.06-0.11	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
	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
	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	45-85	10-45	7-19	1.50-1.65	0.2-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	9-15	23-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-2.9	0.5-1.0
	15-24	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	24-35	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	35-66	23-80	10-45	7-34	1.50-1.75	0.2-0.6	0.16-0.19	0.0-5.9	0.0-0.5
	66-80	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
894104:									
Mollineaux------	0-6	71-100	0-15	0-14	1.30-1.50	5.9-20.0	0.10-0.12	0.0-2.9	2.0-5.0
	6-9	71-100	0-15	0-14	1.30-1.70	5.9-20.0	0.06-0.11	0.0-2.9	0.0-1.0
	9-15	71-100	0-15	0-14	1.40-1.70	5.9-20.0	0.06-0.11	0.0-2.9	0.5-2.0
	15-27	71-100	0-15	0-14	1.40-1.70	5.9-20.0	0.06-0.11	0.0-2.9	0.5-2.0
	27-38	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
	38-64	30-50	15-50	10-35	1.50-1.70	0.2-2.0	0.15-0.19	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	7-19	1.50-1.65	0.2-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	9-15	23-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-2.9	0.5-1.0
	15-24	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	24-35	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	35-66	23-80	10-45	7-34	1.50-1.75	0.2-0.6	0.16-0.19	0.0-5.9	0.0-0.5
	66-80	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
894105:									
Mollineaux------	0-6	71-100	0-15	0-14	1.30-1.50	5.9-20.0	0.10-0.12	0.0-2.9	2.0-5.0
	6-9	71-100	0-15	0-14	1.30-1.70	5.9-20.0	0.06-0.11	0.0-2.9	0.0-1.0
	9-15	71-100	0-15	0-14	1.40-1.70	5.9-20.0	0.06-0.11	0.0-2.9	0.5-2.0
	15-27	71-100	0-15	0-14	1.40-1.70	5.9-20.0	0.06-0.11	0.0-2.9	0.5-2.0
	27-38	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
	38-64	30-50	15-50	10-35	1.50-1.70	0.2-2.0	0.15-0.19	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	7-19	1.50-1.65	0.2-2.0	0.16-0.18	0.0-2.9	2.0-5.0
	9-15	23-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-2.9	0.5-1.0
	15-24	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	24-35	45-90	3-45	0-34	1.50-1.75	0.2-2.0	0.10-0.19	0.0-5.9	0.5-1.0
	35-66	23-80	10-45	7-34	1.50-1.75	0.2-0.6	0.16-0.19	0.0-5.9	0.0-0.5
	66-80	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
894165:									
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
	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
	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
	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
Tekenink, sandy 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
	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
	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
	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
	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
899682:									
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
899722:									
Goodharbor------	0-1	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
	1-3	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	3-23	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
	23-40	86-100	0-10	0-9	1.40-1.65	5.9-20.0	0.06-0.08	0.0-2.9	0.5-1.0
	40-80	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

Table 15.—Physical Soil Properties—Continued

Map unit symbol and soil name	Depth	Sand	Silt	Clay	Moist bulk density	Permeability (Ksat)	Available water capacity	Shrink-swell potential	Organic matter
	In	Pct	Pct	Pct	g/cc	In/hr	In/in	Pct	Pct
899731:									
Covert----------	0-1	86-100	0-10	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	0-10	0-9	1.30-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	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	0-10	0-9	1.45-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	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
	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	5.9-20.0	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	0.06-0.08	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
899733:									
Covert----------	0-1	86-100	0-10	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	0-10	0-9	1.30-1.60	5.9-20.0	0.06-0.08	0.0-2.9	0.5-2.0
	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	0-10	0-9	1.45-1.65	5.9-20.0	0.05-0.07	0.0-2.9	0.0-0.5
	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
	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
Dair------------	0-4	10	50	40	0.30-0.50	0.2-5.9	0.35-0.45	---	60-100
	4-7	23-85	5-45	7-26	1.35-1.50	0.6-2.0	0.13-0.15	0.0-2.9	10-20
	7-11	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
	11-21	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
	21-50	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
	50-80	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
899734:									
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	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
	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
	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
	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
	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

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)

Map unit symbol and soil name	Depth (inches)	Erosion factors: Kw	Erosion factors: Kf	Erosion factors: T	Wind erodi-bility group	Wind erodi-bility index
190775:						
Adrian	0-8	---	---	4	2	134
	8-24	---	---			
	24-60	.15	.15			
Houghton	0-10	---	---	5	2	134
	10-60	---	---			
190777:						
Alcona	0-8	.24	.24	5	3	86
	8-12	.17	.17			
	12-18	.17	.17			
	18-24	.24	.24			
	24-60	.24	.24			
Richter	0-8	.24	.24	5	3	86
	8-27	.17	.17			
	27-60	.20	.20			
190778:						
Alcona	0-8	.24	.24	5	3	86
	8-12	.17	.17			
	12-18	.17	.17			
	18-24	.24	.24			
	24-60	.24	.24			
Richter	0-8	.24	.24	5	3	86
	8-27	.17	.17			
	27-60	.20	.20			
190779:						
Alpena	0-4	.15	.17	2	8	0
	4-60	.10	.15			
190780:						
Au Gres	0-12	.10	.15	5	1	220
	12-24	.10	.15			
	24-60	.10	.15			
Kalkaska	0-7	.15	.15	5	1	220
	7-15	.15	.15			
	15-32	.15	.15			
	32-60	.15	.15			
190781:						
Bach	0-8	.28	.28	5	5	56
	8-19	.28	.28			
	19-60	.43	.43			
190782:						
Deer Park	0-1	.15	.15	5	1	220
	1-4	.15	.15			
	4-60	.15	.15			
190783:						
Deer Park	0-1	.15	.15	5	1	220
	1-4	.15	.15			
	4-60	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
190784:						
Deer Park	0-1	.15	.15	5	1	220
	1-4	.15	.15			
	4-60	.15	.15			
Roscommon	0-6	.15	.15	5	1	220
	6-60	.17	.17			
190786.						
Dune land						
190787:						
East Lake	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190788:						
East Lake	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190789:						
East Lake	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190790:						
East Lake	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190791:						
Eastport	0-3	.15	.15	5	1	220
	3-26	.15	.15			
	26-60	.15	.15			
190792:						
Edwards	0-30	---	---	5	2	134
	30-60	.32	.32			
Marl beds	0-7	---	---	---	2	134
	7-60	.32	.32			
190794:						
Emmet	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Leelanau	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			
190795:						
Emmet	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
		Kw	Kf	T		
190795:						
Leelanau----------------	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			
190796:						
Emmet-------------------	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Leelanau----------------	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			
190797:						
Emmet-------------------	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Leelanau----------------	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			
190799:						
Emmet-------------------	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Leelanau----------------	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			
190801:						
Emmet-------------------	0-8	.17	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Mancelona---------------	0-8	.17	.24	4	3	86
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
190803:						
Emmet-------------------	0-8	.17	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Mancelona---------------	0-8	.17	.24	4	3	86
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
190805:						
Emmet	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Omena	0-8	.24	.24	3	3	86
	8-14	.28	.28			
	14-60	.24	.32			
190806:						
Emmet	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Omena	0-8	.24	.24	3	3	86
	8-14	.28	.28			
	14-60	.24	.32			
190807:						
Emmet	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Omena	0-8	.24	.24	3	3	86
	8-14	.28	.28			
	14-60	.24	.32			
190808:						
Emmet	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Omena	0-8	.24	.24	3	3	86
	8-14	.28	.28			
	14-60	.24	.32			
190809:						
Emmet	0-8	.24	.24	5	3	86
	8-26	.24	.24			
	26-32	.32	.32			
	32-60	.28	.28			
Omena	0-8	.24	.24	3	3	86
	8-14	.28	.28			
	14-60	.24	.32			
190811:						
Hettinger	0-8	.32	.32	3	6	48
	8-23	.43	.43			
	23-60	.43	.43			
Muck	0-11	---	---	5	2	134
	11-23	---	---			
	23-60	.32	---			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
190812:						
Hettinger	0-8	.32	.32	3	6	48
	8-23	.43	.43			
	23-60	.43	.43			
Tonkey	0-8	.32	.32	4	5	56
	8-20	.24	.24			
	20-60	.24	.24			
190814:						
Kalkaska	0-7	.15	.15	5	1	220
	7-15	.15	.15			
	15-32	.15	.15			
	32-60	.15	.15			
190815:						
Kalkaska	0-7	.15	.15	5	1	220
	7-15	.15	.15			
	15-32	.15	.15			
	32-60	.15	.15			
190816:						
Kalkaska	0-7	.15	.15	5	1	220
	7-15	.15	.15			
	15-32	.15	.15			
	32-60	.15	.15			
190817:						
Kalkaska	0-7	.15	.15	5	1	220
	7-15	.15	.15			
	15-32	.15	.15			
	32-60	.15	.15			
190818:						
Kalkaska	0-7	.15	.15	5	1	220
	7-15	.15	.15			
	15-32	.15	.15			
	32-60	.15	.15			
190819:						
Kalkaska	0-7	.17	.17	5	1	220
	7-15	.15	.15			
	15-32	.15	.15			
	32-60	.15	.15			
East Lake	0-8	.17	.17	4	1	220
	8-26	.15	.15			
	26-60	.10	.15			
190820:						
Kiva	0-6	.24	.32	3	5	86
	6-20	.20	.28			
	20-60	.10	.15			
Mancelona	0-8	.17	.24	4	3	86
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
190821:						
Kiva--------------------	0-6	.24	.32	3	3	86
	6-20	.20	.28			
	20-60	.10	.15			
Mancelona---------------	0-8	.17	.24	4	3	86
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
190823:						
Kiva--------------------	0-6	.24	.32	3	3	86
	6-20	.20	.28			
	20-60	.10	.15			
Mancelona---------------	0-8	.17	.24	4	3	86
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
190824.						
Lake beaches						
190825.						
Lake bluffs						
190826:						
Leelanau----------------	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			
East Lake---------------	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190827:						
Leelanau----------------	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			
East Lake---------------	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190828:						
Leelanau----------------	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			
East Lake---------------	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190829:						
Leelanau----------------	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
190829:						
East Lake	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190830:						
Leelanau	0-8	.17	.17	5	2	134
	8-28	.17	.17			
	28-36	.24	.24			
	36-60	.17	.17			
East Lake	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190831:						
Lupton	0-10	---	---	5	2	134
	10-60	---	---			
Markey	0-20	---	---	4	2	134
	20-60	.10	.15			
190832:						
Mancelona	0-8	.24	.24	4	3	86
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
190833:						
Mancelona	0-8	.24	.24	4	3	86
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
190834:						
Mancelona	0-8	.17	.17	4	2	134
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
East Lake	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190835:						
Mancelona	0-8	.17	.17	4	2	134
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
East Lake	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190836:						
Mancelona	0-8	.17	.17	4	2	134
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
190836:						
East Lake----------------	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190837:						
Mancelona----------------	0-8	.17	.17	4	2	134
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
East Lake----------------	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190838:						
Mancelona----------------	0-8	.17	.17	4	2	134
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
East Lake----------------	0-8	.17	.17	4	2	134
	8-26	.15	.15			
	26-60	.10	.15			
190839:						
Mancelona----------------	0-8	.17	.24	4	3	86
	8-25	.17	.24			
	25-30	.17	.24			
	30-60	.10	.15			
Richter------------------	0-8	.24	.24	5	3	86
	8-27	.17	.17			
	27-60	.20	.20			
190840:						
Nester-------------------	0-6	.32	.32	3	5	56
	6-8	.32	.32			
	8-28	.32	.32			
	28-60	.32	.32			
190841:						
Nester-------------------	0-6	.32	.32	3	5	56
	6-8	.32	.32			
	8-28	.32	.32			
	28-60	.32	.32			
190842:						
Nester-------------------	0-6	.32	.32	3	5	56
	6-8	.32	.32			
	8-28	.32	.32			
	28-60	.32	.32			
190843:						
Nester-------------------	0-6	.32	.32	3	5	56
	6-8	.32	.32			
	8-28	.32	.32			
	28-60	.32	.32			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
190844:						
Nester	0-6	.32	.32	3	5	56
	6-8	.32	.32			
	8-28	.32	.32			
	28-60	.32	.32			
190846.						
Pits, gravel						
190847:						
Richter	0-8	.24	.24	5	3	86
	8-27	.17	.17			
	27-60	.20	.20			
Alcona	0-8	.24	.24	5	3	86
	8-12	.17	.17			
	12-18	.17	.17			
	18-24	.24	.24			
	24-60	.24	.24			
190848:						
Richter	0-8	.24	.24	5	3	86
	8-27	.17	.17			
	27-60	.20	.20			
Alcona	0-8	.24	.24	5	3	86
	8-12	.17	.17			
	12-18	.17	.17			
	18-24	.24	.24			
	24-60	.24	.24			
190849:						
Roscommon	0-6	.15	.15	5	1	220
	6-60	.17	.17			
Markey	0-20	---	---	4	2	134
	20-60	.10	.15			
190850:						
Sanilac	0-6	.32	.32	5	5	56
	6-16	.32	.32			
	16-24	.37	.37			
	24-60	.43	.43			
190851:						
Tonkey	0-8	.24	.24	4	3	86
	8-20	.24	.24			
	20-60	.24	.24			
Munuscong	0-10	.20	.20	4	3	86
	10-24	.24	.24			
	24-60	.28	.28			
Iosco	0-8	.17	.17	5	2	134
	8-27	.17	.17			
	27-34	.37	.37			
	34-60	.37	.37			
190852:						
Tonkey	0-8	.24	.24	4	3	86
	8-20	.24	.24			
	20-60	.24	.24			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
190852:						
Munuscong	0-10	.20	.20	4	3	86
	10-24	.24	.24			
	24-60	.28	.28			
Iosco	0-8	.17	.17	5	2	134
	8-27	.17	.17			
	27-34	.37	.37			
	34-60	.37	.37			
190853.						
Water						
190854:						
Wallace	0-8	.15	.15	1	1	220
	8-24	.15	.15			
	24-60	.15	.15			
Kalkaska	0-7	.15	.15	5	1	220
	7-15	.15	.15			
	15-32	.15	.15			
	32-60	.15	.15			
190855:						
Wind eroded land	0-60	.10	.15	5	1	220
190856:						
Wind eroded land	0-60	.10	.15	5	1	220
193236.						
Beaches						
193237:						
Thompsonville	0-5	.15	.15	5	1	250
	5-15	.15	.15			
	15-29	.15	.15			
	29-37	.15	.15			
	37-55	.15	.15			
	55-72	.43	.43			
	72-80	.43	.43			
Milnichol	0-2	.15	.15	5	1	250
	2-12	.15	.15			
	12-15	.15	.15			
	15-25	.15	.15			
	25-33	.15	.15			
	33-47	.15	.15			
	47-50	.17	.17			
	50-68	.43	.43			
	68-80	.43	.43			
193255:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
193255:						
Coloma	0-3	.15	.15	5	1	220
	3-4	.15	.15			
	4-8	.15	.15			
	8-15	.15	.15			
	15-25	.15	.15			
	25-40	.15	.15			
	40-80	.15	.15			
193256:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Coloma	0-3	.15	.15	5	1	220
	3-4	.15	.15			
	4-8	.15	.15			
	8-15	.15	.15			
	15-25	.15	.15			
	25-40	.15	.15			
	40-80	.15	.15			
193257:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Coloma	0-3	.15	.15	5	1	220
	3-4	.15	.15			
	4-8	.15	.15			
	8-15	.15	.15			
	15-25	.15	.15			
	25-40	.15	.15			
	40-80	.15	.15			
193258:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Coloma	0-3	.15	.15	5	1	220
	3-4	.15	.15			
	4-8	.15	.15			
	8-15	.15	.15			
	15-25	.15	.15			
	25-40	.15	.15			
	40-80	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
193260:						
Copemish	0-2	.15	.15	2	1	220
	2-7	.15	.15			
	7-11	.15	.15			
	11-28	.15	.15			
	28-36	.15	.15			
	36-80	.15	.15			
193262:						
Kaleva	0-3	.15	.15	5	1	220
	3-9	.15	.15			
	9-11	.15	.15			
	11-16	.15	.15			
	16-21	.15	.15			
	21-70	.15	.15			
	70-80	.15	.15			
193263:						
Kaleva	0-3	.15	.15	5	1	220
	3-9	.15	.15			
	9-11	.15	.15			
	11-16	.15	.15			
	16-21	.15	.15			
	21-70	.15	.15			
	70-80	.15	.15			
193265:						
Grattan	0-4	.15	.15	5	1	220
	4-13	.15	.15			
	13-18	.15	.15			
	18-25	.15	.15			
	25-53	.15	.15			
	53-80	.15	.15			
193266:						
Grattan	0-4	.15	.15	5	1	220
	4-13	.15	.15			
	13-18	.15	.15			
	18-25	.15	.15			
	25-53	.15	.15			
	53-80	.15	.15			
193267:						
Grattan	0-4	.15	.15	5	1	220
	4-13	.15	.15			
	13-18	.15	.15			
	18-25	.15	.15			
	25-53	.15	.15			
	53-80	.15	.15			
193269:						
Grattan	0-4	.15	.15	5	1	220
	4-13	.15	.15			
	13-18	.15	.15			
	18-25	.15	.15			
	25-53	.15	.15			
	53-80	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
193270:						
Covert------------------	0-1	.15	.15	5	1	220
	1-8	.15	.15			
	8-18	.15	.15			
	18-25	.15	.15			
	25-29	.15	.15			
	29-38	.15	.15			
	38-47	.15	.15			
	47-80	.15	.15			
193271:						
Pipestone---------------	0-2	.15	.15	5	1	220
	2-9	.15	.15			
	9-12	.15	.15			
	12-24	.15	.15			
	24-32	.15	.15			
	32-80	.15	.15			
193272:						
Dair--------------------	0-4	---	---	5	8	0
	4-7	.20	.20			
	7-11	.17	.17			
	11-21	.17	.17			
	21-50	.17	.17			
	50-80	.17	.17			
193277:						
Benona------------------	0-2	.15	.15	5	1	220
	2-6	.15	.15			
	6-9	.15	.15			
	9-17	.15	.15			
	17-28	.15	.15			
	28-46	.15	.15			
	46-80	.15	.15			
193278:						
Benona------------------	0-2	.15	.15	5	1	220
	2-6	.15	.15			
	6-9	.15	.15			
	9-17	.15	.15			
	17-28	.15	.15			
	28-46	.15	.15			
	46-80	.15	.15			
193279:						
Benona------------------	0-2	.15	.15	5	1	220
	2-6	.15	.15			
	6-9	.15	.15			
	9-17	.15	.15			
	17-28	.15	.15			
	28-46	.15	.15			
	46-80	.15	.15			
193284:						
Udorthents--------------	0-80	.24	.24	5	5	56
Udipsamments------------	0-80	.17	.17	5	1	220

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
193285:						
Lumley------------------	0-3	---	---	5	8	0
	3-6	---	---			
	6-8	---	---			
	8-20	---	---			
	20-45	---	---			
	45-53	---	---			
	53-80	---	---			
Makinen-----------------	0-4	---	---	5	8	0
	4-14	---	---			
	14-22	---	---			
	22-31	---	---			
	31-80	.15	.15			
193286:						
Histosols---------------	0-45	---	---	5	8	0
	45-80	.15	.15			
Aquents-----------------	0-80	.15	.15	5	8	0
193287:						
Dune land.						
Quartzipsamments--------	0-80	.15	.15	5	1	220
193288:						
Udipsamments------------	0-80	.17	.17	5	1	220
193342:						
Gorvan------------------	0-4	.28	.28	5	8	0
	4-11	.28	.28			
	11-27	.43	.43			
	27-80	.15	.15			
Houghton----------------	0-12	---	---	5	8	0
	12-26	---	---			
	26-80	---	---			
Glendora----------------	0-6	.17	.17	5	8	0
	6-9	.17	.17			
	9-30	.15	.15			
	30-80	.15	.15			
193349:						
Spinks------------------	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Coloma------------------	0-3	.15	.15	5	1	220
	3-4	.15	.15			
	4-8	.15	.15			
	8-15	.15	.15			
	15-25	.15	.15			
	25-40	.15	.15			
	40-80	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
193351:						
Benona	0-2	.15	.15	5	1	220
	2-6	.15	.15			
	6-9	.15	.15			
	9-17	.15	.15			
	17-28	.15	.15			
	28-46	.15	.15			
	46-80	.15	.15			
193354:						
Dune land.						
Quartzipsamments	0-80	.15	.15	5	1	220
193357:						
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193359:						
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193360:						
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193362:						
Benzonia	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			
193363:						
Benzonia	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
193364:						
Benzonia----------------	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			
193365:						
Benzonia----------------	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			
193371:						
Dair--------------------	0-4	---	---	5	8	0
	4-7	.20	.20			
	7-11	.17	.17			
	11-21	.17	.17			
	21-50	.17	.17			
	50-80	.17	.17			
Pipestone---------------	0-2	.15	.15	5	1	220
	2-9	.15	.15			
	9-12	.15	.15			
	12-24	.15	.15			
	24-32	.15	.15			
	32-80	.15	.15			
193372.						
Access Denied						
193423:						
Benona------------------	0-2	.15	.15	5	1	220
	2-6	.15	.15			
	6-9	.15	.15			
	9-17	.15	.15			
	17-28	.15	.15			
	28-46	.15	.15			
	46-80	.15	.15			
193484.						
Pits, sand and gravel						
193494:						
Nordhouse---------------	0-3	.15	.15	5	1	220
	3-11	.15	.15			
	11-40	.15	.15			
	40-60	.15	.15			
	60-80	.15	.15			
193496:						
Nordhouse---------------	0-3	.15	.15	5	1	220
	3-11	.15	.15			
	11-40	.15	.15			
	40-60	.15	.15			
	60-80	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
193497:						
Nordhouse	0-3	.15	.15	5	1	220
	3-11	.15	.15			
	11-40	.15	.15			
	40-60	.15	.15			
	60-80	.15	.15			
193498:						
Nordhouse	0-3	.15	.15	5	1	220
	3-11	.15	.15			
	11-40	.15	.15			
	40-60	.15	.15			
	60-80	.15	.15			
Platteriver	0-1	---	---	5	1	220
	1-3	.15	.15			
	3-14	.15	.15			
	14-20	.15	.15			
	20-29	.15	.15			
	29-80	.15	.15			
Dair	0-4	---	---	5	8	0
	4-7	.20	.20			
	7-11	.17	.17			
	11-21	.17	.17			
	21-50	.17	.17			
	50-80	.17	.17			
193503:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193504:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
193505:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193506:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193507:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193508:						
Madaus	0-12	---	---	5	8	0
	12-34	.43	.43			
	34-38	.43	.43			
	38-62	.15	.15			
	62-80	.32	.32			
193509:						
Boyer	0-3	.17	.24	4	3	86
	3-4	.15	.24			
	4-14	.10	.24			
	14-30	.15	.24			
	30-45	.05	.15			
	45-80	.10	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
193509:						
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193510:						
Boyer	0-3	.17	.24	4	3	86
	3-4	.15	.24			
	4-14	.10	.24			
	14-30	.15	.24			
	30-45	.05	.15			
	45-80	.10	.15			
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193511:						
Boyer	0-3	.17	.24	4	3	86
	3-4	.15	.24			
	4-14	.10	.24			
	14-30	.15	.24			
	30-45	.05	.15			
	45-80	.10	.15			
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
193513:						
Dair	0-4	---	---	5	8	0
	4-7	.20	.20			
	7-11	.17	.17			
	11-21	.17	.17			
	21-50	.17	.17			
	50-80	.17	.17			
Adrian	0-7	---	---	5	8	0
	7-20	---	---			
	20-35	---	---			
	35-80	.15	.15			
193514:						
Platteriver	0-1	---	---	5	1	220
	1-3	.15	.15			
	3-14	.15	.15			
	14-20	.15	.15			
	20-29	.15	.15			
	29-80	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
193514:						
Pipestone	0-2	.15	.15	5	1	220
	2-9	.15	.15			
	9-12	.15	.15			
	12-24	.15	.15			
	24-32	.15	.15			
	32-80	.15	.15			
202010:						
Houghton	0-12	---	---	5	8	0
	12-26	---	---			
	26-80	---	---			
Adrian	0-7	---	---	5	8	0
	7-20	---	---			
	20-35	---	---			
	35-80	.15	.15			
202016:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
Tekenink, sandy substratum	0-8	.17	.17	5	2	134
	8-16	.17	.17			
	16-21	.24	.24			
	21-49	.17	.17			
	49-62	.24	.24			
	62-72	.17	.17			
	72-80	.15	.15			
631170:						
Fogg	0-2	.15	.15	5	1	220
	2-7	.15	.15			
	7-13	.15	.15			
	13-21	.15	.15			
	21-34	.15	.15			
	34-43	.17	.17			
	43-48	.24	.24			
	48-55	.32	.32			
	55-80	.15	.15			
Benzonia	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
631171:						
Fogg	0-2	.15	.15	5	1	220
	2-7	.15	.15			
	7-13	.15	.15			
	13-21	.15	.15			
	21-34	.15	.15			
	34-43	.17	.17			
	43-48	.24	.24			
	48-55	.32	.32			
	55-80	.15	.15			
Benzonia	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			
631172:						
Fogg	0-2	.15	.15	5	1	220
	2-7	.15	.15			
	7-13	.15	.15			
	13-21	.15	.15			
	21-34	.15	.15			
	34-43	.17	.17			
	43-48	.24	.24			
	48-55	.32	.32			
	55-80	.15	.15			
Benzonia	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			
631173:						
Fogg	0-2	.15	.15	5	1	220
	2-7	.15	.15			
	7-13	.15	.15			
	13-21	.15	.15			
	21-34	.15	.15			
	34-43	.17	.17			
	43-48	.24	.24			
	48-55	.32	.32			
	55-80	.15	.15			
Benzonia	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
631174:						
Fogg	0-2	.15	.15	5	1	220
	2-7	.15	.15			
	7-13	.15	.15			
	13-21	.15	.15			
	21-34	.15	.15			
	34-43	.17	.17			
	43-48	.24	.24			
	48-55	.32	.32			
	55-80	.15	.15			
Benzonia	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			
680939:						
Fern	0-9	.15	.15	5	1	220
	9-10	.15	.15			
	10-24	.15	.15			
	24-29	.37	.37			
	29-42	.37	.37			
	42-50	.37	.37			
	50-80	.37	.37			
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
680943:						
Milnichol	0-2	.15	.15	5	1	250
	2-12	.15	.15			
	12-15	.15	.15			
	15-25	.15	.15			
	25-33	.15	.15			
	33-47	.15	.15			
	47-50	.17	.17			
	50-68	.43	.43			
	68-80	.43	.43			
680945:						
Fern	0-9	.15	.15	5	1	220
	9-10	.15	.15			
	10-24	.15	.15			
	24-29	.37	.37			
	29-42	.37	.37			
	42-50	.37	.37			
	50-80	.37	.37			
680946:						
Fern	0-9	.15	.15	5	1	220
	9-10	.15	.15			
	10-24	.15	.15			
	24-29	.37	.37			
	29-42	.37	.37			
	42-50	.37	.37			
	50-80	.37	.37			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
680971:						
Nessen-------------------	0-4	.15	.15	5	1	220
	4-11	.15	.15			
	11-15	.15	.15			
	15-24	.15	.15			
	24-39	.15	.15			
	39-44	.10	.15			
	44-80	.10	.15			
Kaleva-------------------	0-3	.15	.15	5	1	220
	3-9	.15	.15			
	9-11	.15	.15			
	11-16	.15	.15			
	16-21	.15	.15			
	21-70	.15	.15			
	70-80	.15	.15			
680972:						
Nessen-------------------	0-4	.15	.15	5	1	220
	4-11	.15	.15			
	11-15	.15	.15			
	15-24	.15	.15			
	24-39	.15	.15			
	39-44	.10	.15			
	44-80	.10	.15			
Kaleva-------------------	0-3	.15	.15	5	1	220
	3-9	.15	.15			
	9-11	.15	.15			
	11-16	.15	.15			
	16-21	.15	.15			
	21-70	.15	.15			
	70-80	.15	.15			
680973:						
Nessen-------------------	0-4	.15	.15	5	1	220
	4-11	.15	.15			
	11-15	.15	.15			
	15-24	.15	.15			
	24-39	.15	.15			
	39-44	.10	.15			
	44-80	.10	.15			
Kaleva-------------------	0-3	.15	.15	5	1	220
	3-9	.15	.15			
	9-11	.15	.15			
	11-16	.15	.15			
	16-21	.15	.15			
	21-70	.15	.15			
	70-80	.15	.15			
680974:						
Nessen-------------------	0-4	.15	.15	5	1	220
	4-11	.15	.15			
	11-15	.15	.15			
	15-24	.15	.15			
	24-39	.15	.15			
	39-44	.10	.15			
	44-80	.10	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
680974:						
Kaleva	0-3	.15	.15	5	1	220
	3-9	.15	.15			
	9-11	.15	.15			
	11-16	.15	.15			
	16-21	.15	.15			
	21-70	.15	.15			
	70-80	.15	.15			
893251:						
Boyer	0-3	.17	.24	4	3	86
	3-4	.15	.24			
	4-14	.10	.24			
	14-30	.15	.24			
	30-45	.05	.15			
	45-80	.10	.15			
Shavenaugh	0-5	.15	.15	5	1	220
	5-8	.15	.15			
	8-16	.15	.15			
	16-28	.15	.15			
	28-34	.15	.15			
	34-44	.15	.15			
	44-80	.05	.15			
894062:						
Remus	0-9	.24	.24	5	3	86
	9-15	.28	.28			
	15-24	.17	.17			
	24-35	.37	.37			
	35-66	.37	.37			
	66-80	.37	.37			
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
894063:						
Remus	0-9	.24	.24	5	3	86
	9-15	.28	.28			
	15-24	.17	.17			
	24-35	.37	.37			
	35-66	.37	.37			
	66-80	.37	.37			
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			
894064:						
Fern	0-9	.15	.15	5	1	220
	9-10	.15	.15			
	10-24	.15	.15			
	24-29	.37	.37			
	29-42	.37	.37			
	42-50	.37	.37			
	50-80	.37	.37			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi- bility group	Wind erodi- bility index
894064:						
Remus	0-9	.24	.24	5	3	86
	9-15	.28	.28			
	15-24	.17	.17			
	24-35	.37	.37			
	35-66	.37	.37			
	66-80	.37	.37			
894065:						
Fern	0-9	.15	.15	5	1	220
	9-10	.15	.15			
	10-24	.15	.15			
	24-29	.37	.37			
	29-42	.37	.37			
	42-50	.37	.37			
	50-80	.37	.37			
Remus	0-9	.24	.24	5	3	86
	9-15	.28	.28			
	15-24	.17	.17			
	24-35	.37	.37			
	35-66	.37	.37			
	66-80	.37	.37			
894104:						
Mollineaux	0-6	.17	.17	5	2	134
	6-9	.17	.17			
	9-15	.17	.17			
	15-27	.17	.17			
	27-38	.17	.17			
	38-64	.32	.32			
	64-80	.15	.15			
Remus	0-9	.24	.24	5	3	86
	9-15	.28	.28			
	15-24	.17	.17			
	24-35	.37	.37			
	35-66	.37	.37			
	66-80	.37	.37			
894105:						
Mollineaux	0-6	.17	.17	5	2	134
	6-9	.17	.17			
	9-15	.17	.17			
	15-27	.17	.17			
	27-38	.17	.17			
	38-64	.32	.32			
	64-80	.15	.15			
Remus	0-9	.24	.24	5	3	86
	9-15	.28	.28			
	15-24	.17	.17			
	24-35	.37	.37			
	35-66	.37	.37			
	66-80	.37	.37			
894165:						
Spinks	0-5	.15	.15	5	1	220
	5-10	.15	.15			
	10-17	.15	.15			
	17-62	.15	.15			
	62-72	.15	.15			
	72-80	.10	.15			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors Kw	Kf	T	Wind erodi-bility group	Wind erodi-bility index
894165:						
Tekenink, sandy substratum	0-8	.17	.17	5	2	134
	8-16	.17	.17			
	16-21	.24	.24			
	21-49	.17	.17			
	49-62	.24	.24			
	62-72	.17	.17			
	72-80	.15	.15			
899682:						
Kaleva	0-3	.15	.15	5	1	220
	3-9	.15	.15			
	9-11	.15	.15			
	11-16	.15	.15			
	16-21	.15	.15			
	21-70	.15	.15			
	70-80	.15	.15			
899722:						
Goodharbor	0-1	.15	.15	5	1	250
	1-3	.15	.15			
	3-23	.15	.15			
	23-40	.15	.15			
	40-80	.15	.15			
899731:						
Covert	0-1	.15	.15	5	1	220
	1-8	.15	.15			
	8-18	.15	.15			
	18-25	.15	.15			
	25-29	.15	.15			
	29-38	.15	.15			
	38-47	.15	.15			
	47-80	.15	.15			
Pipestone	0-2	.15	.15	5	1	220
	2-9	.15	.15			
	9-12	.15	.15			
	12-24	.15	.15			
	24-32	.15	.15			
	32-80	.15	.15			
899733:						
Covert	0-1	.15	.15	5	1	220
	1-8	.15	.15			
	8-18	.15	.15			
	18-25	.15	.15			
	25-29	.15	.15			
	29-38	.15	.15			
	38-47	.15	.15			
	47-80	.15	.15			
899733:						
Dair	0-4	---	---	5	8	0
	4-7	.20	.20			
	7-11	.17	.17			
	11-21	.17	.17			
	21-50	.17	.17			
	50-80	.17	.17			

Table 16.—Erosion Properties—Continued

Map unit symbol and soil name	Depth (inches)	Erosion factors			Wind erodi-bility group	Wind erodi-bility index
		Kw	Kf	T		
899734:						
Benzonia----------------	0-5	.15	.15	5	1	220
	5-11	.15	.15			
	11-15	.15	.15			
	15-20	.15	.15			
	20-27	.15	.15			
	27-35	.15	.15			
	35-80	.15	.15			

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%)	132	0
Houghton (45%)	176	0
190777:		
Alcona (55%)	6	0
Richter (30%)	8	16
190778:		
Alcona (65%)	6	0
Richter (25%)	8	16
190779:		
Alpena (90%)	4	32
190780:		
Au Gres (45%)	11	0
Kalkaska (35%)	12	0
190781:		
Bach (90%)	9	29
190782:		
Deer Park (100%)	3	0
190783:		
Deer Park (100%)	3	0
190784:		
Deer Park (70%)	3	0
Roscommon (25%)	13	12
190786:		
Dune land (100%)		
190787:		
East Lake (90%)	4	19
190788:		
East Lake (90%)	4	19

Table 17.—Total Soil Carbon—Continued

Map unit symbol, component name, and component percent	SOC	SIC
	kg/m^2	kg/m^2
190789:		
East Lake (90%)	4	19
190790:		
East Lake (90%)	4	19
190791:		
Eastport (93%)	4	0
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%)	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

Map unit symbol, component name, and component percent	SOC	SIC
	kg/m^2	kg/m^2
190807:		
Emmet (50%)	6	26
Omena (45%)	5	42
190808:		
Emmet (50%)	6	26
Omena (45%)	5	42
190809:		
Emmet (50%)	6	26
Omena (45%)	5	42
190811:		
Hettinger (45%)	13	46
Muck (30%)	86	24
190812:		
Hettinger (45%)	13	46
Tonkey (30%)	11	10
190814:		
Kalkaska (85%)	12	0
190815:		
Kalkaska (85%)	12	0
190816:		
Kalkaska (90%)	12	0
190817:		
Kalkaska (90%)	12	0
190818:		
Kalkaska (90%)	12	0
190819:		
Kalkaska (55%)	10	0
East Lake (35%)	4	19
190820:		
Kiva (65%)	3	21
Mancelona (30%)	6	17
190821:		
Kiva (50%)	3	21
Mancelona (30%)	6	17
190823:		
Kiva (50%)	3	21
Mancelona (30%)	6	17

Table 17.—Total Soil Carbon—Continued

Map unit symbol, component name, and component percent	SOC	SIC
	kg/m2	kg/m2
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	SIC
	kg/m^2	kg/m^2
190838:		
Mancelona (50%)	6	17
East Lake (30%)	4	19
190839:		
Mancelona (70%)	6	17
Richter (25%)	8	16
190840:		
Nester (90%)	5	47
190841:		
Nester (90%)	5	47
190842:		
Nester (90%)	5	47
190843:		
Nester (90%)	5	47
190844:		
Nester (90%)	5	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%)	13	12
Markey (30%)	51	6
190850:		
Sanilac (90%)	6	17
190851:		
Tonkey (40%)	12	10
Munuscong (25%)	8	33
Iosco (25%)	7	29
190852:		
Tonkey (35%)	12	10
Munuscong (30%)	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	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	0
193256:		
Spinks (50%)	9	0
Coloma (40%)	8	0
193257:		
Spinks (55%)	9	0
Coloma (35%)	8	0
193258:		
Spinks (50%)	9	0
Coloma (40%)	8	0
193260:		
Copemish (95%)	19	0
193262:		
Kaleva (95%)	11	0
193263:		
Kaleva (95%)	11	0
193265:		
Grattan (95%)	12	0
193266:		
Grattan (95%)	12	0
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/m2	kg/m2
193271:		
Pipestone (90%)	13	0
193272:		
Dair (90%)	30	0
193277:		
Benona (90%)	13	0
193278:		
Benona (90%)	13	0
193279:		
Benona (90%)	13	0
193284:		
Udorthents (55%)	49	0
Udipsamments (35%)	13	0
193285:		
Lumley (55%)	336	0
Makinen (40%)	164	0
193286:		
Histosols (55%)	269	0
Aquents (45%)	4	0
193287:		
Dune land (55%)		
Quartzipsamments (40%)	1	0
193288:		
Udipsamments (100%)	13	0
193342:		
Gorvan (35%)	12	17
Houghton (30%)	499	0
Glendora (20%)	19	0
193349:		
Spinks (50%)	9	0
Coloma (40%)	8	0
193351:		
Benona (95%)	13	0
193354:		
Dune land (50%)		
Quartzipsamments (40%)	1	0
193357:		
Shavenaugh (85%)	9	16

Table 17.—Total Soil Carbon—Continued

Map unit symbol, component name, and component percent	SOC	SIC
	kg/m^2	kg/m^2
193359:		
Shavenaugh (85%)	9	16
193360:		
Shavenaugh (85%)	9	16
193362:		
Benzonia (90%)	18	0
193363:		
Benzonia (90%)	18	0
193364:		
Benzonia (90%)	18	0
193365:		
Benzonia (90%)	18	0
193371:		
Dair (50%)	30	0
Pipestone (40%)	13	0
193372.		
Access Denied (100%)		
193423:		
Benona (95%)	13	0
193484.		
Pits, sand and gravel (100%)		
193494:		
Nordhouse (100%)	11	0
193496:		
Nordhouse (95%)	11	0
193497:		
Nordhouse (95%)	11	0
193498:		
Nordhouse (40%)	11	0
Platteriver (35%)	17	0
Dair (25%)	30	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	SOC	SIC
	kg/m^2	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	0

Table 17.—Total Soil Carbon—Continued

Map unit symbol, component name, and component percent	SOC	SIC
	kg/m2	kg/m2
631173:		
Fogg (50%)	17	0
Benzonia (40%)	18	0
631174:		
Fogg (50%)	17	0
Benzonia (40%)	18	0
680939:		
Fern (50%)	11	20
Spinks (40%)	9	0
680943:		
Milnichol (90%)	16	28
680945:		
Fern (90%)	11	20
680946:		
Fern (90%)	11	20
680971:		
Nessen (50%)	12	17
Kaleva (40%)	11	0
680972:		
Nessen (50%)	12	17
Kaleva (40%)	11	0
680973:		
Nessen (50%)	12	17
Kaleva (40%)	11	0
680974:		
Nessen (50%)	12	17
Kaleva (40%)	11	0
893251:		
Boyer (50%)	5	26
Shavenaugh (40%)	9	16
894062:		
Remus (50%)	13	6
Spinks (40%)	9	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	6
894065:		
Fern (50%)	11	20
Remus (40%)	13	6
894104:		
Mollineaux (50%)	11	0
Remus (40%)	13	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%)	30	0
899734:		
Benzonia (90%)	18	0

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	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	meq/100 g	pH	Pct
190775:					
Adrian	0-8	80.0-120.0	---	4.5-7.8	0
	8-24	80.0-120.0	---	4.5-7.8	0
	24-60	1.0-3.0	---	5.6-8.4	0
Houghton	0-10	140.0-180.0	---	5.6-7.8	0
	10-60	140.0-180.0	---	5.6-7.8	0
190777:					
Alcona	0-8	3.0-15.0	---	6.1-7.3	0
	8-12	1.0-6.0	---	6.1-7.3	0
	12-18	1.0-8.0	---	6.1-7.8	0
	18-24	2.0-8.0	---	6.1-7.8	0
	24-60	1.0-8.0	---	7.4-8.4	0
Richter	0-8	5.0-15.0	---	5.6-7.3	0
	8-27	5.0-15.0	---	5.6-7.8	0
	27-60	1.0-10.0	---	7.4-8.4	0-20
190778:					
Alcona	0-8	3.0-15.0	---	6.1-7.3	0
	8-12	1.0-6.0	---	6.1-7.3	0
	12-18	1.0-8.0	---	6.1-7.8	0
	18-24	2.0-8.0	---	6.1-7.8	0
	24-60	1.0-8.0	---	7.4-8.4	0
Richter	0-8	5.0-15.0	---	5.6-7.3	0
	8-27	5.0-15.0	---	5.6-7.8	0
	27-60	1.0-10.0	---	7.4-8.4	0-20
190779:					
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:					
Au Gres	0-12	5.0-10.0	---	3.6-7.3	0
	12-24	2.0-5.0	---	4.5-7.3	0
	24-60	1.0-2.0	---	5.1-7.3	0
Kalkaska	0-7	1.0-15.0	---	5.1-6.0	0
	7-15	4.0-15.0	---	5.1-6.0	0
	15-32	2.0-5.0	---	5.1-6.0	0
	32-60	1.0-2.0	---	5.1-6.5	0
190781:					
Bach	0-8	5.0-25.0	---	7.4-7.8	0
	8-19	2.0-10.0	---	7.4-7.8	0
	19-60	2.0-15.0	---	7.4-8.4	5-25
190782:					
Deer Park	0-1	1.0-5.0	---	5.1-6.0	0
	1-4	1.0-3.0	---	5.1-6.5	0
	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
	1-4	1.0-3.0	---	5.1-6.5	0
	4-60	0.0-2.0	---	5.1-6.5	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
190784:					
Deer Park	0-1	1.0-5.0	---	5.1-6.0	0
	1-4	1.0-3.0	---	5.1-6.5	0
	4-60	0.0-2.0	---	5.1-6.5	0
Roscommon	0-6	5.0-35.0	---	6.1-7.8	0
	6-60	1.0-4.0	---	6.1-7.8	0-10
190787:					
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
190788:					
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
190789:					
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
190790:					
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
190791:					
Eastport	0-3	3.0-10.0	---	6.1-7.3	0
	3-26	1.0-4.0	---	5.1-7.8	0
	26-60	1.0-2.0	---	7.4-8.4	0
190792:					
Edwards	0-30	140.0-180.0	---	5.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	50-90
190794:					
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	0-8	3.0-10.0	---	5.6-7.3	0
	8-28	1.0-4.0	---	5.6-7.3	0
	28-36	2.0-10.0	---	6.1-7.3	0
	36-60	1.0-5.0	---	7.4-8.4	10-30
190795:					
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	0-8	3.0-10.0	---	5.6-7.3	0
	8-28	1.0-4.0	---	5.6-7.3	0
	28-36	2.0-10.0	---	6.1-7.3	0
	36-60	1.0-5.0	---	7.4-8.4	10-30

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
190796:					
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	0-8	3.0-10.0	---	5.6-7.3	0
	8-28	1.0-4.0	---	5.6-7.3	0
	28-36	2.0-10.0	---	6.1-7.3	0
	36-60	1.0-5.0	---	7.4-8.4	10-30
190797:					
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	0-8	3.0-10.0	---	5.6-7.3	0
	8-28	1.0-4.0	---	5.6-7.3	0
	28-36	2.0-10.0	---	6.1-7.3	0
	36-60	1.0-5.0	---	7.4-8.4	10-30
190799:					
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	0-8	3.0-10.0	---	5.6-7.3	0
	8-28	1.0-4.0	---	5.6-7.3	0
	28-36	2.0-10.0	---	6.1-7.3	0
	36-60	1.0-5.0	---	7.4-8.4	10-30
190801:					
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
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
190803:					
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
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
190805:					
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

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
190805:					
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
190806:					
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
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:					
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
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
190808:					
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
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
190809:					
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
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
190811:					
Hettinger	0-8	15.0-40.0	---	6.1-7.3	0
	8-23	10.0-20.0	---	6.1-7.3	0
	23-60	10.0-30.0	---	7.9-8.4	20-30
190812:					
Hettinger	0-8	15.0-40.0	---	6.1-7.3	0
	8-23	10.0-20.0	---	6.1-7.3	0
	23-60	10.0-30.0	---	7.9-8.4	20-30
Tonkey	0-8	10.0-25.0	---	5.6-7.8	0
	8-20	2.0-10.0	---	5.6-7.8	0
	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-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
190814:					
Kalkaska	0-7	1.0-15.0	---	5.1-6.0	0
	7-15	4.0-15.0	---	5.1-6.0	0
	15-32	2.0-5.0	---	5.1-6.0	0
	32-60	1.0-2.0	---	5.1-6.5	0
190815:					
Kalkaska	0-7	1.0-15.0	---	5.1-6.0	0
	7-15	4.0-15.0	---	5.1-6.0	0
	15-32	2.0-5.0	---	5.1-6.0	0
	32-60	1.0-2.0	---	5.1-6.5	0
190816:					
Kalkaska	0-7	1.0-15.0	---	5.1-6.0	0
	7-15	4.0-15.0	---	5.1-6.0	0
	15-32	2.0-5.0	---	5.1-6.0	0
	32-60	1.0-2.0	---	5.1-6.5	0
190817:					
Kalkaska	0-7	1.0-15.0	---	5.1-6.0	0
	7-15	4.0-15.0	---	5.1-6.0	0
	15-32	2.0-5.0	---	5.1-6.0	0
	32-60	1.0-2.0	---	5.1-6.5	0
190818:					
Kalkaska	0-7	1.0-15.0	---	5.1-6.0	0
	7-15	4.0-15.0	---	5.1-6.0	0
	15-32	2.0-5.0	---	5.1-6.0	0
	32-60	1.0-2.0	---	5.1-6.5	0
190819:					
Kalkaska	0-7	2.0-5.0	---	5.6-7.3	0
	7-15	4.0-15.0	---	5.1-6.0	0
	15-32	2.0-5.0	---	5.1-6.0	0
	32-60	1.0-2.0	---	5.1-6.5	0
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
190820:					
Kiva	0-6	3.0-15.0	---	6.1-7.8	0
	6-20	2.0-10.0	---	6.6-7.8	0
	20-60	1.0-2.0	---	7.4-8.4	10-25
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
190821:					
Kiva	0-6	3.0-15.0	---	6.1-7.8	0
	6-20	2.0-10.0	---	6.6-7.8	0
	20-60	1.0-2.0	---	7.4-8.4	10-25
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
190823:					
Kiva	0-6	3.0-15.0	---	6.1-7.8	0
	6-20	2.0-10.0	---	6.6-7.8	0
	20-60	1.0-2.0	---	7.4-8.4	10-25
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
190826:					
Leelanau	0-8	3.0-10.0	---	5.6-7.3	---
	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
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
190827:					
Leelanau	0-8	3.0-10.0	---	5.6-7.3	0
	8-28	1.0-4.0	---	5.6-7.3	0
	28-36	2.0-10.0	---	6.1-7.3	0
	36-60	1.0-5.0	---	7.4-8.4	10-30
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
190828:					
Leelanau	0-8	3.0-10.0	---	5.6-7.3	0
	8-28	1.0-4.0	---	5.6-7.3	0
	28-36	2.0-10.0	---	6.1-7.3	0
	36-60	1.0-5.0	---	7.4-8.4	10-30
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
190829:					
Leelanau	0-8	3.0-10.0	---	5.6-7.3	0
	8-28	1.0-4.0	---	5.6-7.3	0
	28-36	2.0-10.0	---	6.1-7.3	0
	36-60	1.0-5.0	---	7.4-8.4	10-30
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
190830:					
Leelanau	0-8	3.0-10.0	---	5.6-7.3	0
	8-28	1.0-4.0	---	5.6-7.3	0
	28-36	2.0-10.0	---	6.1-7.3	0
	36-60	1.0-5.0	---	7.4-8.4	10-30
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

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
190831:					
Lupton	0-10	140.0-180.0	---	5.6-7.8	0
	10-60	140.0-180.0	---	5.6-7.8	0
Markey	0-20	140.0-180.0	---	6.6-7.8	0
	20-60	1.0-3.0	---	7.4-8.4	0-5
190832:					
Mancelona	0-8	2.0-15.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
190833:					
Mancelona	0-8	2.0-15.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
190834:					
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
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
190835:					
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
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
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
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
190837:					
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
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

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
190838:					
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
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
190839:					
Mancelona	0-8	2.0-10.0	---	5.6-7.3	0
	8-25	1.0-10.0	---	5.6-7.8	0
	25-30	4.0-15.0	---	6.1-7.8	0
	30-60	1.0-4.0	---	7.4-8.4	10-25
Richter	0-8	5.0-15.0	---	5.6-7.3	0
	8-27	5.0-15.0	---	5.6-7.8	0
	27-60	1.0-10.0	---	7.4-8.4	0-20
190840:					
Nester	0-6	5.0-20.0	---	6.6-7.3	0
	6-8	2.0-10.0	---	6.6-7.3	0
	8-28	5.0-20.0	---	6.6-7.3	0-20
	28-60	5.0-20.0	---	7.9-8.4	20-30
190841:					
Nester	0-6	5.0-20.0	---	6.6-7.3	0
	6-8	2.0-10.0	---	6.6-7.3	0
	8-28	5.0-20.0	---	6.6-7.3	0-20
	28-60	5.0-20.0	---	7.9-8.4	20-30
190842:					
Nester	0-6	5.0-20.0	---	6.6-7.3	0
	6-8	2.0-10.0	---	6.6-7.3	0
	8-28	5.0-20.0	---	6.6-7.3	0-20
	28-60	5.0-20.0	---	7.9-8.4	20-30
190843:					
Nester	0-6	5.0-20.0	---	6.6-7.3	0
	6-8	2.0-10.0	---	6.6-7.3	0
	8-28	5.0-20.0	---	6.6-7.3	0-20
	28-60	5.0-20.0	---	7.9-8.4	20-30
190844:					
Nester	0-6	5.0-20.0	---	6.6-7.3	0
	6-8	2.0-10.0	---	6.6-7.3	0
	8-28	5.0-20.0	---	6.6-7.3	0-20
	28-60	5.0-20.0	---	7.9-8.4	20-30
190847:					
Richter	0-8	5.0-15.0	---	5.6-7.3	0
	8-27	5.0-15.0	---	5.6-7.8	0
	27-60	1.0-10.0	---	7.4-8.4	0-20
Alcona	0-8	3.0-15.0	---	6.1-7.3	0
	8-12	1.0-6.0	---	6.1-7.3	0
	12-18	1.0-8.0	---	6.1-7.8	0
	18-24	2.0-8.0	---	6.1-7.8	0
	24-60	1.0-8.0	---	7.4-8.4	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
190848:					
Richter	0-8	5.0-15.0	---	5.6-7.3	0
	8-27	5.0-15.0	---	5.6-7.8	0
	27-60	1.0-10.0	---	7.4-8.4	0-20
Alcona	0-8	3.0-15.0	---	6.1-7.3	0
	8-12	1.0-6.0	---	6.1-7.3	0
	12-18	1.0-8.0	---	6.1-7.8	0
	18-24	2.0-8.0	---	6.1-7.8	0
	24-60	1.0-8.0	---	7.4-8.4	0
190849:					
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	0-20	140.0-180.0	---	6.6-7.8	0
	20-60	1.0-3.0	---	7.4-8.4	0-5
190850:					
Sanilac	0-6	5.0-15.0	---	5.6-7.8	0
	6-16	2.0-10.0	---	7.4-8.4	0
	16-24	3.0-15.0	---	7.4-8.4	0
	24-60	2.0-10.0	---	7.4-8.4	0-20
190851:					
Tonkey	0-8	10.0-25.0	---	5.6-7.8	0
	8-20	2.0-10.0	---	5.6-7.8	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	0
	24-60	10.0-30.0	---	7.4-8.4	10-30
Iosco	0-8	4.0-10.0	---	5.6-6.5	0
	8-27	2.0-10.0	---	5.1-7.8	0
	27-34	4.0-10.0	---	6.1-7.8	3-6
	34-60	8.0-20.0	---	6.6-8.4	15-30
190852:					
Tonkey	0-8	10.0-25.0	---	5.6-7.8	0
	8-20	2.0-10.0	---	5.6-7.8	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	0
	24-60	10.0-30.0	---	7.4-8.4	10-30
Iosco	0-8	4.0-10.0	---	5.6-6.5	0
	8-27	2.0-10.0	---	5.1-7.8	0
	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:					
Wallace	0-8	2.0-5.0	0.4-3.0	4.5-5.5	0
	8-24	1.0-4.0	0.4-2.8	4.5-5.0	0
	24-60	1.0-2.0	---	5.1-6.5	0
Kalkaska	0-7	1.0-15.0	---	5.1-6.0	0
	7-15	4.0-15.0	---	5.1-6.0	0
	15-32	2.0-5.0	---	5.1-6.0	0
	32-60	1.0-2.0	---	5.1-6.5	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
193237:					
Thompsonville	0-5	3.0-6.0	1.0-4.0	3.5-6.0	0
	5-15	1.0-3.0	0.8-2.0	3.5-6.0	0
	15-29	2.0-4.0	1.0-3.0	3.5-6.0	0
	29-37	2.0-4.0	1.0-3.0	3.5-6.0	0
	37-55	2.0-4.0	1.0-3.0	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	2.0-6.0	2.0-4.0	3.5-6.0	0
	2-12	1.0-3.0	0.8-2.0	3.5-6.0	0
	12-15	2.0-6.0	1.0-4.0	4.5-6.0	0
	15-25	2.0-4.0	1.0-3.0	4.5-6.0	0
	25-33	1.0-3.0	0.8-3.0	4.5-6.0	0
	33-47	1.0-3.0	---	5.6-7.3	0
	47-50	5.0-15.0	---	6.6-8.4	0-30
	50-68	5.0-20.0	---	6.6-8.4	0-30
	68-80	5.0-15.0	---	6.6-8.4	0-30
193255:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
Coloma	0-3	3.0-6.0	2.0-4.0	4.5-6.5	0
	3-4	1.0-3.0	0.8-2.0	4.5-6.5	0
	4-8	1.0-3.0	0.8-2.0	4.5-6.5	0
	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	0
	25-40	1.0-3.0	0.8-2.0	4.5-6.5	0
	40-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193256:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
Coloma	0-3	3.0-6.0	2.0-4.0	4.5-6.5	0
	3-4	1.0-3.0	0.8-2.0	4.5-6.5	0
	4-8	1.0-3.0	0.8-2.0	4.5-6.5	0
	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	0
	25-40	1.0-3.0	0.8-2.0	4.5-6.5	0
	40-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193257:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
193257:					
Coloma	0-3	3.0-6.0	2.0-4.0	4.5-6.5	0
	3-4	1.0-3.0	0.8-2.0	4.5-6.5	0
	4-8	1.0-3.0	0.8-2.0	4.5-6.5	0
	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	0
	25-40	1.0-3.0	0.8-2.0	4.5-6.5	0
	40-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193258:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
Coloma	0-3	3.0-6.0	2.0-4.0	4.5-6.5	0
	3-4	1.0-3.0	0.8-2.0	4.5-6.5	0
	4-8	1.0-3.0	0.8-2.0	4.5-6.5	0
	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	0
	25-40	1.0-3.0	0.8-2.0	4.5-6.5	0
	40-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193260:					
Copemish	0-2	---	2.0-5.0	3.5-5.0	0
	2-7	---	0.8-2.0	3.5-5.0	0
	7-11	---	0.8-2.0	3.5-5.0	0
	11-28	---	0.8-3.0	3.5-5.0	0
	28-36	---	0.8-3.0	3.5-5.0	0
	36-80	---	0.8-2.0	3.5-5.0	0
193262:					
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
	9-11	2.0-6.0	1.0-4.0	4.5-6.0	0
	11-16	2.0-4.0	1.0-3.0	5.1-6.5	0
	16-21	2.0-4.0	1.0-3.0	5.1-6.5	0
	21-70	1.0-3.0	0.8-2.0	5.1-6.5	0
	70-80	1.0-3.0	0.8-2.0	5.1-6.5	0
193263:					
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
	9-11	2.0-6.0	1.0-4.0	4.5-6.0	0
	11-16	2.0-4.0	1.0-3.0	5.1-6.5	0
	16-21	2.0-4.0	1.0-3.0	5.1-6.5	0
	21-70	1.0-3.0	0.8-2.0	5.1-6.5	0
	70-80	1.0-3.0	0.8-2.0	5.1-6.5	0
193265:					
Grattan	0-4	3.0-6.0	2.0-4.0	4.5-6.5	0
	4-13	1.0-3.0	0.8-2.0	4.5-6.5	0
	13-18	2.0-4.0	1.0-3.0	4.5-6.5	0
	18-25	2.0-4.0	1.0-3.0	4.5-6.5	0
	25-53	1.0-3.0	0.8-2.0	4.5-6.5	0
	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	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	meq/100 g	pH	Pct
193266:					
Grattan	0-4	3.0-6.0	2.0-4.0	4.5-6.5	0
	4-13	1.0-3.0	0.8-2.0	4.5-6.5	0
	13-18	2.0-4.0	1.0-3.0	4.5-6.5	0
	18-25	2.0-4.0	1.0-3.0	4.5-6.5	0
	25-53	1.0-3.0	0.8-2.0	4.5-6.5	0
	53-80	1.0-3.0	0.8-2.0	5.1-7.3	0
193267:					
Grattan	0-4	3.0-6.0	2.0-4.0	4.5-6.5	0
	4-13	1.0-3.0	0.8-2.0	4.5-6.5	0
	13-18	2.0-4.0	1.0-3.0	4.5-6.5	0
	18-25	2.0-4.0	1.0-3.0	4.5-6.5	0
	25-53	1.0-3.0	0.8-2.0	4.5-6.5	0
	53-80	1.0-3.0	0.8-2.0	5.1-7.3	0
193269:					
Grattan	0-4	3.0-6.0	2.0-4.0	4.5-6.5	0
	4-13	1.0-3.0	0.8-2.0	4.5-6.5	0
	13-18	2.0-4.0	1.0-3.0	4.5-6.5	0
	18-25	2.0-4.0	1.0-3.0	4.5-6.5	0
	25-53	1.0-3.0	0.8-2.0	4.5-6.5	0
	53-80	1.0-3.0	0.8-2.0	5.1-7.3	0
193270:					
Covert	0-1	3.0-6.0	1.0-4.0	4.5-7.3	0
	1-8	1.0-3.0	0.8-2.0	4.5-7.3	0
	8-18	2.0-4.0	1.0-3.0	4.5-6.0	0
	18-25	2.0-4.0	1.0-3.0	4.5-7.3	0
	25-29	2.0-3.0	0.8-3.0	4.5-7.3	0
	29-38	1.0-3.0	0.8-2.0	5.1-8.4	0-25
	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
193271:					
Pipestone	0-2	2.0-6.0	1.0-4.0	3.5-7.3	0
	2-9	1.0-3.0	0.8-2.0	3.5-7.3	0
	9-12	2.0-6.0	1.0-4.0	3.5-6.0	0
	12-24	2.0-4.0	1.0-3.0	4.5-6.0	0
	24-32	1.0-3.0	0.8-2.0	4.5-7.3	0
	32-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193272:					
Dair	0-4	125.0-140.0	---	5.6-7.3	0
	4-7	20.0-45.0	---	6.1-7.3	0
	7-11	1.0-3.0	---	6.6-7.8	0
	11-21	1.0-3.0	---	6.6-7.8	0
	21-50	1.0-3.0	---	6.6-7.8	0
	50-80	1.0-3.0	---	6.6-7.8	0
193277:					
Benona	0-2	3.0-6.0	2.0-4.0	3.5-6.0	0
	2-6	1.0-3.0	0.8-2.0	4.5-6.0	0
	6-9	2.0-6.0	1.0-4.0	4.5-6.0	0
	9-17	2.0-5.0	1.0-3.0	4.5-5.5	0
	17-28	1.0-3.0	0.8-2.0	4.5-7.3	0
	28-46	1.0-3.0	0.8-2.0	4.5-7.3	0
	46-80	1.0-3.0	0.8-2.0	4.5-7.3	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
193278:					
Benona	0-2	3.0-6.0	2.0-4.0	3.5-6.0	0
	2-6	1.0-3.0	0.8-2.0	4.5-6.0	0
	6-9	2.0-6.0	1.0-4.0	4.5-6.0	0
	9-17	2.0-5.0	1.0-3.0	4.5-5.5	0
	17-28	1.0-3.0	0.8-2.0	4.5-7.3	0
	28-46	1.0-3.0	0.8-2.0	4.5-7.3	0
	46-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193279:					
Benona	0-2	3.0-6.0	2.0-4.0	3.5-6.0	0
	2-6	1.0-3.0	0.8-2.0	4.5-6.0	0
	6-9	2.0-6.0	1.0-4.0	4.5-6.0	0
	9-17	2.0-5.0	1.0-3.0	4.5-5.5	0
	17-28	1.0-3.0	0.8-2.0	4.5-7.3	0
	28-46	1.0-3.0	0.8-2.0	4.5-7.3	0
	46-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193284:					
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	0
193285:					
Lumley	0-3	---	140.0-180.0	3.5-4.4	0
	3-6	---	140.0-180.0	3.5-4.4	0
	6-8	125.0-200.0	---	5.1-7.3	0
	8-20	125.0-200.0	---	5.1-7.3	0
	20-45	125.0-200.0	---	5.1-7.3	0
	45-53	---	140.0-180.0	3.5-4.4	0
	53-80	---	140.0-180.0	3.5-4.4	0
Makinen	0-4	125.0-200.0	---	5.1-7.3	0
	4-14	125.0-200.0	---	5.1-7.3	0
	14-22	125.0-200.0	---	5.1-7.3	0
	22-31	---	140.0-180.0	3.5-4.4	0
	31-80	1.0-3.0	---	6.1-8.4	0-25
193286:					
Histosols	0-45	125.0-200.0	---	5.1-7.3	0
	45-80	1.0-3.0	---	4.5-7.8	0
Aquents	0-80	1.0-3.0	---	4.5-7.8	0
193287:					
Quartzipsamments	0-80	0.0-1.0	---	5.1-6.5	0
193288:					
Udipsamments	0-80	0.0-2.0	0.0-1.0	5.1-6.5	0
193342:					
Gorvan	0-4	2.5-15.0	---	6.1-7.8	0-15
	4-11	2.5-15.0	---	6.1-7.8	0-15
	11-27	2.5-15.0	---	6.6-7.8	0-15
	27-80	1.0-3.0	---	6.6-8.4	0-15
Houghton	0-12	125.0-200.0	---	4.5-7.3	0
	12-26	125.0-200.0	---	4.5-7.3	0
	26-80	125.0-200.0	---	4.5-7.3	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
193342:					
Glendora	0-6	25.0-100.0	---	5.6-7.3	0
	6-9	1.0-3.0	---	5.6-7.3	0
	9-30	1.0-3.0	---	5.6-7.3	0
	30-80	1.0-3.0	---	5.6-7.3	0
193349:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
Coloma	0-3	3.0-6.0	2.0-4.0	4.5-6.5	0
	3-4	1.0-3.0	0.8-2.0	4.5-6.5	0
	4-8	1.0-3.0	0.8-2.0	4.5-6.5	0
	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	0
	25-40	1.0-3.0	0.8-2.0	4.5-6.5	0
	40-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193351:					
Benona	0-2	3.0-6.0	2.0-4.0	3.5-6.0	0
	2-6	1.0-3.0	0.8-2.0	4.5-6.0	0
	6-9	2.0-6.0	1.0-4.0	4.5-6.0	0
	9-17	2.0-5.0	1.0-3.0	4.5-5.5	0
	17-28	1.0-3.0	0.8-2.0	4.5-7.3	0
	28-46	1.0-3.0	0.8-2.0	4.5-7.3	0
	46-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193354:					
Quartzipsamments	0-80	0.0-1.0	---	5.1-6.5	0
193357:					
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
193359:					
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
193360:					
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
193362:					
Benzonia	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0
193363:					
Benzonia	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0
193364:					
Benzonia	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0
193365:					
Benzonia	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0
193371:					
Dair	0-4	125.0-140.0	---	5.6-7.3	0
	4-7	20.0-45.0	---	6.1-7.3	0
	7-11	1.0-3.0	---	6.6-7.8	0
	11-21	1.0-3.0	---	6.6-7.8	0
	21-50	1.0-3.0	---	6.6-7.8	0
	50-80	1.0-3.0	---	6.6-7.8	0
Pipestone	0-2	2.0-6.0	1.0-4.0	3.5-7.3	0
	2-9	1.0-3.0	0.8-2.0	3.5-7.3	0
	9-12	2.0-6.0	1.0-4.0	3.5-6.0	0
	12-24	2.0-4.0	1.0-3.0	4.5-6.0	0
	24-32	1.0-3.0	0.8-2.0	4.5-7.3	0
	32-80	1.0-3.0	0.8-2.0	4.5-7.3	0
193423:					
Benona	0-2	3.0-6.0	2.0-4.0	3.5-6.0	0
	2-6	1.0-3.0	0.8-2.0	4.5-6.0	0
	6-9	2.0-6.0	1.0-4.0	4.5-6.0	0
	9-17	2.0-5.0	1.0-3.0	4.5-5.5	0
	17-28	1.0-3.0	0.8-2.0	4.5-7.3	0
	28-46	1.0-3.0	0.8-2.0	4.5-7.3	0
	46-80	1.0-3.0	0.8-2.0	4.5-7.3	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbonate
	In	meq/100 g	meq/100 g	pH	Pct
193494:					
Nordhouse	0-3	3.0-6.0	2.0-4.0	3.5-7.3	0
	3-11	1.0-3.0	0.8-2.0	3.5-7.3	0
	11-40	2.0-4.0	1.0-3.0	3.5-7.3	0
	40-60	1.0-3.0	0.8-2.0	3.5-7.3	0
	60-80	1.0-3.0	0.8-2.0	3.5-7.3	0
193496:					
Nordhouse	0-3	3.0-6.0	2.0-4.0	3.5-7.3	0
	3-11	1.0-3.0	0.8-2.0	3.5-7.3	0
	11-40	2.0-4.0	1.0-3.0	3.5-7.3	0
	40-60	1.0-3.0	0.8-2.0	3.5-7.3	0
	60-80	1.0-3.0	0.8-2.0	3.5-7.3	0
193497:					
Nordhouse	0-3	3.0-6.0	2.0-4.0	3.5-7.3	0
	3-11	1.0-3.0	0.8-2.0	3.5-7.3	0
	11-40	2.0-4.0	1.0-3.0	3.5-7.3	0
	40-60	1.0-3.0	0.8-2.0	3.5-7.3	0
	60-80	1.0-3.0	0.8-2.0	3.5-7.3	0
193498:					
Nordhouse	0-3	3.0-6.0	2.0-4.0	3.5-7.3	0
	3-11	1.0-3.0	0.8-2.0	3.5-7.3	0
	11-40	2.0-4.0	1.0-3.0	3.5-7.3	0
	40-60	1.0-3.0	0.8-2.0	3.5-7.3	0
	60-80	1.0-3.0	0.8-2.0	3.5-7.3	0
Platteriver	0-1	2.0-6.0	1.0-4.0	3.5-6.5	0
	1-3	2.0-6.0	1.0-4.0	3.5-6.5	0
	3-14	1.0-3.0	0.8-2.0	3.5-6.5	0
	14-20	1.0-3.0	0.8-2.0	3.5-6.5	0
	20-29	1.0-3.0	0.8-2.0	3.5-6.5	0
	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
	4-7	20.0-45.0	---	6.1-7.3	0
	7-11	1.0-3.0	---	6.6-7.8	0
	11-21	1.0-3.0	---	6.6-7.8	0
	21-50	1.0-3.0	---	6.6-7.8	0
	50-80	1.0-3.0	---	6.6-7.8	0
193503:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
193504:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
193505:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
193506:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
193507:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
193507:					
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
193508:					
Madaus	0-12	125.0-200.0	---	6.1-8.4	0
	12-34	2.0-10.0	---	7.4-8.4	50-90
	34-38	2.0-10.0	---	7.4-8.4	50-90
	38-62	1.0-3.0	---	7.4-8.4	10-25
	62-80	1.0-3.0	---	7.4-8.4	10-30
193509:					
Boyer	0-3	3.0-8.0	---	5.6-8.4	0
	3-4	1.0-6.0	---	5.6-8.4	0
	4-14	4.0-20.0	---	5.6-8.4	0
	14-30	4.0-20.0	---	5.6-8.4	0
	30-45	1.0-3.0	---	7.9-8.4	10-25
	45-80	1.0-3.0	---	7.9-8.4	10-25
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
193510:					
Boyer	0-3	3.0-8.0	---	5.6-8.4	0
	3-4	1.0-6.0	---	5.6-8.4	0
	4-14	4.0-20.0	---	5.6-8.4	0
	14-30	4.0-20.0	---	5.6-8.4	0
	30-45	1.0-3.0	---	7.9-8.4	10-25
	45-80	1.0-3.0	---	7.9-8.4	10-25
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
193511:					
Boyer	0-3	3.0-8.0	---	5.6-8.4	0
	3-4	1.0-6.0	---	5.6-8.4	0
	4-14	4.0-20.0	---	5.6-8.4	0
	14-30	4.0-20.0	---	5.6-8.4	0
	30-45	1.0-3.0	---	7.9-8.4	10-25
	45-80	1.0-3.0	---	7.9-8.4	10-25

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
193511:					
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
193513:					
Dair	0-4	125.0-140.0	---	5.6-7.3	0
	4-7	20.0-45.0	---	6.1-7.3	0
	7-11	1.0-3.0	---	6.6-7.8	0
	11-21	1.0-3.0	---	6.6-7.8	0
	21-50	1.0-3.0	---	6.6-7.8	0
	50-80	1.0-3.0	---	6.6-7.8	0
Adrian	0-7	125.0-200.0	---	5.1-7.3	0
	7-20	125.0-200.0	---	5.1-7.3	0
	20-35	125.0-200.0	---	5.1-7.3	0
	35-80	1.0-3.0	---	6.1-8.4	0-25
193514:					
Platteriver	0-1	2.0-6.0	1.0-4.0	3.5-6.5	0
	1-3	2.0-6.0	1.0-4.0	3.5-6.5	0
	3-14	1.0-3.0	0.8-2.0	3.5-6.5	0
	14-20	1.0-3.0	0.8-2.0	3.5-6.5	0
	20-29	1.0-3.0	0.8-2.0	3.5-6.5	0
	29-80	1.0-3.0	0.8-2.0	3.5-6.5	0
Pipestone	0-2	2.0-6.0	1.0-4.0	3.5-7.3	0
	2-9	1.0-3.0	0.8-2.0	3.5-7.3	0
	9-12	2.0-6.0	1.0-4.0	3.5-6.0	0
	12-24	2.0-4.0	1.0-3.0	4.5-6.0	0
	24-32	1.0-3.0	0.8-2.0	4.5-7.3	0
	32-80	1.0-3.0	0.8-2.0	4.5-7.3	0
202010:					
Houghton	0-12	125.0-200.0	---	5.1-7.3	0
	12-26	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	0
	7-20	125.0-200.0	---	5.1-7.3	0
	20-35	125.0-200.0	---	5.1-7.3	0
	35-80	1.0-3.0	---	6.1-8.4	0-25
202016:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
202016:					
Tekenink, sandy substratum----------	0-8	5.0-15.0	3.0-10.0	5.1-7.3	0
	8-16	5.0-10.0	0.8-3.0	5.1-7.3	0
	16-21	5.0-10.0	0.8-3.0	5.1-7.3	0
	21-49	3.0-10.0	0.8-3.0	5.1-7.3	0
	49-62	5.0-15.0	3.0-10.0	5.1-7.8	0-25
	62-72	1.0-3.0	---	7.4-8.4	10-25
	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
	2-7	1.0-3.0	0.8-2.0	4.5-6.0	0
	7-13	2.0-6.0	2.0-4.0	4.5-6.0	0
	13-21	2.0-4.0	1.0-3.0	4.5-6.0	0
	21-34	2.0-4.0	1.0-3.0	4.5-6.0	0
	34-43	3.0-10.0	---	5.6-7.3	0
	43-48	3.0-10.0	---	5.6-7.3	0
	48-55	5.0-15.0	---	5.6-7.3	0
	55-80	1.0-3.0	---	5.6-7.3	0
Benzonia-------------	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0
631171:					
Fogg-----------------	0-2	3.0-6.0	2.0-4.0	4.5-6.0	0
	2-7	1.0-3.0	0.8-2.0	4.5-6.0	0
	7-13	2.0-6.0	2.0-4.0	4.5-6.0	0
	13-21	2.0-4.0	1.0-3.0	4.5-6.0	0
	21-34	2.0-4.0	1.0-3.0	4.5-6.0	0
	34-43	3.0-10.0	---	5.6-7.3	0
	43-48	3.0-10.0	---	5.6-7.3	0
	48-55	5.0-15.0	---	5.6-7.3	0
	55-80	1.0-3.0	---	5.6-7.3	0
Benzonia-------------	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0
631172:					
Fogg-----------------	0-2	3.0-6.0	2.0-4.0	4.5-6.0	0
	2-7	1.0-3.0	0.8-2.0	4.5-6.0	0
	7-13	2.0-6.0	2.0-4.0	4.5-6.0	0
	13-21	2.0-4.0	1.0-3.0	4.5-6.0	0
	21-34	2.0-4.0	1.0-3.0	4.5-6.0	0
	34-43	3.0-10.0	---	5.6-7.3	0
	43-48	3.0-10.0	---	5.6-7.3	0
	48-55	5.0-15.0	---	5.6-7.3	0
	55-80	1.0-3.0	---	5.6-7.3	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
631172:					
Benzonia	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0
631173:					
Fogg	0-2	3.0-6.0	2.0-4.0	4.5-6.0	0
	2-7	1.0-3.0	0.8-2.0	4.5-6.0	0
	7-13	2.0-6.0	2.0-4.0	4.5-6.0	0
	13-21	2.0-4.0	1.0-3.0	4.5-6.0	0
	21-34	2.0-4.0	1.0-3.0	4.5-6.0	0
	34-43	3.0-10.0	---	5.6-7.3	0
	43-48	3.0-10.0	---	5.6-7.3	0
	48-55	5.0-15.0	---	5.6-7.3	0
	55-80	1.0-3.0	---	5.6-7.3	0
Benzonia	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0
631174:					
Fogg	0-2	3.0-6.0	2.0-4.0	4.5-6.0	0
	2-7	1.0-3.0	0.8-2.0	4.5-6.0	0
	7-13	2.0-6.0	2.0-4.0	4.5-6.0	0
	13-21	2.0-4.0	1.0-3.0	4.5-6.0	0
	21-34	2.0-4.0	1.0-3.0	4.5-6.0	0
	34-43	3.0-10.0	---	5.6-7.3	0
	43-48	3.0-10.0	---	5.6-7.3	0
	48-55	5.0-15.0	---	5.6-7.3	0
	55-80	1.0-3.0	---	5.6-7.3	0
Benzonia	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0
680939:					
Fern	0-9	3.0-6.0	---	5.6-7.3	0
	9-10	1.0-3.0	---	5.6-7.3	0
	10-24	2.0-4.0	---	5.6-7.3	0
	24-29	3.0-20.0	---	5.6-7.3	0
	29-42	4.0-20.0	---	6.1-7.8	0-20
	42-50	3.0-10.0	---	6.1-8.4	0-30
	50-80	3.0-10.0	---	6.1-8.4	0-30

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
680939:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
680943:					
Milnichol	0-2	2.0-6.0	2.0-4.0	3.5-6.0	0
	2-12	1.0-3.0	0.8-2.0	3.5-6.0	0
	12-15	2.0-6.0	1.0-4.0	4.5-6.0	0
	15-25	2.0-4.0	1.0-3.0	4.5-6.0	0
	25-33	1.0-3.0	0.8-3.0	4.5-6.0	0
	33-47	1.0-3.0	---	5.6-7.3	0
	47-50	5.0-15.0	---	6.6-8.4	0-30
	50-68	5.0-20.0	---	6.6-8.4	0-30
	68-80	5.0-15.0	---	6.6-8.4	0-30
680945:					
Fern	0-9	3.0-6.0	---	5.6-7.3	0
	9-10	1.0-3.0	---	5.6-7.3	0
	10-24	2.0-4.0	---	5.6-7.3	0
	24-29	3.0-20.0	---	5.6-7.3	0
	29-42	4.0-20.0	---	6.1-7.8	0-20
	42-50	3.0-10.0	---	6.1-8.4	0-30
	50-80	3.0-10.0	---	6.1-8.4	0-30
680946:					
Fern	0-9	3.0-6.0	---	5.6-7.3	0
	9-10	1.0-3.0	---	5.6-7.3	0
	10-24	2.0-4.0	---	5.6-7.3	0
	24-29	3.0-20.0	---	5.6-7.3	0
	29-42	4.0-20.0	---	6.1-7.8	0-20
	42-50	3.0-10.0	---	6.1-8.4	0-30
	50-80	3.0-10.0	---	6.1-8.4	0-30
680971:					
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	0
	11-15	2.0-6.0	1.0-4.0	5.1-6.0	0
	15-24	2.0-4.0	1.0-3.0	5.1-6.0	0
	24-39	2.0-4.0	1.0-3.0	5.1-6.0	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
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
	9-11	2.0-6.0	1.0-4.0	4.5-6.0	0
	11-16	2.0-4.0	1.0-3.0	5.1-6.5	0
	16-21	2.0-4.0	1.0-3.0	5.1-6.5	0
	21-70	1.0-3.0	0.8-2.0	5.1-6.5	0
	70-80	1.0-3.0	0.8-2.0	5.1-6.5	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
680972:					
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	0
	11-15	2.0-6.0	1.0-4.0	5.1-6.0	0
	15-24	2.0-4.0	1.0-3.0	5.1-6.0	0
	24-39	2.0-4.0	1.0-3.0	5.1-6.0	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
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
	9-11	2.0-6.0	1.0-4.0	4.5-6.0	0
	11-16	2.0-4.0	1.0-3.0	5.1-6.5	0
	16-21	2.0-4.0	1.0-3.0	5.1-6.5	0
	21-70	1.0-3.0	0.8-2.0	5.1-6.5	0
	70-80	1.0-3.0	0.8-2.0	5.1-6.5	0
680973:					
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	0
	11-15	2.0-6.0	1.0-4.0	5.1-6.0	0
	15-24	2.0-4.0	1.0-3.0	5.1-6.0	0
	24-39	2.0-4.0	1.0-3.0	5.1-6.0	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
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
	9-11	2.0-6.0	1.0-4.0	4.5-6.0	0
	11-16	2.0-4.0	1.0-3.0	5.1-6.5	0
	16-21	2.0-4.0	1.0-3.0	5.1-6.5	0
	21-70	1.0-3.0	0.8-2.0	5.1-6.5	0
	70-80	1.0-3.0	0.8-2.0	5.1-6.5	0
680974:					
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	0
	11-15	2.0-6.0	1.0-4.0	5.1-6.0	0
	15-24	2.0-4.0	1.0-3.0	5.1-6.0	0
	24-39	2.0-4.0	1.0-3.0	5.1-6.0	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
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
	9-11	2.0-6.0	1.0-4.0	4.5-6.0	0
	11-16	2.0-4.0	1.0-3.0	5.1-6.5	0
	16-21	2.0-4.0	1.0-3.0	5.1-6.5	0
	21-70	1.0-3.0	0.8-2.0	5.1-6.5	0
	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	---	5.6-8.4	0
	4-14	4.0-20.0	---	5.6-8.4	0
	14-30	4.0-20.0	---	5.6-8.4	0
	30-45	1.0-3.0	---	7.9-8.4	10-25
	45-80	1.0-3.0	---	7.9-8.4	10-25

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
893251:					
Shavenaugh	0-5	3.0-6.0	---	5.6-7.3	0
	5-8	1.0-3.0	0.8-2.0	5.1-7.3	0
	8-16	1.0-3.0	---	6.6-7.8	0
	16-28	1.0-3.0	---	6.6-7.8	0
	28-34	1.0-3.0	---	6.6-7.8	0
	34-44	1.0-3.0	---	6.6-7.8	0
	44-80	1.0-3.0	---	7.4-8.4	10-25
894062:					
Remus	0-9	5.0-15.0	3.0-10.0	5.1-7.3	0
	9-15	5.0-15.0	3.0-10.0	5.1-7.3	0
	15-24	1.0-15.0	3.0-10.0	5.1-7.3	0
	24-35	1.0-15.0	3.0-10.0	5.1-7.3	0
	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
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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
894063:					
Remus	0-9	5.0-15.0	3.0-10.0	5.1-7.3	0
	9-15	5.0-15.0	3.0-10.0	5.1-7.3	0
	15-24	1.0-15.0	3.0-10.0	5.1-7.3	0
	24-35	1.0-15.0	3.0-10.0	5.1-7.3	0
	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
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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	0-9	3.0-6.0	---	5.6-7.3	0
	9-10	1.0-3.0	---	5.6-7.3	0
	10-24	2.0-4.0	---	5.6-7.3	0
	24-29	3.0-20.0	---	5.6-7.3	0
	29-42	4.0-20.0	---	6.1-7.8	0-20
	42-50	3.0-10.0	---	6.1-8.4	0-30
	50-80	3.0-10.0	---	6.1-8.4	0-30
Remus	0-9	5.0-15.0	3.0-10.0	5.1-7.3	0
	9-15	5.0-15.0	3.0-10.0	5.1-7.3	0
	15-24	1.0-15.0	3.0-10.0	5.1-7.3	0
	24-35	1.0-15.0	3.0-10.0	5.1-7.3	0
	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

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
894065:					
Fern	0-9	3.0-6.0	---	5.6-7.3	0
	9-10	1.0-3.0	---	5.6-7.3	0
	10-24	2.0-4.0	---	5.6-7.3	0
	24-29	3.0-20.0	---	5.6-7.3	0
	29-42	4.0-20.0	---	6.1-7.8	0-20
	42-50	3.0-10.0	---	6.1-8.4	0-30
	50-80	3.0-10.0	---	6.1-8.4	0-30
Remus	0-9	5.0-15.0	3.0-10.0	5.1-7.3	0
	9-15	5.0-15.0	3.0-10.0	5.1-7.3	0
	15-24	1.0-15.0	3.0-10.0	5.1-7.3	0
	24-35	1.0-15.0	3.0-10.0	5.1-7.3	0
	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
894104:					
Mollineaux	0-6	3.0-6.0	---	5.6-7.3	0
	6-9	1.0-3.0	---	5.6-7.3	0
	9-15	2.0-4.0	---	5.6-6.0	0
	15-27	2.0-4.0	---	5.6-6.5	0
	27-38	1.0-3.0	---	5.6-7.3	0
	38-64	5.0-20.0	---	5.6-7.3	0
	64-80	1.0-3.0	---	5.6-7.3	0
894104:					
Remus	0-9	5.0-15.0	3.0-10.0	5.1-7.3	0
	9-15	5.0-15.0	3.0-10.0	5.1-7.3	0
	15-24	1.0-15.0	3.0-10.0	5.1-7.3	0
	24-35	1.0-15.0	3.0-10.0	5.1-7.3	0
	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
894105:					
Mollineaux	0-6	3.0-6.0	---	5.6-7.3	0
	6-9	1.0-3.0	---	5.6-7.3	0
	9-15	2.0-4.0	---	5.6-6.0	0
	15-27	2.0-4.0	---	5.6-6.5	0
	27-38	1.0-3.0	---	5.6-7.3	0
	38-64	5.0-20.0	---	5.6-7.3	0
	64-80	1.0-3.0	---	5.6-7.3	0
Remus	0-9	5.0-15.0	3.0-10.0	5.1-7.3	0
	9-15	5.0-15.0	3.0-10.0	5.1-7.3	0
	15-24	1.0-15.0	3.0-10.0	5.1-7.3	0
	24-35	1.0-15.0	3.0-10.0	5.1-7.3	0
	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
894165:					
Spinks	0-5	3.0-6.0	1.0-4.0	5.1-7.3	0
	5-10	1.0-3.0	0.8-2.0	5.1-7.3	0
	10-17	1.0-3.0	0.8-2.0	5.1-7.3	0
	17-62	1.0-3.0	0.8-2.0	5.1-7.3	0
	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

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
894165:					
Tekenink, sandy substratum	0-8	5.0-15.0	3.0-10.0	5.1-7.3	0
	8-16	5.0-10.0	0.8-3.0	5.1-7.3	0
	16-21	5.0-10.0	0.8-3.0	5.1-7.3	0
	21-49	3.0-10.0	0.8-3.0	5.1-7.3	0
	49-62	5.0-15.0	3.0-10.0	5.1-7.8	0-25
	62-72	1.0-3.0	---	7.4-8.4	10-25
	72-80	1.0-3.0	---	7.4-8.4	10-25
899682:					
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
	9-11	2.0-6.0	1.0-4.0	4.5-6.0	0
	11-16	2.0-4.0	1.0-3.0	5.1-6.5	0
	16-21	2.0-4.0	1.0-3.0	5.1-6.5	0
	21-70	1.0-3.0	0.8-2.0	5.1-6.5	0
	70-80	1.0-3.0	0.8-2.0	5.1-6.5	0
899722:					
Goodharbor	0-1	3.0-6.0	2.0-4.0	5.1-7.3	0
	1-3	1.0-3.0	0.8-2.0	5.1-7.3	0
	3-23	1.0-3.0	---	7.4-8.4	10-25
	23-40	1.0-3.0	---	7.4-8.4	10-25
	40-80	1.0-3.0	---	7.4-8.4	10-25
899731:					
Covert	0-1	3.0-6.0	1.0-4.0	4.5-7.3	0
	1-8	1.0-3.0	0.8-2.0	4.5-7.3	0
	8-18	2.0-4.0	1.0-3.0	4.5-6.0	0
	18-25	2.0-4.0	1.0-3.0	4.5-7.3	0
	25-29	2.0-3.0	0.8-3.0	4.5-7.3	0
	29-38	1.0-3.0	0.8-2.0	5.1-8.4	0-25
	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	0
	2-9	1.0-3.0	0.8-2.0	3.5-7.3	0
	9-12	2.0-6.0	1.0-4.0	3.5-6.0	0
	12-24	2.0-4.0	1.0-3.0	4.5-6.0	0
	24-32	1.0-3.0	0.8-2.0	4.5-7.3	0
	32-80	1.0-3.0	0.8-2.0	4.5-7.3	0
899733:					
Covert	0-1	3.0-6.0	1.0-4.0	4.5-7.3	0
	1-8	1.0-3.0	0.8-2.0	4.5-7.3	0
	8-18	2.0-4.0	1.0-3.0	4.5-6.0	0
	18-25	2.0-4.0	1.0-3.0	4.5-7.3	0
	25-29	2.0-3.0	0.8-3.0	4.5-7.3	0
	29-38	1.0-3.0	0.8-2.0	5.1-8.4	0-25
	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
Dair	0-4	125.0-140.0	---	5.6-7.3	0
	4-7	20.0-45.0	---	6.1-7.3	0
	7-11	1.0-3.0	---	6.6-7.8	0
	11-21	1.0-3.0	---	6.6-7.8	0
	21-50	1.0-3.0	---	6.6-7.8	0
	50-80	1.0-3.0	---	6.6-7.8	0

Table 18.—Chemical Soil Properties—Continued

Map unit symbol and soil name	Depth	Cation-exchange capacity	Effective cation-exchange capacity	Soil reaction	Calcium carbon-ate
	In	meq/100 g	meq/100 g	pH	Pct
899734:					
Benzonia	0-5	---	2.0-4.0	4.5-5.5	0
	5-11	---	0.8-2.0	4.5-5.5	0
	11-15	---	2.0-4.0	5.1-5.5	0
	15-20	---	2.0-4.0	5.1-5.5	0
	20-27	2.0-4.0	1.0-3.0	5.1-6.0	0
	27-35	2.0-4.0	1.0-3.0	5.1-6.0	0
	35-80	1.0-3.0	---	5.6-6.0	0

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)

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190775:									
Adrian	A/D								
		January	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
Houghton	A/D								
		January	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		September	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
190777:									
Alcona	B								
		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
Richter	B								
		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
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190778:									
Alcona	B								
		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
Richter	B								
		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
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None
190779:									
Alpena	A								
		Jan-Dec	---	---	---	---	None	---	None
190780:									
Au Gres	B								
		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
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None
Kalkaska	A								
		Jan-Dec	---	---	---	---	None	---	None
190781:									
Bach	B/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190782:									
Deer Park	A								
		Jan-Dec	---	---	---	---	None	---	None
190783:									
Deer Park	A								
		Jan-Dec	---	---	---	---	None	---	None
190784:									
Deer Park	A								
		Jan-Dec	---	---	---	---	None	---	None
Roscommon	A/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		September	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
190786.									
Dune land									
190787:									
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190788:									
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190789:									
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190790:									
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190791:									
Eastport	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190792:									
Edwards	A/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		February	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		March	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		April	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		July	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		August	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		September	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		December	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
Marl beds	D								
		January	0.0	>6.0	0.0-1.0	Very long	---	---	None
		February	0.0	>6.0	0.0-1.0	Very long	---	---	None
		March	0.0	>6.0	0.0-1.0	Very long	---	---	None
		April	0.0	>6.0	0.0-1.0	Very long	---	---	None
		May	0.0	>6.0	0.0-1.0	Very long	---	---	None
		June	0.0	>6.0	0.0-1.0	Very long	---	---	None
		July	0.0	>6.0	0.0-1.0	Very long	---	---	None
		August	0.0	>6.0	0.0-1.0	Very long	---	---	None
		September	0.0	>6.0	0.0-1.0	Very long	---	---	None
		October	0.0	>6.0	0.0-1.0	Very long	---	---	None
		November	0.0	>6.0	0.0-1.0	Very long	---	---	None
		December	0.0	>6.0	0.0-1.0	Very long	---	---	None
190794:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None
190795:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190796:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None
190797:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None
190799:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None
190801:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
190803:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
190805:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Omena	B								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
190806:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Omena	B								
		Jan-Dec	---	---	---	---	None	---	None
190807:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Omena	B								
		Jan-Dec	---	---	---	---	None	---	None
190808:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Omena	B								
		Jan-Dec	---	---	---	---	None	---	None
190809:									
Emmet	B								
		Jan-Dec	---	---	---	---	None	---	None
Omena	B								
		Jan-Dec	---	---	---	---	None	---	None
190811:									
Hettinger	C/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
Muck	A/D								
		January	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190812:									
Hettinger	C/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
Tonkey	B/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
190814:									
Kalkaska	A								
		Jan-Dec	---	---	---	---	None	---	None
190815:									
Kalkaska	A								
		Jan-Dec	---	---	---	---	None	---	None
190816:									
Kalkaska	A								
		Jan-Dec	---	---	---	---	None	---	None
190817:									
Kalkaska	A								
		Jan-Dec	---	---	---	---	None	---	None
190818:									
Kalkaska	A								
		Jan-Dec	---	---	---	---	None	---	None
190819:									
Kalkaska	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190820:									
Kiva	A								
		Jan-Dec	---	---	---	---	None	---	None
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
190821:									
Kiva	A								
		Jan-Dec	---	---	---	---	None	---	None
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
190823:									
Kiva	A								
		Jan-Dec	---	---	---	---	None	---	None
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
190824. Lake beaches									
190825. Lake bluffs									
190826:									
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190827:									
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190828:									
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190829:									
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190830:									
Leelanau	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190831:									
Lupton	A/D								
		January	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		September	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
Markey	A/D								
		January	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
190832:									
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
190833:									
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190834:									
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190835:									
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190836:									
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190837:									
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190838:									
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
East Lake	A								
		Jan-Dec	---	---	---	---	None	---	None
190839:									
Mancelona	A								
		Jan-Dec	---	---	---	---	None	---	None
Richter	B								
		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
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190840:									
Nester	C								
		Jan-Dec	---	---	---	---	None	---	None
190841:									
Nester	C								
		Jan-Dec	---	---	---	---	None	---	None
190842:									
Nester	C								
		Jan-Dec	---	---	---	---	None	---	None
190843:									
Nester	C								
		Jan-Dec	---	---	---	---	None	---	None
190844:									
Nester	C								
		Jan-Dec	---	---	---	---	None	---	None
190846.									
Pits, gravel									
190847:									
Richter	B								
		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
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None
Alcona	B								
		Jan-Dec	---	---	---	---	None	---	None
190848:									
Richter	B								
		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
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190848:									
Alcona	B								
		Jan-Dec	---	---	---	---	None	---	None
190849:									
Roscommon	A/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		September	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
Markey	A/D								
		January	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
190850:									
Sanilac	C								
		January	1.2	---	---	---	None	Brief	Occasional
		February	1.2	>6.0	---	---	None	Brief	Occasional
		March	1.2	>6.0	---	---	None	Brief	Occasional
		April	1.2	>6.0	---	---	None	Brief	Occasional
		December	1.2	>6.0	---	---	None	Brief	Occasional
190851:									
Tonkey	B/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190851:									
Munuscong	B/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
Iosco	B								
		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
		June	1.0	>6.0	---	---	None	---	None
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None
190852:									
Tonkey	B/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
Munuscong	B/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
190852:									
Iosco	B								
		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
		June	1.0	>6.0	---	---	None	---	None
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None
190853.									
Water									
190854:									
Wallace	B								
		Jan-Dec	---	---	---	---	None	---	None
Kalkaska	A								
		Jan-Dec	---	---	---	---	None	---	None
190855:									
Wind eroded land	A								
		Jan-Dec	---	---	---	---	None	---	None
190856:									
Wind eroded land	A								
		Jan-Dec	---	---	---	---	None	---	None
193236.									
Beaches									
193237:									
Thompsonville	A								
		January	3.0	>6.0	---	---	None	---	None
		February	2.5	>6.0	---	---	None	---	None
		March	2.0	>6.0	---	---	None	---	None
		April	1.5	>6.0	---	---	None	---	None
		May	3.0	>6.0	---	---	None	---	None
		June	4.0	>6.0	---	---	None	---	None
		July	4.5	>6.0	---	---	None	---	None
		August	5.0	>6.0	---	---	None	---	None
		September	4.0	>6.0	---	---	None	---	None
		October	2.5	>6.0	---	---	None	---	None
		November	2.5	>6.0	---	---	None	---	None
		December	3.0	>6.0	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193237:									
Milnichol	B								
		January	1.5	>6.0	---	---	None	---	None
		February	1.5	>6.0	---	---	None	---	None
		March	1.0	>6.0	---	---	None	---	None
		April	1.0	>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	2.5	>6.0	---	---	None	---	None
		October	2.0	>6.0	---	---	None	---	None
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None
193255:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Coloma	A								
		Jan-Dec	---	---	---	---	None	---	None
193256:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Coloma	A								
		Jan-Dec	---	---	---	---	None	---	None
193257:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Coloma	A								
		Jan-Dec	---	---	---	---	None	---	None
193258:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Coloma	A								
		Jan-Dec	---	---	---	---	None	---	None
193260:									
Copemish	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193262:									
Kaleva	A								
		Jan-Dec	---	---	---	---	None	---	None
193263:									
Kaleva	A								
		Jan-Dec	---	---	---	---	None	---	None
193265:									
Grattan	A								
		Jan-Dec	---	---	---	---	None	---	None
193266:									
Grattan	A								
		Jan-Dec	---	---	---	---	None	---	None
193267:									
Grattan	A								
		Jan-Dec	---	---	---	---	None	---	None
193269:									
Grattan	A								
		Jan-Dec	---	---	---	---	None	---	None
193270:									
Covert	A								
		January	3.0	>6.0	---	---	None	---	None
		February	2.5	>6.0	---	---	None	---	None
		March	2.5	>6.0	---	---	None	---	None
		April	2.5	>6.0	---	---	None	---	None
		May	2.0	>6.0	---	---	None	---	None
		June	4.0	>6.0	---	---	None	---	None
		July	4.5	>6.0	---	---	None	---	None
		August	5.0	>6.0	---	---	None	---	None
		September	4.0	>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

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193271:									
Pipestone	B								
		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	3.0	>6.0	---	---	None	---	None
		October	2.5	>6.0	---	---	None	---	None
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None
193272:									
Dair	A/D								
		January	0.0	>6.0	---	---	None	---	None
		February	0.0	>6.0	---	---	None	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	---	---	None	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	---	---	None	---	None
193277:									
Benona	A								
		Jan-Dec	---	---	---	---	None	---	None
193278:									
Benona	A								
		Jan-Dec	---	---	---	---	None	---	None
193279:									
Benona	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193284:									
Udorthents	B								
		Jan-Dec	---	---	---	---	None	---	None
Udipsamments	A								
		Jan-Dec	---	---	---	---	None	---	None
193285:									
Lumley	A/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	0.5	>6.0	---	---	None	---	None
		September	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
Makinen	A/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	0.5	>6.0	---	---	None	---	None
		September	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro- logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193286:									
Histosols	D								
		January	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		July	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		August	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		September	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
Aquents	D								
		January	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		July	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		August	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		September	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		October	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Very long	Frequent	---	None
193287:									
Dune land.									
Quartzipsamments	A								
		Jan-Dec	---	---	---	---	None	---	None
193288:									
Udipsamments	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193342:									
Gorvan	B/D								
		January	0.0	>6.0	---	---	None	Brief	Occasional
		February	0.0	>6.0	---	---	None	Brief	Occasional
		March	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		April	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		May	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Occasional
		November	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Occasional
		December	0.0	>6.0	---	---	None	---	None
Houghton	B/D								
		January	0.0	>6.0	---	---	None	Brief	Occasional
		February	0.0	>6.0	---	---	None	Brief	Occasional
		March	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		April	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		May	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Frequent
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Occasional
		November	0.0	>6.0	0.0-1.0	Long	Frequent	Long	Occasional
		December	0.0	>6.0	---	---	None	---	None
Glendora	A/D								
		January	0.0	>6.0	---	---	None	Brief	Occasional
		February	0.0	>6.0	---	---	None	Brief	Occasional
		March	0.0	>6.0	0.0-0.5	Long	Frequent	Long	Frequent
		April	0.0	>6.0	0.0-0.5	Long	Frequent	Long	Frequent
		May	0.0	>6.0	0.0-0.5	Long	Frequent	Long	Frequent
		June	0.0	>6.0	0.0-0.5	Long	Frequent	---	None
		July	1.0	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-0.5	Long	Frequent	Brief	Occasional
		November	0.0	>6.0	0.0-0.5	Long	Frequent	Brief	Occasional
		December	0.0	>6.0	---	---	None	Brief	Occasional

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193349:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Coloma	A								
		Jan-Dec	---	---	---	---	None	---	None
193351:									
Benona	A								
		Jan-Dec	---	---	---	---	None	---	None
193354:									
Dune land.									
Quartzipsamments	A								
		Jan-Dec	---	---	---	---	None	---	None
193357:									
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193359:									
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193360:									
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193362:									
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None
193363:									
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None
193364:									
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None
193365:									
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193371:									
Dair	A/D								
		January	0.0	>6.0	---	---	None	---	None
		February	0.0	>6.0	---	---	None	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	---	---	None	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	---	---	None	---	None
Pipestone	B								
		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	3.0	>6.0	---	---	None	---	None
		October	2.5	>6.0	---	---	None	---	None
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None
193372. Access Denied									
193423:									
Benona	A								
		Jan-Dec	---	---	---	---	None	---	None
193484. Pits, sand and gravel									
193494:									
Nordhouse	A								
		Jan-Dec	---	---	---	---	None	---	None
193496:									
Nordhouse	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193497:									
Nordhouse	A								
		Jan-Dec	---	---	---	---	None	---	None
193498:									
Nordhouse	A								
		Jan-Dec	---	---	---	---	None	---	None
Platteriver	A								
		January	3.0	>6.0	---	---	None	---	None
		February	2.5	>6.0	---	---	None	---	None
		March	2.0	>6.0	---	---	None	---	None
		April	1.5	>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	4.5	>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
Dair	A/D								
		January	0.0	>6.0	---	---	None	---	None
		February	0.0	>6.0	---	---	None	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	---	---	None	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	---	---	None	---	None
193503:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193504:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193505:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193506:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193507:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193508:									
Madaus	B/D								
		January	0.0	>6.0	---	---	None	---	None
		February	0.0	>6.0	---	---	None	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	---	---	None	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193509:									
Boyer	B								
		Jan-Dec	---	---	---	---	None	---	None
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193510:									
Boyer	B								
		Jan-Dec	---	---	---	---	None	---	None
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193511:									
Boyer	B								
		Jan-Dec	---	---	---	---	None	---	None
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
193513:									
Dair	A/D								
		January	0.0	>6.0	---	---	None	---	None
		February	0.0	>6.0	---	---	None	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	---	---	None	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
193513:									
Adrian	A/D								
		January	0.0	>6.0	---	---	None	---	None
		February	0.0	>6.0	---	---	None	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.5	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	---	---	None	---	None
193514:									
Platteriver	A								
		January	3.0	>6.0	---	---	None	---	None
		February	2.5	>6.0	---	---	None	---	None
		March	2.0	>6.0	---	---	None	---	None
		April	1.5	>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	4.5	>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
Pipestone	B								
		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	3.0	>6.0	---	---	None	---	None
		October	2.5	>6.0	---	---	None	---	None
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
202010:									
Houghton	B/D								
		January	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		February	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
Adrian	A/D								
		January	0.0	>6.0	---	---	None	---	None
		February	0.0	>6.0	---	---	None	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.5	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	---	---	None	---	None
202016:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Tekenink, sandy substratum	B								
		Jan-Dec	---	---	---	---	None	---	None
631170:									
Fogg	A								
		Jan-Dec	---	---	---	---	None	---	None
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
631171:									
Fogg	A								
		Jan-Dec	---	---	---	---	None	---	None
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None
631172:									
Fogg	A								
		Jan-Dec	---	---	---	---	None	---	None
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None
631173:									
Fogg	A								
		Jan-Dec	---	---	---	---	None	---	None
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None
631174:									
Fogg	A								
		Jan-Dec	---	---	---	---	None	---	None
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None
680939:									
Fern	B								
		February	3.0	>6.0	---	---	None	---	None
		March	2.5	>6.0	---	---	None	---	None
		April	2.5	>6.0	---	---	None	---	None
		May	2.0	>6.0	---	---	None	---	None
		June	4.0	>6.0	---	---	None	---	None
		September	4.0	>6.0	---	---	None	---	None
		October	3.0	>6.0	---	---	None	---	None
		November	2.5	>6.0	---	---	None	---	None
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
680943:									
Milnichol	B								
		January	1.5	>6.0	---	---	None	---	None
		February	1.5	>6.0	---	---	None	---	None
		March	1.0	>6.0	---	---	None	---	None
		April	1.0	>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	2.5	>6.0	---	---	None	---	None
		October	2.0	>6.0	---	---	None	---	None
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None
680945:									
Fern	B								
		February	3.0	>6.0	---	---	None	---	None
		March	2.5	>6.0	---	---	None	---	None
		April	2.5	>6.0	---	---	None	---	None
		May	2.0	>6.0	---	---	None	---	None
		June	4.0	>6.0	---	---	None	---	None
		September	4.0	>6.0	---	---	None	---	None
		October	3.0	>6.0	---	---	None	---	None
		November	2.5	>6.0	---	---	None	---	None
680946:									
Fern	B								
		February	3.0	>6.0	---	---	None	---	None
		March	2.5	>6.0	---	---	None	---	None
		April	2.5	>6.0	---	---	None	---	None
		May	2.0	>6.0	---	---	None	---	None
		June	4.0	>6.0	---	---	None	---	None
		September	4.0	>6.0	---	---	None	---	None
		October	3.0	>6.0	---	---	None	---	None
		November	2.5	>6.0	---	---	None	---	None
680971:									
Nessen	A								
		Jan-Dec	---	---	---	---	None	---	None
Kaleva	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table		Ponding			Flooding	
			Upper limit	Lower limit	Surface water depth	Duration	Frequency	Duration	Frequency
			Ft	Ft	Ft				
680972:									
Nessen	A								
		Jan-Dec	---	---	---	---	None	---	None
Kaleva	A								
		Jan-Dec	---	---	---	---	None	---	None
680973:									
Nessen	A								
		Jan-Dec	---	---	---	---	None	---	None
Kaleva	A								
		Jan-Dec	---	---	---	---	None	---	None
680974:									
Nessen	A								
		Jan-Dec	---	---	---	---	None	---	None
Kaleva	A								
		Jan-Dec	---	---	---	---	None	---	None
893251:									
Boyer	B								
		Jan-Dec	---	---	---	---	None	---	None
Shavenaugh	A								
		Jan-Dec	---	---	---	---	None	---	None
894062:									
Remus	B								
		Jan-Dec	---	---	---	---	None	---	None
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
894063:									
Remus	B								
		Jan-Dec	---	---	---	---	None	---	None
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
894064:									
Fern	B								
		February	3.0	>6.0	---	---	None	---	None
		March	2.5	>6.0	---	---	None	---	None
		April	2.5	>6.0	---	---	None	---	None
		May	2.0	>6.0	---	---	None	---	None
		June	4.0	>6.0	---	---	None	---	None
		September	4.0	>6.0	---	---	None	---	None
		October	3.0	>6.0	---	---	None	---	None
		November	2.5	>6.0	---	---	None	---	None
Remus	B								
		Jan-Dec	---	---	---	---	None	---	None
894065:									
Fern	B								
		February	3.0	>6.0	---	---	None	---	None
		March	2.5	>6.0	---	---	None	---	None
		April	2.5	>6.0	---	---	None	---	None
		May	2.0	>6.0	---	---	None	---	None
		June	4.0	>6.0	---	---	None	---	None
		September	4.0	>6.0	---	---	None	---	None
		October	3.0	>6.0	---	---	None	---	None
		November	2.5	>6.0	---	---	None	---	None
Remus	B								
		Jan-Dec	---	---	---	---	None	---	None
894104:									
Mollineaux	A								
		Jan-Dec	---	---	---	---	None	---	None
Remus	B								
		Jan-Dec	---	---	---	---	None	---	None
894105:									
Mollineaux	A								
		Jan-Dec	---	---	---	---	None	---	None
Remus	B								
		Jan-Dec	---	---	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydro-logic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
894165:									
Spinks	A								
		Jan-Dec	---	---	---	---	None	---	None
Tekenink, sandy substratum	B								
		Jan-Dec	---	---	---	---	None	---	None
899682:									
Kaleva	A								
		Jan-Dec	---	---	---	---	None	---	None
899722:									
Goodharbor	A								
		Jan-Dec	---	---	---	---	None	---	None
899731:									
Covert	A								
		January	3.0	>6.0	---	---	None	---	None
		February	2.5	>6.0	---	---	None	---	None
		March	2.5	>6.0	---	---	None	---	None
		April	2.5	>6.0	---	---	None	---	None
		May	2.0	>6.0	---	---	None	---	None
		June	4.0	>6.0	---	---	None	---	None
		July	4.5	>6.0	---	---	None	---	None
		August	5.0	>6.0	---	---	None	---	None
		September	4.0	>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
Pipestone	B								
		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	3.0	>6.0	---	---	None	---	None
		October	2.5	>6.0	---	---	None	---	None
		November	1.0	>6.0	---	---	None	---	None
		December	1.0	>6.0	---	---	None	---	None

Table 19.—Water Features—Continued

Map unit symbol and soil name	Hydrologic group	Months	Water table: Upper limit	Water table: Lower limit	Ponding: Surface water depth	Ponding: Duration	Ponding: Frequency	Flooding: Duration	Flooding: Frequency
			Ft	Ft	Ft				
899733:									
Covert	A								
		January	3.0	>6.0	---	---	None	---	None
		February	2.5	>6.0	---	---	None	---	None
		March	2.5	>6.0	---	---	None	---	None
		April	2.5	>6.0	---	---	None	---	None
		May	2.0	>6.0	---	---	None	---	None
		June	4.0	>6.0	---	---	None	---	None
		July	4.5	>6.0	---	---	None	---	None
		August	5.0	>6.0	---	---	None	---	None
		September	4.0	>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
Dair	A/D								
		January	0.0	>6.0	---	---	None	---	None
		February	0.0	>6.0	---	---	None	---	None
		March	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		April	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		May	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		June	0.0	>6.0	---	---	None	---	None
		July	0.5	>6.0	---	---	None	---	None
		August	1.0	>6.0	---	---	None	---	None
		September	0.0	>6.0	---	---	None	---	None
		October	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		November	0.0	>6.0	0.0-1.0	Long	Frequent	---	None
		December	0.0	>6.0	---	---	None	---	None
899734:									
Benzonia	A								
		Jan-Dec	---	---	---	---	None	---	None

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 and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
190775:							
Adrian	---	---	---	---	High	High	Moderate
Houghton	---	---	---	---	High	High	Low
190777:							
Alcona	---	---	---	---	Moderate	Moderate	Low
Richter	---	---	---	---	High	High	Moderate
190778:							
Alcona	---	---	---	---	Moderate	Moderate	Low
Richter	---	---	---	---	High	High	Moderate
190779:							
Alpena	---	---	---	---	Low	Low	Low
190780:							
Au Gres	---	---	---	---	Moderate	Low	Moderate
Kalkaska	---	---	---	---	Low	Low	High
190781:							
Bach	---	---	---	---	High	High	Low
190782:							
Deer Park	---	---	---	---	Low	Low	Low
190783:							
Deer Park	---	---	---	---	Low	Low	Low
190784:							
Deer Park	---	---	---	---	Low	Low	Low
Roscommon	---	---	---	---	Moderate	High	Low
190786:							
Dune land							
190787:							
East Lake	---	---	---	---	Low	Low	Moderate
190788:							
East Lake	---	---	---	---	Low	Low	Moderate

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
190789:							
East Lake	---	---	---	---	Low	Low	Moderate
190790:							
East Lake	---	---	---	---	Low	Low	Moderate
190791:							
Eastport	---	---	---	---	Low	Low	Moderate
190792:							
Edwards	---	---	---	---	High	High	Low
Marl beds	---	---	---	---	High	High	Low
190794:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Leelanau	---	---	---	---	Low	Low	Low
190795:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Leelanau	---	---	---	---	Low	Low	Low
190796:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Leelanau	---	---	---	---	Low	Low	Low
190797:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Leelanau	---	---	---	---	Low	Low	Low
190799:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Leelanau	---	---	---	---	Low	Low	Low
190801:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Mancelona	---	---	---	---	Low	Low	Low
190803:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Mancelona	---	---	---	---	Low	Low	Low

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top (In)	Restrictive layer: Thickness (In)	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
190805:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Omena	---	---	---	---	Moderate	Low	Low
190806:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Omena	---	---	---	---	Moderate	Low	Low
190807:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Omena	---	---	---	---	Moderate	Low	Low
190808:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Omena	---	---	---	---	Moderate	Low	Low
190809:							
Emmet	---	---	---	---	Moderate	Low	Moderate
Omena	---	---	---	---	Moderate	Low	Low
190811:							
Hettinger	---	---	---	---	High	High	Low
Muck	---	---	---	---	High	High	Low
190812:							
Hettinger	---	---	---	---	High	High	Low
Tonkey	---	---	---	---	High	High	Low
190814:							
Kalkaska	---	---	---	---	Low	Low	High
190815:							
Kalkaska	---	---	---	---	Low	Low	High
190816:							
Kalkaska	---	---	---	---	Low	Low	High
190817:							
Kalkaska	---	---	---	---	Low	Low	High

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
190818:							
Kalkaska	---	---	---	---	Low	Low	High
190819:							
Kalkaska	---	---	---	---	Low	Low	High
East Lake	---	---	---	---	Low	Low	Moderate
190820:							
Kiva	---	---	---	---	Low	Low	Low
Mancelona	---	---	---	---	Low	Low	Low
190821:							
Kiva	---	---	---	---	Low	Low	Low
Mancelona	---	---	---	---	Low	Low	Low
190823:							
Kiva	---	---	---	---	Low	Low	Low
Mancelona	---	---	---	---	Low	Low	Low
190824. Lake beaches							
190825. Lake bluffs							
190826:							
Leelanau	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate
190827:							
Leelanau	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate
190828:							
Leelanau	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate
190829:							
Leelanau	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
190830:							
Leelanau	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate
190831:							
Lupton	---	---	---	---	High	High	Low
Markey	---	---	---	---	High	High	Low
190832:							
Mancelona	---	---	---	---	Low	Low	Low
190833:							
Mancelona	---	---	---	---	Low	Low	Low
190834:							
Mancelona	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate
190835:							
Mancelona	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate
190836:							
Mancelona	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate
190837:							
Mancelona	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate
190838:							
Mancelona	---	---	---	---	Low	Low	Low
East Lake	---	---	---	---	Low	Low	Moderate
190839:							
Mancelona	---	---	---	---	Low	Low	Low
Richter	---	---	---	---	High	High	Moderate
190840:							
Nester	---	---	---	---	Moderate	High	Low

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer				Potential for frost action	Risk of corrosion	
	Kind	Depth to top	Thickness	Hardness		Uncoated steel	Concrete
		In	In				
190841:							
Nester	---	---	---	---	Moderate	High	Low
190842:							
Nester	---	---	---	---	Moderate	High	Low
190843:							
Nester	---	---	---	---	Moderate	High	Low
190844:							
Nester	---	---	---	---	Moderate	High	Low
190846.							
Pits, gravel							
190847:							
Richter	---	---	---	---	High	High	Moderate
Alcona	---	---	---	---	Moderate	Low	Low
190848:							
Richter	---	---	---	---	High	High	Moderate
Alcona	---	---	---	---	Moderate	Low	Low
190849:							
Roscommon	---	---	---	---	Moderate	High	Low
Markey	---	---	---	---	High	High	Low
190850:							
Sanilac	---	---	---	---	High	High	Low
190851:							
Tonkey	---	---	---	---	High	High	Low
Munuscong	---	---	---	---	High	High	Low
Iosco	---	---	---	---	Moderate	High	Low
190852:							
Tonkey	---	---	---	---	High	High	Low
Munuscong	---	---	---	---	High	High	Low
Iosco	---	---	---	---	Moderate	High	Low

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
190853. Water							
190854:							
Wallace	Ortstein	8	---	Strongly cemented	Low	Low	High
Kalkaska	---	---	---	---	Low	Low	High
190855:							
Wind eroded land	---	---	---	---	Low	Low	Moderate
190856:							
Wind eroded land	---	---	---	---	Low	Low	Moderate
193236. Beaches							
193237:							
Thompsonville	---	---	---	---	Low	Low	Moderate
Milnichol	---	---	---	---	Moderate	Low	Moderate
193255:							
Spinks	---	---	---	---	Low	Low	Low
Coloma	---	---	---	---	Low	Low	Moderate
193256:							
Spinks	---	---	---	---	Low	Low	Low
Coloma	---	---	---	---	Low	Low	Moderate
193257:							
Spinks	---	---	---	---	Low	Low	Low
Coloma	---	---	---	---	Low	Low	Moderate
193258:							
Spinks	---	---	---	---	Low	Low	Low
Coloma	---	---	---	---	Low	Low	Moderate
193260:							
Copemish	Ortstein	8-14	8-28	Moderately cemented	Low	Low	High
193262:							
Kaleva	---	---	---	---	Low	Low	High

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
193263:							
Kaleva	---	---	---	---	Low	Low	High
193265:							
Grattan	---	---	---	---	Low	Low	High
193266:							
Grattan	---	---	---	---	Low	Low	High
193267:							
Grattan	---	---	---	---	Low	Low	High
193269:							
Grattan	---	---	---	---	Low	Low	High
193270:							
Covert	---	---	---	---	Low	Low	Moderate
193271:							
Pipestone	---	---	---	---	Moderate	Low	Moderate
193272:							
Dair	---	---	---	---	Moderate	Low	Moderate
193277:							
Benona	---	---	---	---	Low	Low	High
193278:							
Benona	---	---	---	---	Low	Low	High
193279:							
Benona	---	---	---	---	Low	Low	High
193284:							
Udorthents	---	---	---	---	Moderate	High	Low
Udipsamments	---	---	---	---	Low	Low	Moderate
193285:							
Lumley	---	---	---	---	High	High	High
Makinen	---	---	---	---	High	High	High
193286:							
Histosols	---	---	---	---	High	High	Moderate
Aquents	---	---	---	---	High	---	---

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top (In)	Restrictive layer: Thickness (In)	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
193287:							
Dune land.							
Quartzipsamments	---	---	---	---	Low	---	---
193288:							
Udipsamments	---	---	---	---	Low	Low	Moderate
193342:							
Gorvan	---	---	---	---	High	High	Low
Houghton	---	---	---	---	High	High	Low
Glendora	---	---	---	---	Moderate	High	Moderate
193349:							
Spinks	---	---	---	---	Low	Low	Low
Coloma	---	---	---	---	Low	Low	Moderate
193351:							
Benona	---	---	---	---	Low	Low	High
193354:							
Dune land.							
Quartzipsamments	---	---	---	---	Low	---	---
193357:							
Shavenaugh	---	---	---	---	Low	Low	Low
193359:							
Shavenaugh	---	---	---	---	Low	Low	Low
193360:							
Shavenaugh	---	---	---	---	Low	Low	Low
193362:							
Benzonia	---	---	---	---	Low	Low	High
193363:							
Benzonia	---	---	---	---	Low	Low	High
193364:							
Benzonia	---	---	---	---	Low	Low	High
193365:							
Benzonia	---	---	---	---	Low	Low	High

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
193371:							
Dair	---	---	---	---	Moderate	Low	Moderate
Pipestone	---	---	---	---	Moderate	Low	Moderate
193372.							
Access Denied							
193423:							
Benona	---	---	---	---	Low	Low	High
193484.							
Pits, sand and gravel							
193494:							
Nordhouse	---	---	---	---	Low	Low	Moderate
193496:							
Nordhouse	---	---	---	---	Low	Low	Moderate
193497:							
Nordhouse	---	---	---	---	Low	Low	Moderate
193498:							
Nordhouse	---	---	---	---	Low	Low	Moderate
Platteriver	---	---	---	---	Low	Low	Moderate
Dair	---	---	---	---	Moderate	Low	Moderate
193503:							
Spinks	---	---	---	---	Low	Low	Low
Shavenaugh	---	---	---	---	Low	Low	Low
193504:							
Spinks	---	---	---	---	Low	Low	Low
Shavenaugh	---	---	---	---	Low	Low	Low
193505:							
Spinks	---	---	---	---	Low	Low	Low
Shavenaugh	---	---	---	---	Low	Low	Low

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
193506:							
Spinks	---	---	---	---	Low	Low	Low
Shavenaugh	---	---	---	---	Low	Low	Low
193507:							
Spinks	---	---	---	---	Low	Low	Low
Shavenaugh	---	---	---	---	Low	Low	Low
193508:							
Madaus	---	---	---	---	High	High	Low
193509:							
Boyer	---	---	---	---	Moderate	Low	Moderate
Shavenaugh	---	---	---	---	Low	Low	Low
193510:							
Boyer	---	---	---	---	Moderate	Low	Moderate
Shavenaugh	---	---	---	---	Low	Low	Low
193511:							
Boyer	---	---	---	---	Moderate	Low	Moderate
Shavenaugh	---	---	---	---	Low	Low	Low
193513:							
Dair	---	---	---	---	Moderate	Low	Moderate
Adrian	---	---	---	---	High	High	Moderate
193514:							
Platteriver	---	---	---	---	Low	Low	Moderate
Pipestone	---	---	---	---	Moderate	Low	Moderate
202010:							
Houghton	---	---	---	---	High	High	Low
Adrian	---	---	---	---	High	High	Moderate
202016:							
Spinks	---	---	---	---	Low	Low	Low
Tekenink, sandy substratum	---	---	---	---	Moderate	Low	Moderate

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
631170:							
Fogg	---	---	---	---	Low	Low	Moderate
Benzonia	---	---	---	---	Low	Low	High
631171:							
Fogg	---	---	---	---	Low	Low	Moderate
Benzonia	---	---	---	---	Low	Low	High
631172:							
Fogg	---	---	---	---	Low	Low	Moderate
Benzonia	---	---	---	---	Low	Low	High
631173:							
Fogg	---	---	---	---	Low	Low	Moderate
Benzonia	---	---	---	---	Low	Low	High
631174:							
Fogg	---	---	---	---	Low	Low	Moderate
Benzonia	---	---	---	---	Low	Low	High
680939:							
Fern	---	---	---	---	Low	Low	Moderate
Spinks	---	---	---	---	Low	Low	Low
680943:							
Milnichol	---	---	---	---	Moderate	Low	Moderate
680945:							
Fern	---	---	---	---	Low	Low	Moderate
680946:							
Fern	---	---	---	---	Low	Low	Moderate
680971:							
Nessen	---	---	---	---	Low	Low	Moderate
Kaleva	---	---	---	---	Low	Low	High
680972:							
Nessen	---	---	---	---	Low	Low	Moderate
Kaleva	---	---	---	---	Low	Low	High

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
680973:							
Nessen	---	---	---	---	Low	Low	Moderate
Kaleva	---	---	---	---	Low	Low	High
680974:							
Nessen	---	---	---	---	Low	Low	Moderate
Kaleva	---	---	---	---	Low	Low	High
893251:							
Boyer	---	---	---	---	Moderate	Low	Moderate
Shavenaugh	---	---	---	---	Low	Low	Low
894062:							
Remus	---	---	---	---	Moderate	Moderate	Low
Spinks	---	---	---	---	Low	Low	Low
894063:							
Remus	---	---	---	---	Moderate	Moderate	Low
Spinks	---	---	---	---	Low	Low	Low
894064:							
Fern	---	---	---	---	Low	Low	Moderate
Remus	---	---	---	---	Moderate	Moderate	Low
894065:							
Fern	---	---	---	---	Low	Low	Moderate
Remus	---	---	---	---	Moderate	Moderate	Low
894104:							
Mollineaux	---	---	---	---	Low	Low	Moderate
Remus	---	---	---	---	Moderate	Moderate	Low
894105:							
Mollineaux	---	---	---	---	Low	Low	Moderate
Remus	---	---	---	---	Moderate	Moderate	Low

Table 20.—Soil Features—Continued

Map unit symbol and soil name	Restrictive layer: Kind	Restrictive layer: Depth to top	Restrictive layer: Thickness	Restrictive layer: Hardness	Potential for frost action	Risk of corrosion: Uncoated steel	Risk of corrosion: Concrete
		In	In				
894165:							
Spinks	---	---	---	---	Low	Low	Low
Tekenink, sandy substratum	---	---	---	---	Moderate	Low	Moderate
899682:							
Kaleva	---	---	---	---	Low	Low	High
899722:							
Goodharbor	---	---	---	---	Low	Low	Low
899731:							
Covert	---	---	---	---	Low	Low	Moderate
Pipestone	---	---	---	---	Moderate	Low	Moderate
899733:							
Covert	---	---	---	---	Low	Low	Moderate
Dair	---	---	---	---	Moderate	Low	Moderate
899734:							
Benzonia	---	---	---	---	Low	Low	High

Table 21.—Taxonomic Classification of the Soils

Soil name	Family or higher taxonomic class
Abscota	Mixed, mesic Oxyaquic Udipsamments
Adrian	Sandy or sandy-skeletal, mixed, euic, mesic Terric Haplosaprists
Alcona	Coarse-loamy, mixed, active, frigid Alfic Haplorthods
Alpena taxadjunct	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
Benzonia	Sandy, isotic, mesic Lamellic Haplorthods
Boyer	Coarse-loamy, mixed, semiactive, mesic Typic Hapludalfs
Coloma	Mixed, mesic Lamellic Udipsamments
Copemish	Sandy, mixed, mesic, ortstein Entic Haplorthods
Covert	Sandy, mixed, mesic Oxyaquic Haplorthods
Dair	Mixed, mesic Typic Psammaquents
Deer Park taxadjunct	Mixed, frigid Spodic Udipsamments
East Lake	Sandy, mixed, frigid Entic Haplorthods
Eastport	Mixed, frigid Spodic Udipsamments
Edwards	Marly, euic, mesic Limnic Haplosaprists
Emmet	Coarse-loamy, mixed, active, frigid Typic Eutroboralfs
Epoufette	Coarse-loamy, mixed, superactive, frigid Mollic Ochraqualfs
Fern	Loamy, mixed, active, mesic Arenic Oxyaquic Glossudalfs
Filer	Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs
Fogg	Sandy, mixed, mesic Alfic Haplorthods
Glendora	Mixed, mesic Mollic Psammaquents
Goodharbor	Mesic, uncoated Typic Quartzipsamments
Gorvan	Fine-loamy over sandy or sandy-skeletal, mixed, semiactive, mesic Fluvaquentic Endoaquolls
Grattan	Sandy, mixed, mesic Entic Haplorthods
Hettinger	Fine-loamy, mixed, active, nonacid, frigid Mollic Haplaquepts
Histosols	Histosols
Houghton	Euic, mesic Typic Haplosaprists
Iosco	Sandy over loamy, mixed, active, frigid Argic Endoaquods
Kaleva	Sandy, mixed, mesic Typic Haplorthods
Kalkaska	Sandy, mixed, frigid Typic Haplorthods
Kiva	Sandy, mixed, frigid Entic Haplorthods
Leelanau	Sandy, mixed, frigid Alfic Haplorthods
Lumley	Dysic, mesic Typic Haplosaprists
Lupton	Euic, frigid Typic Haplosaprists
Madaus	Coarse-silty over sandy or sandy-skeletal, carbonatic over mixed, mesic Histic Humaquepts
Makinen	Sandy or sandy-skeletal, mixed, dysic, mesic Terric Haplosaprists
Mancelona	Sandy, mixed, frigid Alfic Haplorthods
Markey	Sandy or sandy-skeletal, mixed, euic, frigid Terric Haplosaprists
Marlette	Fine-loamy, mixed, semiactive, mesic Oxyaquic Glossudalfs
Milnichol	Sandy, mixed, mesic Typic Epiaquods
Mollineaux	Sandy over loamy, mixed, active, mesic Lamellic Haplorthods
Munuscong	Coarse-loamy over clayey, mixed, active, nonacid, frigid Mollic Haplaquepts
Nessen	Sandy, mixed, mesic Typic Haplorthods
Nester taxadjunct	Fine, mixed, semiactive, frigid Typic Eutroboralfs
Nordhouse	Mesic, uncoated Spodic Quartzipsamments
Omena	Coarse-loamy, mixed, active, frigid Typic Eutroboralfs
Onekama	Fine, mixed, active, mesic Haplic Glossudalfs
Perrinton	Fine, mixed, active, mesic Oxyaquic Glossudalfs
Pipestone	Sandy, mixed, mesic Typic Endoaquods
Platteriver	Mixed, mesic Oxyaquic Udipsamments
Quartzipsamments	Quartzipsamments
Remus	Fine-loamy, mixed, semiactive, mesic Haplic Glossudalfs
Richter	Coarse-loamy, mixed, semiactive, frigid Alfic Haplaquods
Roscommon	Mixed, frigid Mollic Psammaquents
Sanilac	Fine-loamy, mixed, semiactive, calcareous, frigid Aeric Endoaquepts
Saugatuck	Sandy, mixed, mesic, shallow, ortstein Typic Duraquods
Shavenaugh	Mixed, mesic Psammentic Hapludalfs

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

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 Ochraqualfs**
        - **Epoufette---------------------Coarse-loamy, mixed, superactive, frigid Mollic Ochraqualfs**
  - **Boralfs**
    - **Eutroboralfs**
      - **Typic Eutroboralfs**
        - **Emmet-------------------------Coarse-loamy, mixed, active, frigid Typic Eutroboralfs**
        - **Omena-------------------------Coarse-loamy, mixed, active, frigid Typic Eutroboralfs**
        - ***Nester------------------------Fine, mixed, semiactive, 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 Quartzipsamments
      - 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-----------------------Marly, 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 Haplaquepts
      - 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--------------------------Fine-loamy, mixed, semiactive, calcareous, frigid Mollic Haplaquepts
  - Humaquepts
    - Histic Humaquepts
      - Madaus------------------------Coarse-silty over sandy or sandy-skeletal, carbonatic over mixed, mesic Histic Humaquepts
  - Endoaquepts
    - 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 Haplaquods**
        - **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 Endoaquods**
        - **Iosco**---Sandy over loamy, mixed, active, frigid Argic Endoaquods
    - **Epiaquods**
      - **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
      - **Entic 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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